Demand for Diversity

The Global Expansion of Chinatown's Food System

by

Valerie Imbruce

A dissertation submitted to the Graduate Faculty in Biology
in partial fulfillment of the requirements of the degree of
Doctor of Philosophy, The City University of New York

2006

UMI Number: 3232025

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

This manuscript has been read and accepted for the
Graduate Faculty in Biology in satisfaction of the
dissertation requirements for the degree of Doctor of Philosophy.

May 25, 2006 — Dr. Christine Padoch
Chair of Examining Committee

May 25, 2006 — Dr. Richard Chappell
Executive Officer

Dr. Charles Peters
Examining Committee

Dr. Amy Berkov
Examining Committee

Dr. Andrew Greller
Examining Committee

Dr. Roberta Balstad
Examining Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

Demand for Diversity
The Global Expansion of Chinatown's Food System

by

Valerie Imbruce

New York City presents an enormous and ever-changing market for a large variety of fruits and vegetables. Some products are produced regionally, most come from distant corners of the world. Recent studies on agricultural commodity chains in the United States suggest that homogenization and corporate appropriation are associated with spatial expansion of food distribution. Yet within New York City methods of food procurement are continually remade. Chinese immigrants in Manhattan's Chinatown have developed a diverse and dynamic system to satisfy the demands of East Asian ethnic groups. Although Chinatown's food system has been rapidly undergoing geographic expansion, it displays characteristics apart from other global food systems. The seemingly unique nature of this system of trade leads to the main research questions, how is the distribution and production of Asian fruits and vegetables organized? Is it different than corporately controlled, globalized agriculture? What are its social and environmental impacts? Tying together previous studies on the globalization of agriculture, alternative food systems, and studies on agrobiodiversity, this project describes and analyzes the cultivation and marketing of Asian fruits and vegetables on a newly emergent global scale. The project is multi-sited and includes New York City as the market destination, southern Florida as a well-established point of production and distribution, and Honduras as a newly emergent site of production. This project combines standard ecological surveys and semi-structured interviews to examine how the relationships between vendors, distributors, and producers ultimately influence

the use of plant resources in a food system. By focusing on a system broadly distinguished by cultural preferences, this research describes how immigrants not only create new market demands, but concurrently create new systems of resource use to satisfy their demands. Results show trade networks based in social relations, diverse cropping systems, and family owned and operated firms constitute the food system This understanding is significant in a world of highly mobile people and commodities. This project builds on the tradition of research that looks at the influence of political and economic structures on natural resource use, while taking a new approach that integrates this tradition with research on global agricultural systems.

Acknowledgements

There are many people who have been of great help and inspiration in the undertaking of this project. First and foremost, I would like to thank my parents for their love, support, and encouragement. They stand beside me in all of my endeavors. This project would not have taken shape or come to fruition without my primary advisor, Dr. Christine Padoch. From the first day I showed up in her office telling her my ideas to do a study on “something about New York City and food markets” she has been my biggest proponent and source of inspiration. Her confidence in me was what I most needed to complete this project. I am very grateful to Christine, and Dr. Miguel Pinedo, for opening their home and providing me with many needed drinks and dinners! My advisory committee, Dr. Charles Peters, Dr. Andrew Greller, Dr. Amy Berkov, and Dr. Roberta Balstad, have all been very gracious in their support and review of my work.

I would like to thank Andrew Roberts for his assistance in the first round of data collection for this project. It was his enthusiasm about Southeast Asian herbs that helped lead us to the home gardens in Homestead. He also helped with the identification of many herbs, as did Hieu Nguyen with the Vietnamese plants and Ant Ariya with the Thai names. The many staff members of the University of Florida Agricultural Extension Service were very helpful and patient with my many questions. They freely shared their knowledge and gave me many contacts in the south Florida farming community. I am particularly glad to have met Ken Schuler. His concern for and knowledge of the Chinese vegetable growers in Palm Beach County really enabled a great deal of my research. He collected production data from 1987-2001 that provided me invaluable data for Chapter Four.

Dr. Hugh Popenoe, Professor Emeritus University of Florida, gave me the contact I needed with Zamorano, the Pan-American School for Agriculture in order to undertake research in Honduras. Mario Contreras and Dr. Alfredo Rueda of Zamorano helped me with much of the logistical planning and introductions I needed in Honduras. The Zamorano pick-up truck I rented gave me prestige as well as a free pass from many policemen! *Los Zamoranos* are truly well regarded in Honduras. Most importantly, Dr. Rueda introduced me to Karen Jiron, my wonderful research assistant who spent time away from her young daughter and worked through the start of a new pregnancy with thoughtfulness and integrity. She was such a pleasure to work with that I probably relied on her too much! In addition to her work she rescued me from my trials and tribulations in Honduras, opened her home to me, and invited me for weekend excursions. Dr. Rueda also introduced me to the employees of FHIA, *la Fundacíon Hondureño de Investigaciones Agricola*, who facilitated my work in Comayagua. The many conversations I had with Dr. Dennis Ramirez and Ing. Jaime Jimenez provided me with great insight into the situation in Comayagua. Jaime also provided me with a place to live and a family to rely on for friendship and help. He, his sister Darriella, and Aunt Margarita were my surrogate family in Lejamani.

In my race to finish line of my dissertation, I have to thank Holly and Brian Morgan for the great relief they provided me with for taking over my maps. Brian did a beautiful job on the Chinatown, Honduras, and Comayagua maps, and kindly obliged to my many requests for nuanced changes. Figures 2B (map of Chinatown produce markets), 6A (map of Honduras), 6B (map of Comayagua) are solely the work of Brian Morgan.

Financial support for the preliminary research came from New York Botanical Garden; subsequent financial support for my research has come from the Geography and Regional

Sciences Program of the National Science Foundation Doctoral Dissertation Improvement Award #425734. Fellowships from the Department of Biology at CUNY Graduate Center, the Center for Place, Politics and Culture and the Center for Advanced Research in Education helped me pay my way through my studies. I am particularly grateful to Dr. Victor Strozak for renewing my fellowship twice and keeping me around the AP Fellows program. The program was not only financial support, but a link to the other world of the New York City Department of Education as well as a "home base" at the Graduate Center. Finally, I'd like to thank Joan Reid, without whom there would be no program in Biology.

Finally, and most importantly, I would like to thank all of the farmers, distributors, and agricultural professionals who were very generous with their time and knowledge, and patient with my questions. Their livelihoods are not only sources of information, but in many ways are sources of inspiration and admiration. I am truly grateful for the opportunity to know the many people I would otherwise have not met through this work.

To Kevin,

for your unending support

Table of Contents

Table of Contents

List of Tables

List of Figures

List of Figures

Chapter One

Globalization and Chinatown's Food System

On the sidewalks of Manhattan's Chinatown a striking diversity of fresh fruits and vegetables is bought and sold every day. Immigration and shifting cultural preferences propel a constantly changing market, and the global economy delivers. While some of Chinatown's produce comes from local and regional farms, much of it is imported from around the world. Bitter melon is grown in Honduras, rambutan in Guatemala, and bok choy in Mexico. Traditional food products are increasingly coming from non-traditional places.

New York, like most other cities, contributes to an efficient, industrial, and corporately controlled food system. Such agribusiness developed in part to feed burgeoning urban populations. Yet within the same cities that support industrial agriculture, other systems are defined and redefined everyday. The many spaces of New York City offer opportunities for alternatives to the dominant political economic reality of corporate globalization. Multi-lingual, transnational communities find ways to use spaces not appropriated by corporate interests to create their own international systems of capital exchange.

Immigrant populations develop alternative food systems, yet they have not been adequately analyzed—empirically or theoretically—in the food system literature. Studies have analyzed the ethnicities of farm workers, highlighting otherwise invisible aspects of production systems (Wells, 1996). Ethnicity, however, has not been considered in studies of marketing and distribution (Friedland, 2001). Researchers are finding that the activities of once seemingly ephemeral immigrant communities are playing an important and unnoticed role in global political and economic restructuring, particularly in New York City (Wong, 1998; Stoller, 2002; Guest, 2003), and that global circulation is not only enabled by corporate expansion (Tsing, 2000). The complexities and dynamism of cities, in particular, present many opportunities for activities alternative to dominant structures (Harvey, 2001).

It is the intention of this work to introduce the poorly understood food system of one of New York's most important and most written about ethnic neighborhoods, lower Manhattan's Chinatown. The analysis of Chinatown's food system provides the opportunity to contrast several observations on its structure and dynamics with national and global trends in food systems, as well as to further discuss socioeconomic characteristics of Chinese entrepreneurship in relation to the design and management of its food system. Chinese-Americans manage the distribution networks of Asian fruits and vegetables, moving thousands of boxes of produce a day through warehouses in Manhattan and Brooklyn to be sold by independent greengrocers and street vendors in the city's multiple Chinatowns. While some of Chinatown's merchants use the Hunts Point Terminal Market, the city's main distribution point and the country's largest terminal market for conventional fruits and vegetables, the vast majority of Asian products are traded by Chinese-American brokers outside of Hunts Point.

The fruit and vegetable trade in Chinatown has historical roots. Since the development of a Chinese enclave in lower Manhattan over one hundred years ago, the Chinese have created their own networks of exchange. Local farms in New Jersey and Long Island operated by Chinese families grew and trucked fruits and vegetables preferred by urban Chinese to Chinatown markets. Currently Chinatown's fresh fruit and vegetable markets are part of a highly complex and dynamic, global system of production and distribution. Fresh food products now come from New York, New Jersey, Florida, California, Mexico, Honduras, the Dominican Republic as well as Taiwan, mainland China and other places.

A number of features of Chinatown's food system set it apart from other global food systems. Although Chinatown's food system has been undergoing rapid geographic expansion, it does not display the hegemonic tendencies of global agro-food systems (McMichael, 1994;

Lyson and Raymer, 2000; Goodman and Watts, 1997; Bonnano et. al., 1994; Barndt, 2002). The industry is neither vertically nor horizontally integrated, nor has it been subject to corporate appropriation. From farm to retail level, businesses are individually owned and operated. Transport is contracted by independent trucking companies, and as many as four brokers may be involved in international commodity chains. Individuals who grow, sell, import, and export Chinese fruits and vegetables employ their cultural knowledge about food preferences, language skills, and kin and ethnic ties to develop a food system that meets the demands of Chinese, other East Asian, and Southeast Asian ethnic groups in New York City.

RECENT TRENDS IN NEW YORK CITY'S FOOD SYSTEMS

The population density of New York City combined with the intensity of public and private interest in how food is delivered and sold in the city, manifests itself in the hyper-expression of particularly urban, as well as more general global, economic trends in food supply and distribution. New York City, with its multiple economic and cultural layers, displays a wealth of trends. Many of these trends have been widely discussed, including the consolidation of the food industry and the development of direct (producer-to-consumer) markets, while others, such as immigrant food systems, have received considerably less attention.

New York City has also seen a substantial increase in the variety of fresh fruits and vegetables sold, regional shifts in the regions of production of the fruits and vegetables that are sold, and a consolidation of food retailing. As national and international trends have shown, sale of "exotic" produce is a lucrative and fast growing segment of the fruit and vegetable trade (Thrupp, 1995; Cook, 1994). This is in part due to changes in consumption patterns. Immigration, travel, and culinary tourism all foster interest in new foods. It is also a result of

political economic restructuring in less developed countries. In order to promote economic growth, the export of "non traditional" agricultural products[1] has been promoted by government and non-government organizations. Export-led growth strategies in Latin America have focused on high-value agricultural products like fresh fruits and vegetables.

These consumption-side and production-side trends are well reflected in NYC's produce sales data. The Agricultural Marketing Service of the United States Department of Agriculture collects price and volume data for products traded at the Hunts Point Terminal Market. Over the past two decades the number of tropical fruits and vegetables sold at Hunts Point has increased by 70%, and the number of Asian vegetables has increased by 200% (USDA, 1998). The number of fresh herbs as well as the USDA category "other fruits," which includes many tropical, specialty or otherwise "exotic" fruits, has also increased by over 100%. (See a 20-year comparison of USDA data on "Fresh Fruit and Vegetable Arrivals" for NYC in Table 1.0 and Figure 1A).

These numbers reflect a substantial diversification of produce and yet they do not include all the varieties of fresh fruits and vegetables sold in NYC. There are a great number of items sold around the city that are not recorded by the USDA because they do not flow through Hunts Point, or they do so in numbers too small to track. The city might officially state terminal market use is up, or at least stable,[2] but the volume of commodities flowing through the market has

[1] The production of non-traditional agricultural export (NTAEs), also known as high-value exports, is an economic development strategy prevalent in Latin America. NTAE refers to those products that (1) were not traditionally produced in a particular country for export (traditional exports are soybeans, sugar, bananas, and coffee); (2) were traditionally produced for domestic consumption but are now exported; (3) are traditional products now exported to a new market. NTAEs are generally high-value or niche products. Fresh fruits and vegetables and fair trade coffee are examples of NTAEs (Thrupp, 1995).

[2] The city of New York built Hunts Point Terminal Market in 1967 to centralize and organize distribution. It located in the South Bronx, in a very accessible location for most trucking routes. In conversation in November of 2002, Bob Lewis, Chief Marketing Representative of New York State Department of Agriculture & Markets, expressed his belief that Hunts Point Terminal Market is popular and well used. At the time he was spearheading a study to explore the possibility of constructing a wholesale farmers' market for New York City much like Hunts Point, but

actually been decreasing (see Figure 1B). The decline suggests an anomaly in the marketing data. Many products are simply unaccounted for. Undocumented specialty fruits and vegetables show up on the streets, in greengrocers and ethnic shops in Chinese, Southeast Asian, South Asian, and Mexican communities through distribution networks outside of Hunts Point Terminal Market (see Table 1.1).

Chinatown's food system and other ethnic produce vendors account, in part, for the undocumented produce sold in NYC, as well as some of the loss of volume. The majority of the volume loss, however, is due to two other antagonistic national trends: the corporate consolidation of food supply and distribution, and the response of "local agriculture." The food retail sector has undergone a great concentration of ownership in the United States. By 1999 the top five food retailing chains controlled 28.9% of the market, compared with 19.9% in 1995 (Guptill and Wilkins, 2002). Wal-Mart is the largest grocer in the in the United States, owning 20% of the market.

In addition to horizontal integration whereby retailing organizations acquire others to increase market share in the produce industry, power is concentrated by vertical integration whereby retailers make supply arrangements with manufacturers (Hendrickson et al., 2001). Consolidation renders the use of terminal markets unnecessary because retailers manage the distribution portion of their operation, or will accept shipment directly from manufacturers. This sort of concentration is occurring in the supposedly "alternative" organic and natural foods industries as well. Whole Foods has rapidly acquired 10% of the natural foods retail market, and Wild Oates Market, Inc. has been heavily invested in by the same company that is invested in

---

for local farmers only. The results of this study are now available at: http://www.wholesalefarmersmarketnyc.com/index.html.

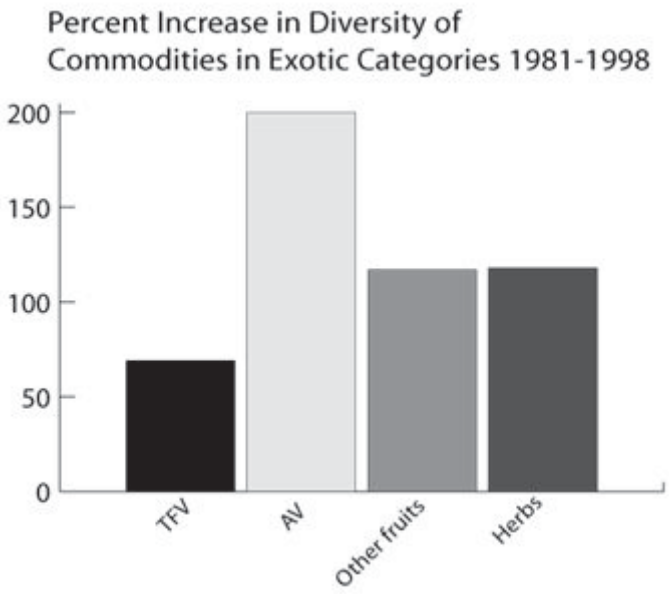


Figure 1A: Over the past two decades, the diversity of fruits and vegetables in USDA's exotic categories has increased. See Table 1 below for explanation of categories (source: USDA Agricultural Marketing Service, 1998).

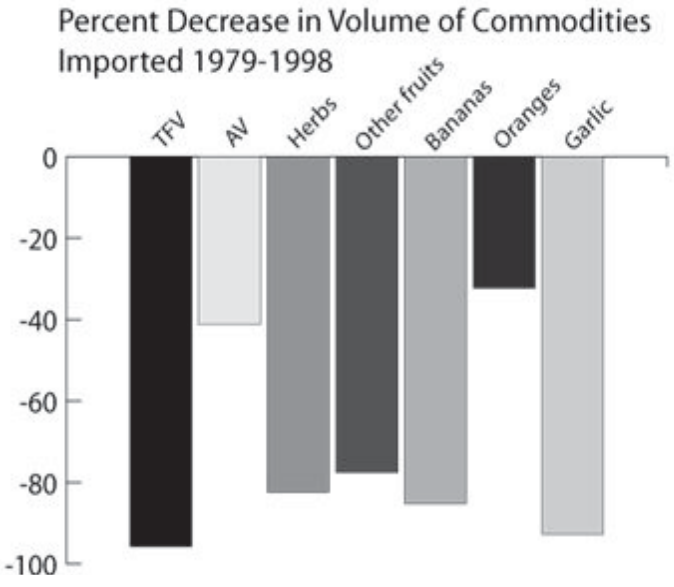


Figure 1B: Over the past two decades the amount of fruits and vegetables coming to NYC through Hunts Point Terminal Market has been decreasing. See Table 1 below for explanation of categories (source: USDA Agricultural Marketing Service, 1998).

Table 1.0: Diversity of products that reach NYC markets through Hunts Point Terminal Market according to USDA Marketing Service Categories, 1998

Tropical Fruits and Vegetables		Asian Vegetables	Herbs		Fruits, other	
Apio	Yucca	Bean sprouts	Anise	Caraway	Figs	Feijoa
Arum	Blanca	Bok choy	Basil	Celeriac	Fresh olives	Guava
Batata	Coconuts	Daikon	Chives	Cilantro	Prickly pear	Kiwano
Breadfruit	Dates	Gobo (burdock)	Chipolinos	Coriander	Quince	Loquat
Calabaza	Jicama	Bitter melon	Dill	Lemongrass	Asian pear	Lychee
Chayote	Pangana	Don gua (winter melon)	Shallots	Oregano	Atemoya	Manzano
Cilantro	Sapote	Gai choy (mustard)	Horse-radish	Rosemary	Star fruit	Passion fruit
Dasheen	Sugarcane	Kobocha (Japanese squash)	Mint	Sage	Cherimoya	Pepino
Gandules	Tamarindo	Lo bok (radish)	Thyme	Salsify		
Ginger root	Yautia	Long beans	Watercress	Savory		
Honeyberry	Tomatillos	Mo gua (fuzzy squash)	Arugula	Sorrell		
Malanga	Yams	Opo (long squash)	Borage	Tarragon		
Quenepas		Sing gua (Chinese okra)				
Taro		taro				

Table 1.1: Some fruits and vegetables sold in ethnic markets in NYC not recorded by USDA Terminal Market Reports.

Chinese and Southeast Asian		Asian Indian	Mexican
Rambutan	Water Chestnuts	Paan Leaves	Epazote
Thai Guava	Celtuce	Kerala	Romero
Jackfruit	Lily Bulbs	Chiku	Rocoto
Litchi	Lotus Root	Tinda	Guajes
Longan	Choy Sum	Amla	Guazotle
Jujube	Snow Pea Tips	Parvar	Papalo
Wax Jambu	Taiwan Choy	Curry Leaves	Pepiza
Pithaya	Shanghai Choy	Tumeric	
Galangal	Water Spinach	Olivar	
Mah Ohm	Chinese Broccoli	Malabar Spinach	
Rau Ram	Thai Eggplant	Areca Nuts	
Kaffir Lime Leaves	Thai Okra	Lablab Beans	
Culantro	Chinese Celery		
Banana Flowers	Bamboo Shoots		

Pathmark (Rich, 2005). A recent analysis of mergers and acquisitions in the organic foods manufacturers has revealed that most organic brands are now owned by food giants.[3]

New York City has not been immune to these trends. The warehouse club stores as well as national supermarket chains that have become big players in grocery retail are part of the city's food landscape. There are four Costco's in the metro area, in Brooklyn, Queens, Yonkers, and New Rochelle. Pathmark opened a new store on 125th Street in Harlem. Whole Foods has opened two stores in Manhattan within the last two years, and are developing two more stores in Manhattan and one in Brooklyn. Whole Foods has opened the largest grocery stores in Manhattan (59,000 – 66,000 square feet) at the strategic transportation hubs of Columbus Circle and Union Square and are planning to open stores in the gentrified neighborhoods of TriBeCa and the Lower East Side.

The backlash to the concentration of power in food supply and distribution has been a concerted effort in direct marketing—fostering direct sales between farmers and consumers to the benefit of both. New York has been successful at direct marketing; there are currently 54 greenmarkets and 36 community supported agriculture (CSA) arrangements around the five boroughs.[4] New Yorkers are embracing the social, economic, and environmental good (or perception thereof) of direct sales: NYC Parks are adding farmers' markets to encourage safe use of parks, university staff and students are organizing CSA's and purchase of local produce in their cafeterias, public schools are promoting local agriculture to their students, and parents and

[3] Phil Howard, Postdoctoral Researcher at the Centre for Agroecology and Sustainable Food Systems, has analyzed organic food brands introduced or acquired by the top 50 global food processers in Howard, P. 2003. Consolidation in food and agriculture: Implications for farmers and consumers. *California Certified Organic Farmers Magazine* 21 (4):2-6 (http://www.ccof.org/pdf/mag_w0304.pdf). An updated (June 2005) visual representation of these findings which can be viewed at: http://www.certifiedorganic.bc.ca/rcbtoa/services/corporate-ownership.html

[4] Greenmarkets (also called farmers' markets) in New York City are coordinated by the Council on the Environment of NYC. Current listings of city greenmarkets can be found at: http://www.cenyc.org/HTMLGM/maingm.htm. Just Food coordinates CSAs in the city. Current listings can be found at: http://www.justfood.org/csa/.

chefs are requesting locally grown foods. In fact, buying local has become such a powerful marketing tool, that powerful companies in the food industry are starting to do it.

Where does Chinatown's food system fit into the city's food landscape and into the nation's imagining of how food should be supplied? What is behind the chaotic face of Chinatown's markets? Some people assume the worst. I have been told by a New Yorker with a social conscience that the food sold in Chinatown, "must be pesticide laden food grown by non-union, exploited agricultural laborers." The image of the dirty, chaotic Chinatown in which illegal activity underlies the economic infrastructure, has crept into her perception of its food system.

THE GLOBAL EXPANSION OF CHINATOWN'S FOOD SYSTEM

Global agricultural markets foster new relationships between consumers and producers. Although some agricultural commodities, such as sugar, have been in circulation for hundreds of years (Mintz, 1985), the compression of time and space with transportation and communication infrastructure has led scholars to examine globalization in a new context (Harvey, 1989). The increasing expansion of global markets and transnational processes has provoked reconsideration of the meaning of culture and community (Appadurai, 1996; Gupta and Ferguson, 1992; Anderson, 1991), as well as of the connections between urban cores and rural peripheries (Sassen, 1998). Some global markets arise in response to the needs of transnational migrants to maintain social and cultural identities across political and geographical borders (Basch et al., 1994). Consumption of "ethnic" food products from home environments is an important part of building the identities and economies of transnational communities.

In the agro-food literature, political economists have analyzed how the world is constituted and reconstituted around global processes, focusing on the transnational corporation

as the unit of analysis in shaping governance, labor, production, and consumption in global agricultural markets (Bonanno et al., 1994; Goodman and Watts, 1997; McMichael, 1994). The land-based nature of agriculture has led to the critique of the industry's exploitation of biodiversity and other natural resources, particularly as a result of global markets (Conway, 1997; Pretty, 1995). In response to the critique of agribusiness and its effects on environments, there has been path-breaking work that defines and analyzes the politics of "environmentalization" and "relocalization" of agriculture (Buttel, 1992; Kloppenburg, 1996).

The growth of transnational communities of people who demand products that cannot be grown in their new environments, and must be imported from distant (often tropical) environments, has not, however, been included in analyses to this point. While metropolitan areas like New York encourage immigration and value cultural diversity, how the demand for tropical fruits and vegetables fits into agricultural restructuring has not been studied systematically. The examination of how the growth of transnational communities creates alternative pathways of fresh fruit and vegetable distribution will foster the discussion of a growing market that has largely been overlooked in global and local arenas.

In this dissertation I argue that Asian immigrants support diverse and dynamic methods of production and distribution to satisfy their food preferences. Chinatown's food system counters a trend toward increasing appropriation and homogenization of commodity chains by agribusiness. Although it is rapidly undergoing geographic expansion, three characteristics set it apart from other global food systems:

(1) Trade networks and businesses are established through ethnicity and kinship.

(2) Cropping systems are diverse in cultivated plant species and management practices.

(3) Enterprises from farm to retail level are entrepreneurial, established by newcomers to the business, and are family-owned and operated.

I believe it is necessary to include ethnic entrepreneurs as a unit of analysis in addition to the dominant transnational corporation in the discourse on globalization of agricultural networks. These entrepreneurs are producers of alternative global processes. Enabled by the ease of global communication and transportation, as well as trade liberalization, ethnic entrepreneurs establish connections with co-ethnics across continents to create their own networks of trade. These initial findings have led to the main questions of this research, *how is the distribution and production of Asian fruits and vegetables organized? Is it fundamentally different from corporately controlled, globalized agriculture? What are its social and environmental impacts?*

LITERATURE REVIEW

This project begins at the intersection of three bodies of literature: agro-food systems and alterative agriculture, the politics of consumption in advanced capitalist societies, and transnationalism.

Transnational Agro-food Systems

Political economic theory of global markets has been employed in discussions of the globalization of agricultural markets, including fresh fruit and vegetable markets. Agro-food systems[5] are seen as fundamental to political-economic relations within and among states, as

[5] McMichael (1995) uses the term agro-food system to refer to global networks of agricultural production, distribution and consumption that are being increasingly appropriated and consolidated by transnational corporations. As Whatmore and Thorne (1997) point out, such processes and patterns of connection are not reducible to a single logic or determinant interest lying somewhere *outside* or *above* the social fray. I maintain the use of this term to denote the highly structured and centrally regulated processes representative of corporately controlled global trade, but accept it as only one model of global agricultural trade.

well as in recreating diets of specific communities (McMichael, 1995). The applicability of broad ranging political economic theory, including Fordism and post-Fordism[6] has been questioned in discussions of agricultural industry (Grossman, 1997; Friedland, 1994; Bonanno et al., 1994), as has the centrality of the nation-state to analysis (Heffernan and Constance, 1994). These discussions have highlighted major changes that have occurred throughout the past few decades within the agro-food industry. Political economists argue that global restructuring is felt at the local and regional levels, regulated (although less than previously) at the national level, but driven by transnational corporations (TNCs). The firms that have survived in the global marketplace are ones that are diversified and have political and economic power. TNCs use their unique ability to gather and use information in the global arena as well as their global vision for economic systems to grow at excessive rates (Heffernan and Constance, 1994) and form global oligopolies (Calvin and Barrios, 1998). The resultant effect on the distribution of goods from producers to consumers has been the vertical integration of the commodity chain where TNCs manage each step from production to consumption, to increase profits and purportedly increase efficiency.

The Politics of Consumption

Changing consumption patterns have contributed to an unprecedented expansion of the fresh fruit and vegetable system over the past few decades. The dietary demands of Japan, the United States, and Western Europe have influenced, and in turn been influenced by, the agricultural productivity of the developing world. Trends in the diets of advanced capitalist

[6] Harvey (1989) provides a concise yet thorough review of Fordism, arising from Henry Ford's method of industrial management based on assembly-line methods production of cheap, uniform commodities in high volume and post-Fordism, which is characterized by flexible production techniques like subcontracting, just-in-time inventories and seasonal labor. Agriculture uses aspects of each condition.

countries over the past ten years include consumption of more fresh fruits and vegetables. Once a luxury of the rich, counter-seasonal, fresh produce is now accessible to most segments of the population in more developed countries. Perishable fruits and vegetables are delivered all over the world through integrated networks of agro-food chains. The U.S. was the first to develop a "fresh system" of fruit and vegetable distribution made possible through the combination of technological advances and potential market identification. The realization that California lettuce was highly desirable in off-season locations (Friedland, 1994), in conjunction with the development of refrigerated trucks, began a revolution in the fresh food industry. European and American producers experimented with subcontracting Mexican and African growers in the 1960s. From the 1970s to 1980s less developed countries began to develop fresh systems to exploit counter-seasonal markets around the world. Chilean grapes were once a luxury product, but Chile's climatic advantage of having seasons opposite to those of wealthy Northern markets led to substantial production growth. Between 1962 and 1988, fruit exports in Chile increased 26-fold in volume, from revenues of $19.9 million to $473 million (Thrupp, 1995). The Caribbean region and Central America followed Chile's export strategies, along with Holland whose technological sophistication allows its growers to cultivate greenhouse crops all year round. More recently, the African countries of Kenya and Zimbabwe have begun producing for UK markets (Dolan and Humphrey, 1999). The transition from luxury consumption limited to a select group to mass consumption of fresh fruits and vegetables brought about new trends and standards in the agriculture industry: counter-seasonal production, niche marketing, and value-adding.

A combination of factors laid the groundwork for the mass consumption of fresh produce. The changing consumer base was influenced by urbanization (which concentrated markets),

health concerns, a growing class of professional workers, and immigration (Friedland, 1994; Thrupp, 1995; Mingione and Pugliese, 1994; Fine, 1995). The aging population as well as the population at large became more aware of diet-related disease and the value of fresh foods in the diet. The shifts in the post-Fordist labor force from low-skill workers to highly educated professionals created a base of many wealthy, urban inhabitants in Northern countries with money to spend on luxuries like traveling and dining out, where specialty food items would first be introduced and then sought out. Migrants from Asia and Latin America to Northern cities also brought exposure to ethnic foods, which urban inhabitants in turn began to demand.

The fastest growing segment of the fresh produce trade in the last two decades has been a class labeled "specialty fruits and vegetables." These products are sourced from tropical areas because they are not available in temperate zones year round. Between 1983 and 1989 specialty fruit imported to the United Kingdom showed the most significant change (Cook, 1994). In the USA, between 1980 and 1986 specialty products grew at an annual rate of 13%, compared to a 2% growth rate for fruits and vegetables commonly produced within the country (Thrupp, 1995). Many products once considered ethnic are no longer confined to ethnic-based consumption and are becoming mainstreamed. Mangoes, for example, are quickly becoming one of the world's most consumed fruits. This trend has great significance in shaping linkages between the North and the South. It opens up many opportunities for new modes of distribution on both the demand and supply sides of the commodity chain.

The power of consumers in the marketplace presents problems as well as opportunities for corporate consolidation of commodity chains (Guthman, 2000). Moreover, by becoming central to the political economy, consumption is an axis for social change (Marsden and Wrigley, 1995). The varied consumer demands for agricultural products that can be seen today, from

ethnic to organic goods, are promoting diversification and place a growing emphasis on high-value horticultural crops in international and domestic markets (Buttel, 1995).

Transnationalism

The very forces that are driving globalization and political-economic restructuring of agro-food systems are also promoting the construction of transnational communities (Portes, 1999). As defined by Bash, Glick Schiller and Szanton Blanc (1994), transnationalism is the process by which immigrants form and maintain multiple levels of social relations between their home country and country of settlement. The hybridity of these relations emphasizes that immigrants today build social fields that cross political and geographical borders. Some feel that this process is as old as labor migration; (Wolf, 1982) others assert that what distinguishes transnational processes today is the pace and scale at which cross border communication can be maintained by current technologies (Glick Schiller et al.,1992; Portes, 1997).

Global capital flows facilitate the creation of transnational communities. Through grassroots, collaborative actions immigrants use the networks opened up by globalization in order to acquire the goods and services they need to maintain their national identities in countries outside their homeland. This process is what some researchers are calling “transnationalism from below” (Glick Schiller, 1999; Basch et al.,1994). Focusing on transnationism allows the less institutionalized initiatives of ordinary people to become an important subject of research. Conversely, the activities of transnational communities that reflect and respond to the forces of globalization are the same activities that can be seen as subversive, resistant or at the very least alternative, to fundamental premises of corporate globalization (Portes, 1997). By following non-linear paths of development and assimilation, transnational activities challenge us to rethink how

social activity creates alternatives to global processes increasingly dominated by transnational corporations.

Chinatown: a Transnational Space

Many books have been written about social, political, and economic aspects of Chinese in New York City (Zhou, 1992; Kuo, 1977; Kwong, 1996, 1997; Lin, 1998; Wong, 1988; Guest, 2003), as well as the history of Chinese in the United States (Kwong and Miscevic, 2005). Much of the debate surrounding the analysis of Chinatown has focused on the role of ethnicity in its political-economic structure, and Chinatown's relationship to the City's society as large. Some scholars have mistakenly characterized Chinatown as a bounded, isolated space (Zhou, 1992). Chinatown is a site of transnational activity (Lin, 1998; Guest, 2003; Imbruce, 2006), rendering the boundaries of the enclave fluid, if not limitless. Through fieldwork in both Fuzhou Province and Chinatown, Guest shows how the Fuzhounese have mobilized transnational religious networks to establish religious communities in their new home, even under the duress of labor and immigration exploitation that most Fuzhounese face. Ethnic entrepreneurship cannot be analyzed as an isolated unit within the enclave; rather ethnic businesses are embedded in inter-firm relations on multiple scales (Werbner, 2001). The focus on labor earnings and opportunities solely within an enclave in the ethnic enclave model obscures the organizational pathways that ethnic businesses create with manufacturers, wholesalers and retailers. Ethnic economies have their own dynamics which are separate, yet parallel to the larger economy (Wong, 1998; Portes, 1980). Immigrants use their connections both within their new country and old countries to build businesses.

Alternative Agriculture

The analysis of global changes in fresh fruit and vegetable distribution and consumption above has provided insights into the role of the consumer in the global marketplace as well as into the restructuring of agro-food systems as a result of exogenous political and economic forces. This type of analysis, known as regulationalist,[7] does not adequately deal with the diversity of practices in agricultural production and distribution. By placing emphasis on macrostructural forces, regulation theory assumes a linear trend of economic development, following the logic of the Bretton-Woods institutions. Cases other than those predicted by this model are considered not yet infiltrated by these macro forces.

Global integration, although a reality, is hardly the only reality. The burgeoning literature on agricultural rurality and ecology parallels globalization as an object of analysis and describes local examples of alternative scenarios (Buttel, 1992). In the literature on alternative agriculture, the social, economic, and geographic spaces that are not filled or passed over by industrial agriculture are analyzed in their own right. They are not considered spaces soon to be transformed to industrial efficiency (Lyson, 1999). There have been very good studies on alternative markets and pathways exploring a new or sustainable agriculture (Allen, 1993). Alternative trade has been considered an opportunity for progressive social change that takes advantage of political spaces above and below the nation state (Tickell and Peck, 1995) and as opposition to the social and ecological injustices of industrialization and market liberalization (Friedmann, 1993). Fair trade of agricultural commodities is one such alternative (Murray and Raynolds, 2000) and organic agriculture another, although organics have not quite lived up to their promises (Guthman, 2000; 2002).

This turn inward to the endogenous pressures and needs of a locality has stirred much research as well as activism. The "local" has become the antidote to the "global" in the search for diversity and sustainability. But in thinking about how the transnational community is simultaneously a global (spatially expansive) as well as local (community-oriented) process, we have realized that the transnational community fills different spatial fields and therefore deserves attention. Marginalized or minority peoples are creative in finding ways to meet their needs. Immigrants in the urban environments of New York City rely on diverse and dynamic processes of procurement and distribution to fulfill their unique demands. The analysis of the single, homogenous (modern) system tends to ignore or trivialize the diversity of practice that the progress story cannot explain, or explains it as inferior (de Certeau, 1984). Contemporary scholarship challenges the notion of the universal, the perfect, the essential, to readmit explanations of agricultural change based in social and political contexts, and linked to historical analyses (DuPuis, 2002; van der Ploeg, 1994) In this way, we can look at the exceptions to the rule as not only exceptions, but alternatives linked to institutionalized and organized communities. Seeing how these alternatives survive is interesting not only because of the value of diversity in itself, but because it shows how society really works behind the mask of the most efficient form (DuPuis, 2002). Alternatives are not only reacting to the forces of agricultural modernization and globalization, but rather are results of dynamic, adaptive strategies.

CAN CHINATOWN'S FOOD SYSTEM BE CONSIDERED "ALTERNATIVE"?

This study focuses on transnational entrepreneurs in a highly integrated political

[7] Regulation theory is based on Marxist-inspired ideas that attempt to relate changes in labor practices and forms of industrial and social organization to wider economic developments and the changing relations among nation states and, more recently, transnational corporations.

economy in order to understand how they are using opportunities and dealing with pressures of globalization. It explores a diversity of scenarios that exist in the global marketplace. Reliance on internationally grown products may be enabled by vertically integrated commodity chains that link distant production areas with northern consumers, but not as a result of the forces of modernization and globalization guiding agriculture into one efficient form. The influence of the global model of agriculture may be so pervasive that it drives policy to make its vision a self-fulfilling prophecy and masks the true diversity of processes that exist.

Food systems that contest, resist, and oppose global agro-food systems are working towards the goals of ecological sustainability, economic viability, and social justice. Alternatives are united in the practice of reconstructing a locally-situated, decentralized food system (Kloppenburg et al., 1996; Hinrichs, 2000), or in commodifying ecologically and socially responsible food production and trade (Guthman, 2000; Murray and Raynolds, 2000). Tensions between local and global food supplies are constantly negotiated and it is clear that the local-global binary is problematic. Although it has been recognized that the ideology of alternative food systems has been better theorized than the practice itself (Allen et al., 2003), the tensions between the local and global have not been reconsidered in theory or in practice. The commitment to the relocalization of agriculture is indeed an important one, but I am afraid that it may obscure merits of other systems, particularly systems that feed people across class boundaries. We cannot ignore that farmers' markets, artisan "slow foods," organic and fairly-traded foods can often be prohibitively expensive, and only appeal to certain demographics as well as class sensibilities. We continue to face the challenge of defining the many manifestations of "alternativeness" (Watts, 2005).

If we compare part of the mission of alternative agriculture—to conserve agricultural diversity and protect local and traditional foods—to Chinatown's food system for a moment, there are clear commonalities. Supplying a market with over 200 types of fresh, culturally specific ingredients year round, as Chinatown's food system does, helps to conserve biodiversity as well as gastronomic traditions. Slow Food's *Cittaslow* (Slow Cities), according to their website, seeks to promote something "less frantic, yielding, and fast—no doubt more human, environmentally correct and sensible."[8] Chinatown at any given moment may appear frantic, but when one considers how the community has retained so many of its cultural traditions as the city has been constantly changing, and hybrid cultures have been constantly forming, one realizes that Chinatown has not yielded. The pace of immigration and trade may deliver change, but it can also slow change. New immigrants sustain old habits, and old habits are sustained by trade.

This study brings global networks into the alternative food system discussion by examining Chinatown's food system. While the Chinatown food system in practice displays part of the vision of alternative food systems, it does not share in its political agenda. The global expansion of the food system follows processes outside of the dominant industrial and corporately controlled food system, but not by consciously resisting it. I argue that Chinatown's food system constitutes an alternative global food system in which individual entrepreneurs are making new spatial connections through their lived experiences, and that this system contributes biological diversity to produce stands of the city, as well as helps sustain cultural practices of new and old urban inhabitants. This research tests the following hypotheses:

[8] More about Cittaslow can be found at: http://www.cittaslow.net/world/.

(1) *Geographic expansion of agricultural trade networks does not necessarily result in homogenization of practices and concentration of power along commodity chains; rather it can increase diversity.*

The geographic expansion of trade networks and agricultural globalization are often associated with corporate control and standardized practices. However, preliminary evidence suggested otherwise for Asian fruit and vegetable networks. The absence of added-value[9] as well as the ethnic character of the products may keep multinational corporations and other mainstream interests often blamed for homogenization, from appropriating Asian commodity chains. Asian vegetables are sold in New York City by greengrocers, street vendors, and through other informal means. Firms from farm to retail level are individually owned and operated. Products may be bought and sold by as many as five firms before reaching Chinatown. Although other niche crops, such as organic and natural foods, have been appropriated by agribusiness, Asian products have not.

(2) *Networks rooted in ethnicity and kinship drive the geographic expansion of the Asian fruit and vegetable commodity chain.*

If the geographic expansion of Chinatown's food system is not propelled through business mergers and acquisitions, then how is expansion occurring? Asian-Americans identify business opportunities in procuring food for their communities. They establish contacts with farmers in new areas through the use of personal connections. New York City-based produce brokers have sent family members or friends to begin farming in new areas. Transnational communities have been known to build businesses through connections to co-ethnics and kin

across continents. Entrepreneurial immigrants use their cultural knowledge and language skills to build businesses. Transnational corporations have been shown to be at an advantage in the global economy because they have unique access to information and suppliers. Individuals, however, can also have unique access to information through social relations. Among questions that arise is whether kinship and friendship are the only ways in which trust can be maintained in the long term.

(3) *Asian fruit and vegetable production is characterized by cultivated plant diversity and a diversity of production techniques.*

The great diversity of fruits and vegetables characteristic of Chinese and Southeast Asian diets is reflected in the fields of farmers who produce for the Chinatown market. It is common for a single farmer to grow the entire inventory of one wholesaler. Some farmers find economic security in low volume, high diversity. Others have low diversity, and high volume. Does diversity ensure economic success? Many farmers in Chinatown's food system are self-taught and come from professions other than agriculture. Among producers in Honduras, farmers have no history of growing or eating Asian vegetables. Farmers of Asian vegetables in the United States are not involved in the agricultural extension system due to language and cultural barriers. They often receive seed from wholesalers or their own sources, and are part of information flows outside of the local university extension services. Wholesalers, who know exactly what the market wants, often suggest new varieties and procedures to maintain the quality the market

[9] Added-value products are those that are marketed at a higher price than like products due to steps taken at the production end of commodity chains. Steps include extra processing (such as pre-washed, bagged salad mix) and certification of production practices (such as organic).

demands. An important question that suggests itself is whether farmers of Asian vegetables are developing their own, place-based practices.

SELECTION OF FIELD SITES AND METHODOLOGY

This research was designed to investigate socioeconomic and environmental aspects of Chinatown's food system. Using a multi-sited, commodity chain approach, data were collected in Manhattan's Chinatown and in two sites of production, south Florida and central Honduras. Anthropological field methods used included interviews, life histories, and participant observation. These were employed in conjunction with ecological field methods, including measuries of plant diversity in Chinatown markets and on farms. Brokers, importers, exporters, farmers, and agricultural professionals were interviewed at each site. Semi-structured and in-depth interviews were designed to facilitate qualitative and quantitative analysis. Plant diversity was analyzed through taxonomic identification and measures of richness, abundance, and occurrence. A detailed description of the methods employed is included in Appendix A.

New York City, southern Florida, and central Honduras were selected as sites for empirical study because they function as an integrated commodity chain and because of their social, environmental, and logistical importance to the food system. New York City is home to the country's largest Chinese population. Since the founding of Chinatown in the late 1800s, Chinese-Americans have been organizing their own food system. South Florida has been a winter source of Asian vegetables since the 1950s. Miami-Dade County has the only tropical climate in the continental United States; subtropical and tropical fruits common to Asian diets can be grown there. The Port of Miami is also a critical distribution point for produce imported from Latin America. Honduras was selected because it is a newly emergent site of production

were small farmers are contracted to grow an assemblage of crops complimentary to those grown in Florida. Distributors in South Florida play a key role in facilitating production there. Currently, Asian vegetables are the most stable cash crop in the Comayagua Valley of Honduras.

Finally, New York City, South Florida, and Honduras were selected as field sites because each includes a distinct social network of brokers, importers, exporters, and farmers. Network actors at each site engage in complimentary as well as antagonistic business practices, display a range of styles of farming, and grow distinct arrays of crops. Furthermore, actors at each site are influenced by nationally as well as internationally significant trends. Variation in the political-economic climate, biophysical environment, and social structure within each site make for meaningful comparisons and distinctions between producers. Although they operate in the same market, differences in regulatory environments, capital resources, crop genetic resources, household size, climate, growing season, and labor, to name a few variables, shape practices and perceptions of producers within each site. Analysis of their practices illuminates local responses to large-scale processes.

ORGANIZATION OF THE DISSERTATION

The first part of this dissertation gives an introduction to the main ideas addressed by this research and their place in the academic literature. The introduction also reviews how the hypotheses are tested. Chapter Two discusses the market for Asian fruits and vegetables in New York City. New York City is known in the produce industry as the "produce capital of the country." New York City moves the largest volume of produce in the country and is the most important market for many East Coast producers and distributors. In New York City, Asian-American entrepreneurs manage the production and distribution of the largest and most

organized system for providing ethnic fruits and vegetables. This system is separate from that of Hunts Point Terminal Market. Approximately eight Asian wholesalers located in lower Manhattan and ten in Brooklyn control distribution of Asian vegetables in the city, as well as for cities along the eastern seaboard. Distributors from Boston and Philadelphia send trucks to the NYC on a daily basis. Distributors truck products around NYC to retail markets. The geographic proximity between wholesale and retail markets facilitates competition. Each business tries to set itself apart from others through the composition and quality of their inventories.

The use of social networks in the expansion of the industry is discussed in Chapter Three. Chinese-American wholesalers organize the market in New York City, as well as production sites abroad. Following national and international production trends, they send kin, friends, or partners to new production locales in order to take advantage of new climates and places with lower production costs (like Mexico and Honduras). The wholesalers include business-savvy risk takers who utilize opportunities within their social networks to enable trade.

Three Chinese vegetable farms in Hendry and Palm Beach counties in South Florida, are described and discussed in Chapter Four. One farmer is the son of a Cantonese immigrant who farmed in New Jersey and, following in his father's footsteps, has been growing Chinese vegetables in Florida for over thirty years. The other two farmers have become part of Chinatown's food system more recently. The three farms continue to make South Florida an important winter source of Chinese vegetables.

Southeast Asian farmers in Miami-Dade County compliment the Chinese vegetable farmers in Hendry and Palm Beach Counties by producing Asian tropical and sub-tropical fruits, herbs, and vegetables. The Southeast Asian farmers are the subject of Chapter Five. While the volume of produce that they supply is not great and their farms are very small, the diversity of

produce they supply and their production methods merit analysis. A few examples of the crops grown are: (1) fruits such as *Litchi chinensis, Annona spp., Spondias dulcis;* (2) beans such as *Vigna unguiculata, Psophocarpus tetragonolobus*; (3) squashes such as *Luffa acuntangula, Laginaria siceraria;* and (4) herbs such as *Polygonum odoratum, Murraya keonigii*, *Cymbopogan citratus.* The Miami-Dade farmers also merit inclusion in this study because the produce they supply reflects the changing nature of Asian immigration to New York and their participation in the food system demonstrates the flexibility of the system as well as the potential for inclusion of small farmers.

Enabling the trend in offshore sourcing of produce by American companies are trends in diversification of non-traditional agricultural exports in Latin America. The emergence of Asian vegetable production in Honduras exemplifies these trends and will be the subject of Chapter Six. The geographic proximity of Honduras and lower production costs there have attracted Florida distributors to import from Honduras. Produce grown in Honduras can be picked on Tuesday, shipped by boat to the Port of Miami to arrive on Saturday, trucked up to New York, and on the store shelf by the following Friday.

Honduran farmers have been involved in export production of Asian vegetables for over a decade. Three exporters currently organize production in the Comayagua Valley of Central Honduras with partner companies in Florida who handle all U.S. logistics and provide market access. Between the three Honduran distributors there are more than 400 growers, cultivating thirteen varieties of vegetables. Vegetables include: Chinese and Thai egg-plant (*Solanum melongena*), bitter melon (*Momordica charantia*), chives (*Allium tuberosum*), Chinese okra (*Luffa acuntangula*) and fuzzy squash (*Benincasa hispida*).

Finally, the principle findings are reviewed in the concluding chapter. Chinese-American entrepreneurs have been managing the production and distribution of Chinese fruits and vegetables sold in New York City for over one hundred years. With shifting immigration trends bringing larger numbers of people from many parts of Asia to New York City, the population size as well as cultural diversity of Asian communities has been growing. Manhattan's Chinatown is the preeminent place in the Northeast to buy ethnic East and Southeast Asian food products. To meet the increasing demands of residents and shoppers of Manhattan's Chinatown, the production and distribution of ethnic foods has been expanding to new production locales Although Chinatown's food system is becoming global in scope, the system does not display characteristics other of global food system. Chinatown's food system embraces small, minority owned and operated firms and farms. Actors in the system use social networks to build new trade relationships both within and between countries. Farmers specialize in a variety of crops and use biological diversity to improve production. Far from leading to consolidation of ownership and homogenization of practice, Chinatown's food system has shown us that global food systems are filled with diversity and dynamism.

Chapter Two

The Produce Markets of Manhattan's Chinatown

The juxtaposition of the informal sector and small, ethnic-based enterprises with powerful, multinational corporations is striking in Chinatown. Sidewalk peddlers sell tropical fruit, hot cakes, and lucky bamboo plants in front of the glass facades of some of the world's largest banking corporations. It can be perceived that Chinatown is undergoing a transformation. Recently, illegal trading of fake designer goods on Canal Street underwent a crackdown, Starbucks moved in, and a new information kiosk was erected to welcome tourists to Chinatown. But in the popular media descriptors like "Third World", "dirty," "smelly," "congested," and "illegal" are frequently used in reports about Chinatown. And more often than not these reports refer to the food markets of Chinatown: the striking plethora of green grocers, fish mongers, vendors of pickled, dried, and freshly prepared food that can be found in numerous sites along Chinatown's arteries. Indeed, Chinatown has retained its small, ethnic enterprises and much of the street life that other parts of the New York City have lost.

Food markets are abundant in Chinatown. Within seven blocks there can be as many as 40 vendors of fresh fruits and vegetables. In addition to street vendors and stores, Chinatown houses several produce wholesale operations, a combination that is unique in New York City. Over the past century, wholesale food distribution has been removed from Manhattan. Hunts Point Terminal Market was built in 1967 in the South Bronx to rid Manhattan of the congestion and garbage associated with wholesale food distribution. The city's produce and meat distribution have taken place at Hunts Point since then; recently fishmongers moved to Hunts Point as well. The year 2006 marked the end of New York's last iconic wholesale market, the Fulton Fish Market. In Chinatown, however, wholesale produce vendors remain; neighborhood residents, city officials, street vendors, and store owners are frequently at odds over the structure and location of wholesale warehouses. The disagreements among Chinatown's stakeholders is

fodder for reports that perpetuate the "foreignness" of Chinatown. Comments about the disputes printed in NYC media include: "These wholesalers have turned my block into the black hole of Calcutta," and that Chinatown's old Dragon Gate Market "… looks like a shantytown" (Kirby, 1998).

But Chinatown also has the reputation of offering anything imaginable to eat to those brave enough to enter its convoluted streets. On any given day of the year, there are at least 135 different fresh fruits and vegetables to choose from! So why then, have the structure and dynamics of Chinatown's food system been virtually ignored, except for being condemned as unacceptable? In order to supply Chinatown with its edible bounty, entrepreneurs have not only transformed the area delimited as Chinatown, they have transformed numerous production sites around the world and have formed a flexible network that supplies Chinatown's streets, stores, and restaurants with copious and varied fresh ingredients.

THE DEVELOPMENT OF CHINATOWN'S FOOD SYSTEM

The development of Chinatown's food system is intertwined with the history of Chinese immigration and the development of the Chinese enclave in lower Manhattan. The first major wave of Chinese immigration to the United States was from Canton (now Guangdong) Province over one hundred years ago. Prior to this migration, starting in the mid-1800s, only small groups of Chinese sailors, cooks, and others involved in the U.S.-China trade lived in lower Manhattan in the multiethnic Five Points area. After the British forced open the ports of southeastern China in the Opium War (1839-1842), Chinese laborers from the port city of Canton (now Guanzhou) were transported to California to work as laborers in the Gold Rush and then to build the western spur of the transcontinental railroad. By this time the formation of the Chinese diaspora was

underway. Chinese "coolies" were also sent to the Caribbean and South America, and many Chinese emigrated to locations throughout Southeast Asia. As a result of these labor migrations, the Chinese population of New York expanded steadily in the late 1870s.

Economic recessions later in the 19th century heightened antipathy towards the Chinese. Many Chinese left California to return to China, or to the East Coast to escape California's racially charged environment. Anti-Chinese sentiments were codified in the U.S. with the passage of the Exclusion Act in 1882. Chinatowns along the East Coast grew both involuntarily and voluntarily. Because they were denied structural assimilation, the Chinese developed enclaves for self-protection as well as social and economic improvement (Zhou, 1992).

The food system of Chinatown arose out of the desire to feed the enclave. Like much of Chinatown's social and economic activity, the food system operated outside of the mainstream food system of New York. Restaurants were one of the first business sectors to develop in Chinatown and they generated a steady demand for Chinese ingredients. In 1937 over 40 types of plant foods were available in Chinatown, including dried items like fungus, fruits, and lily flowers in addition to fresh roots, tubers, fruits, and leafy vegetables (Porterfield, 1937). Restaurants catered to Chinatown's bachelor society. Tea houses and "chop suey" houses were places where men could get hot, homemade meals and socialize with others. Typical Cantonese dishes that would come to be known as Chinese-American food, like chop suey, lo mein, chow mein, and fried rice, were served because they were quick and inexpensive, yet contained a mixture of meats and vegetables. It has been said that this new style of Chinese cuisine was so different from cuisines in China that the chefs were not sure if the joke was on them or their customers.

Chinese cuisine did not develop mass appeal until the 1970s. President Nixon's trip to China in 1972 stirred American interest in Chinese food (Wong, 1988). This widely publicized trip coincided with a time when Chinese immigration was increasing due to the immigration reforms of 1965. The new demographic flows increased both the number and ethnic variation among Chinese immigrants. Between 1963 and 1973 the Chinese restaurant industry expanded from 560 to 1,700 restaurants in New York City. Likewise, the number of grocery stores in Chinatown increased from 50 in 1965 to 70 in 1988 (Wong, 1988). The increase in American interest combined with the increase in Chinese immigration also propelled the expansion of the variety and quality of food preparation in Chinese restaurants. Diners no longer looked for simply functional meals; they wanted a culinary experience.

The First Chinese-American Farmers

> "A few of the vegetables sold, such as cabbage, found their way into Chinese markets in the United States many years ago, but a large number, because they do not appeal to American palates, because of difficulties raising them as agricultural crops, or perhaps merely because they are as yet unknown to the American farmer, are cultivated for Chinese use, that is for their own benefit or for Chinese-American restaurants."
>
> [Porterfield, 1951: 5]

Porterfield affirms that by 1951 Chinese-Americans had been growing and selling Chinese crops. The demand for basic Chinese vegetables like bok choy, lo bak (Chinese radish), ong choy (water spinach), and dau mui (snow pea shoots) encouraged Chinese immigrants to establish farms in agricultural areas outside of New York City. Porterfield (1951) also reported that produce for winter trade and some subtropical items were supplied from gardens in Florida and even Cuba.

Records of Chinese crops in the United States even precede Porterfield's writings and date back to the nineteenth century. The prominent American horticulturalist Liberty Hyde Bailey wrote about Chinese crops in the United States in 1894 and their great potential for assimilation into the American diet. Mainstreaming "ethnic" crops is still a preoccupation of agriculturalists interested in the economic potential of new crops.

I was fortunate to interview Karen Lee of Sang Lee Farms, the first Chinese-American farm on Long Island.[1] The story of Sang Lee Farms provides insight into the means and motivations of the first Chinese-American farmers in the New York area. Sang Lee Farms was founded by the Lee family in 1948. The Lees were part of the Cantonese migration to New York City in the early 1900s. They ran a laundry business in which their sons would help after school. After returning from military service in World War II, George Lee, father of the current owner of Sang Lee Farms, went to the State University of New York at Farmingdale to study agronomy. His parents, immigrants from Canton, approved of his career choice. In an interview with the *New York Times*, George Lee's wife said, "In those days, being a farmer was different than in China, where it was considered low. Here, they knew you had to have an education and know what you're doing" (Toy, 2003). The two Lee cousins established Sang Lee Farms. At that time Chinese farms were already well established in southern New Jersey, but the Lees preferred Long Island because of its extensive underground aquifer. Southern New Jersey has a longer growing season, but the aquifer promised a competitive advantage during dry periods.

The Lee's intuition proved right. Sang Lee Farms quickly became the main supplier of Chinese vegetables for New York, Philadelphia, Boston, as far north as Montreal, west to Detroit and south to Miami. They established a strong reputation in Chinatown among wholesalers as well as market shoppers. The farm expanded to Hobe Sound, Florida in the late 1950s to produce

during winter months. At the peak of production the farm was double cropping 600 acres in East Moriches, Long Island, and several hundred in Florida during the winter. Half of their acreage was in bok choy, and the other half was planted to a mix of about two dozen types of vegetables.

Sang Lee Farms grew in tandem with the immigration rates of the Chinese to the United States. In the mid-1960s there was a boom in Chinese immigration. Although 60 years of Chinese exclusion ended in 1943 when China became allied with the United States in World War II, it was not until 1965 that there was a turning point in U.S. immigration from Asia. In 1965 the U.S. government abolished nation of origin quotas that had favored immigration from Northwestern Europe for 80 years. Whereas the first half of the twentieth century saw 85% of its immigrants from Europe, the second half saw the reverse; 85% from Asia, Latin America and the Caribbean. Between 1961 and 1970, the number of Chinese immigrants to the United States was just over 100,000, over four times that of the previous decade; and from 1971 to 1980 the number jumped to roughly 240,000 (INS Statistical Yearbook, 1950-1988). The influx of people from Asia has mainly come from mainland China, Hong Kong, Taiwan, Korea, and India. Refugees and others from Southeast Asian countries such as the Philippines, Cambodia, Laos and Vietnam make up a small percent. China (including Taiwan and Hong Kong, each locality has a separate immigration quota) makes up the largest portion of Asian immigration today, about 22% (See Table 2.0).

Currently New York City has 361,531 Chinese inhabitants, the largest Chinese population in the country (New York City Department of City Planning, 2000 Census). The population grew by almost 250 percent since 1980. The rapid growth quickly saturated

[1] The interview was conducted at the farm in Peconic, Long Island on August 2, 2002.

Origin	1990	2000	% Change
Indian	94,590	170,899	80.7
Bangladeshi	4,955	19,148	286.4
Cambodian	2,565	1771	-31
Chinese	238,919	361,531	51.3
Filipino	43,229	54,993	27.2
Indonesian	1,443	2,263	56.8
Japanese	16,828	22,636	34.5
Korean	69,718	86,473	24
Malaysian	845	1,368	61.9
Pakistani	13,501	24,099	78.5
Sri Lankan	811	2,033	150.7
Thai	3,944	4,169	5.7
Vietnamese	8,400	11,334	34.9
Asian Total	509,955	787,047	54.3

Table 2.0: New York City Population of Asian Origin, NYC Department of City Planning

lower Manhattan's Chinatown, spurring the growth of Chinese neighborhoods outside of lower Manhattan in Flushing, Queens and Sunset Park, Brooklyn.

Agricultural production to meet the demands of the new Asian-Americans continues to develop. Chinese farmers followed the Lees to Florida, making the southern region of the state an important source of Asian vegetables from November to May and fruit from May to September (see Chapter 4). New Jersey continues to be an important summer supplier of Asian vegetables for the East Coast, with new Chinese immigrants still going into agriculture there.[2] But as agricultural trade has been globalizing, so has Asian fruit and vegetable production. This has caused many farms in the U.S. that once grew for Chinatown, like the Lees, to shift their focus to higher priced agricultural commodities like heirloom tomatoes, herbs, and wine.[3] The

[2] The manager at a Chinese wholesaler firm in lower Manhattan, an immigrant from Taiwan, told me how she and her husband were able to get a loan to purchase land in New Jersey because she told the bank that "she knows the market and what it takes to be successful". She commented that there are many Chinese going into farming in New Jersey, some with more success than others.

[3] Sang Lee Farms gave up growing for Chinatown markets in favor of growing baby vegetables and heirloom tomatoes for their farm stand and elite restaurants (see Chapter 3). Another farmer of Chinese vegetables in New Jersey left vegetables to open a winery.

means and significance of the geographic expansion of Asian fruit and vegetable production will be taken up in the next chapter. The remainder of this chapter will describe the current state of produce markets in Chinatown.

THE STRUCTURE AND POLITICS OF CHINATOWN'S PRODUCE SECTOR

Like produce markets around the country, Chinatown markets have been subject to a diversification of product inventories and availability, and now draw products from around the world. Chinatown markets depend on a year-round supply of produce from many places. In the winter, wholesalers bring produce from California and Florida, as well as from Mexico and Honduras. In summer produce also comes from New Jersey and Ontario. Specific products come from other national and international locales as well. For example, lotus root is sourced from China, and longan and litchi come from Taiwan; mangos come from Haiti and Brazil, papayas from Belize. The majority of Asian fruits and vegetables, however, come from the aforementioned places (See Table 2.1).

At a national level, the distribution of Asian fruits and vegetables is divided into two interlinking networks: the East Coast network and the West Coast network (see Figure 2A). Most produce imported from Mexico goes through distributors in California. Mexican produce joins Californian produce as it is shipped around the country. Produce grown in Central America and the Caribbean is imported through Miami. In Miami, produce from Latin America joins Florida produce and is shipped up the East Coast. Places like Georgia, the Carolinas, Virginia, New Jersey and Ontario also contribute to distribution throughout the East Coast. Cities in the Mid-West and Texas that have large Asian populations, like Chicago, Detroit, Houston, and St. Paul, consume products from the East and West Coasts.

Table 2.1: Seasons for Asian vegetable production by location. Data based on market surveys and interviews. "X" represents the high season and "o" represents the low season. Mexico is reported as the largest producer of Asian vegetables. A wide variety of leafy greens, squashes, and long beans are grown in Mexico. Mexico is a direct competitor of Florida, where leafy greens are grown in high volume in the winter. Honduras' main export is eggplant, and has no major competitors. New Jersey and Canadian grown produce dominates during the summer months. California supplements production of a wide variety of vegetables year-round. Data collected by author through market surveys and interviews.

Month	Mexico	California	Florida	Honduras	New Jersey	Ontario
January	X	X	X	X		
February	X	X	X	X		
March	X	X	X	X		
April	X	X	X	X		
May	o	X	X	o		
June	o	X	o	o	X	
July	o	X	o	o	X	X
August	o	X	o	o	X	X
September	o	X	o	o	X	X
October	X	X	X	o	X	
November	X	X	X	X		
December	X	X	X	X		

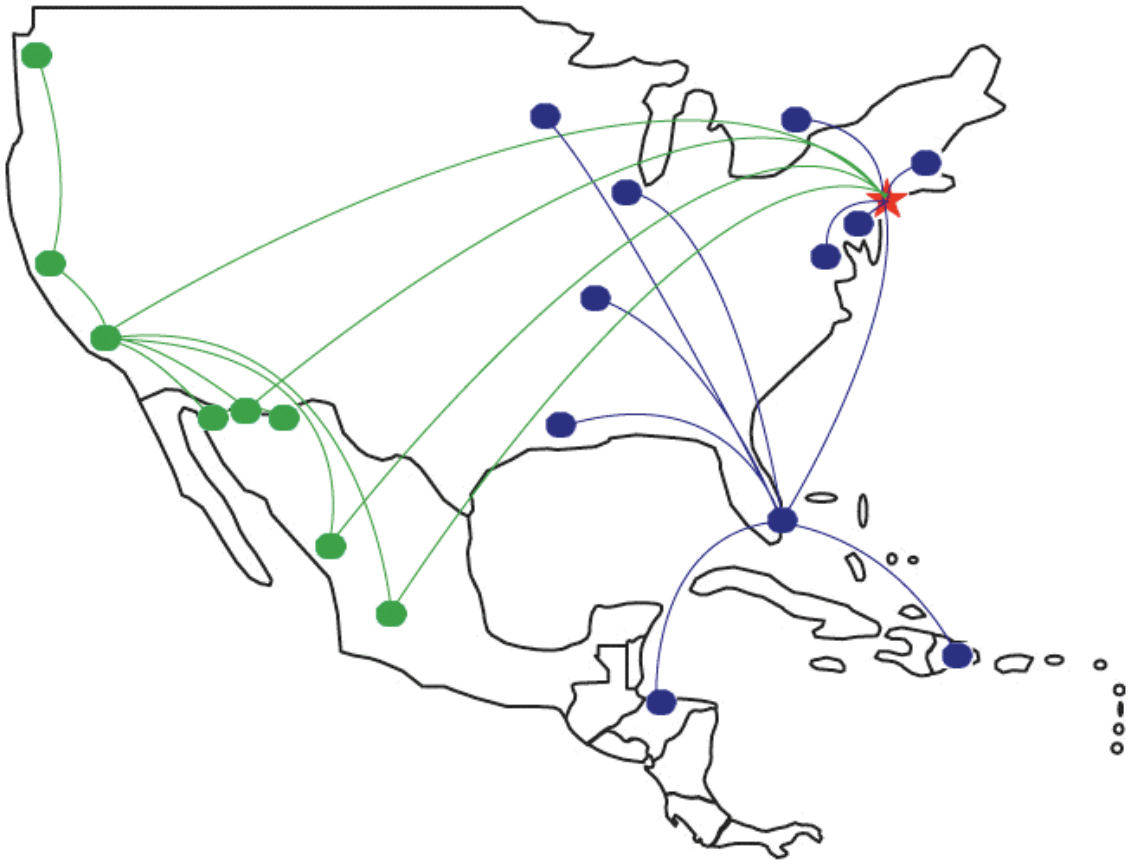


Figure 2A: Distribution Networks for Asian Produce between North America, Central America, and the Caribbean. Data based on market surveys and interviews. This figure is not comprehensive but includes some important points of production, distribution, and consumption as they relate to New York City. Networks are divided between the East and West Coasts. Florida is both a place of production and a main point of distribution for Honduras and the Dominican Republic. Produce is shipped from Florida to Mid West, East Coast, and Canadian cities. Mexican and Californian grown produce is shipped to California and Washington as well as to NYC.

Although the East Coast depends highly on the West Coast system, the West Coast does not depend on production from points east. California is a notoriously strict state in regard to produce imports. Restrictions largely protect California producers from pest and pathogen invasion, but they also protect the Californian agricultural economy. Distributors in Florida use California only as a last resort: if they can't sell anywhere else they will try to sell in California. They hesitate because state inspectors of trucks crossing into California will order container loads of produce back to senders if any pests are detected.

Miami and New York City are important nodes in the East Coast distribution network. Miami distributors import produce from Central America and the Caribbean through the Port of Miami in addition to buying locally produced fruits and vegetables. Distributors truck imported produce to their warehouses around Miami where they prepare orders to be shipped north. In New York, distributors sell at wholesale prices to Chinatown retail vendors, and they also distribute to wholesalers in Philadelphia and Boston. In this network, produce can be exchanged from one to five times. The shortest commodity chain is that which links growers in Florida and New Jersey directly to NYC retailers, bypassing the wholesalers. The longest commodity chain involves international growers. Their produce can be bought and sold five times (farmer→exporter→importer in Miami→distributor in NYC→wholesaler in Philadelphia→retail vendor). The distribution network embodies many trade arrangements which will be discussed more at length in the following chapters.

New York City is known as the "produce capital of the country" because the largest volume of produce in the United States is traded through New York. Hunts Point Terminal Market serves as a site of distribution for regional cities; so does Chinatown. Distributors from Philadelphia and Boston will drive to Chinese wholesalers in lower Manhattan and Brooklyn to

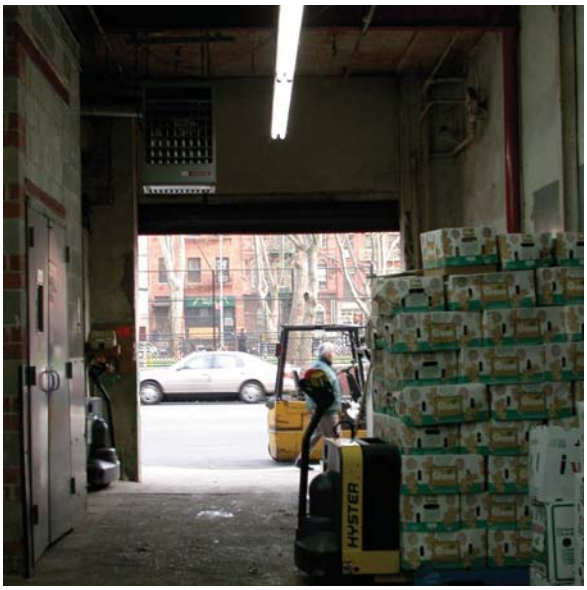
make purchases. This gives New York wholesalers power in regional markets. Wholesalers in New York are reported to use their clients in other cities to spread rumors about prices, create artificial demand, or dump extra produce to preserve prices in NY. The system is run by day to day negotiations. There are no assurances of price, quality, or volume. One wholesaler in New York told me, "Wholesale produce sales depend on volume. If the quality is good we can take fifteen percent profit, if it is bad, then ten percent, and sometimes we lose money." [4]

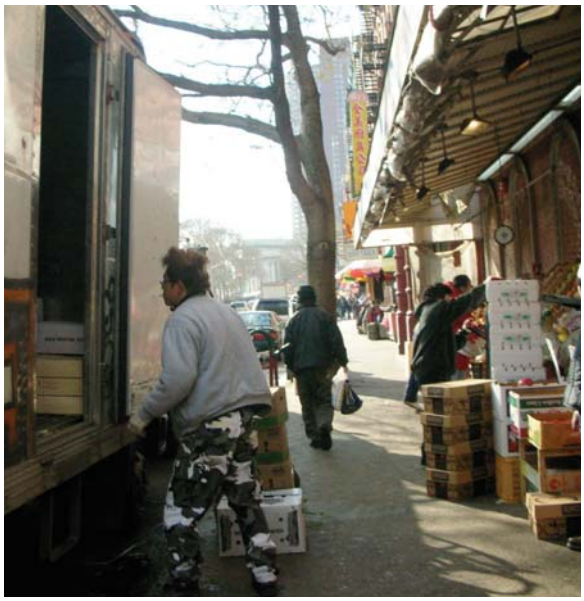
The wholesale and retail structure of produce sales in Chinatown has been subject to neither vertical nor horizontal integration, nor to corporate appropriation. As one of my informants told me, "Chinatown works on a micro-basis." The retail and wholesale produce sector of Chinatown is composed of small, highly competitive businesses. Nine wholesale firms are located in Manhattan's Chinatown, another ten are located in the growing satellite Chinatown in Sunset Park, Brooklyn. Eighty-eight produce vendors are located in Manhattan's Chinatown, clustered along Grand Street, Mott Street, and Canal Street, with other vendors scattered along Mulberry Street, East Broadway, and other locations. (See Figure 2B for a map of produce markets in Chinatown, Appendix B for a list of produce retail and wholesale markets in Chinatown, and Figures 2C-2N for images).

Produce sales in Chinatown are facilitated by the proximity of retail and wholesale markets. Wholesalers make deliveries to retailers and take orders at retail markets to support retailers with limited infrastructure. Most retail markets do not have refrigerated storage, transport, telephones, or fax machines. Men pushing hand trucks, idling delivery trucks, and boxes stacked on the sidewalk are constant features of Chinatown. Wholesalers, however, are feeling more and more pressure operating in Chinatown. In the late 1990s Chinatown's councilman proposed a wholesale market for Chinatown, but nothing has come of this to date.

[4] Interview with wholesaler conducted in NYC on October 14, 2002.

Figure 2B: Map of Produce Markets in Chinatown





Figures 2C-2F, top left to bottom right: Wholesale warehouses in lower Manhattan unload pallets and boxes both inside and warehouse and on the sidewalks. Trucks make deliveries throughout the day to retail vendors around Chinatown. Movement of produce is a constant feature of Chinatown.

Figures 2G–2J, top left to bottom right: Examples of market types. Figure 2G is a makeshift market on the edge of a parking lot. This market no longer exists because a high rise, "luxury apartment" building has gone up on this site. Figure 2H is a storefront market on East Broadway. Figures 2I and 2J are grocery stores that make use of both the sidewalk space and inside space.

Figures 2K–2N, top left to bottom right: Street vendors are the most numerous and diverse types of produce markets in Chinatown. Figure 2K is a seasonal vendor that sells produce on the Bowery. Figure 2L is an itinerant vendor that will set up a stool and a scale to sell a few boxes of produce. Figure 2M is a permanent pushcart vendor that sells fruit on Canal St. and figure 2N is a permanent vendor that has constructed tables with storage areas underneath to sell a choice selection of produce.

Space is limited in Chinatown, and areas once exclusively zoned for industrial use have now changed. Wholesalers have to be much more wary of previously common practices like leaving trucks idling, double parking, and working on the sidewalks in front of their store. The NYC Police Department has been issuing more and more parking tickets for trucks that are parked incorrectly or exceed standing limits. The new enforcements have made loading and unloading very difficult and costly: parking tickets cost $115 each. Many wholesalers have moved to Brooklyn, or purchased additional warehouses in Brooklyn, to decrease the unloading and loading of large orders in Chinatown.

Wholesalers also face opposition from neighborhood groups. An extreme case is the conflict between World Farm Inc. and the SoHo Alliance. Many wholesale companies have moved to the fringes of Chinatown, along Chrystie Street to the east and around Broome and Lafayette Streets to the west. The western fringe proved to be a contentious battleground. There the chic restaurants, shops, galleries and apartments of SoHo abut the fruit and vegetable warehouses of Chinatown.

In September 1996 the SoHo Alliance, which represents over 1,000 SoHo residents, filed a $10 million dollar lawsuit against World Farm Inc., a Chinese produce wholesaler, seeking a permanent injunction against the operation as well as monetary damages on grounds of nuisance and trespass. The allegations included complaints of the use of the sidewalks to operate forklifts to unload produce, parking trucks in front of fire hydrants and crosswalks, and garbage left on the sidewalk. On November 27, 1996 the Supreme Court of New York set up the provisions that stated World Farm would not: (1) operate its vehicles in a manner threatening the safety of health of plaintiffs, (2) drive forklifts on the sidewalk, (3) utilize sidewalks to display and sell produce, (4) use sidewalks to store shipments for more than one hour, or (5) leave machinery on the

sidewalk when not being used. The stipulation also set up an Advisory Committee to deal with problems that would arise (Justice Saxe, New York Law Journal, 1997).

Problems persisted for the next five years. In response, the wholesalers united to form an association, the Chinese Wholesalers and Retailers Association of Greater New York, and attended community board meetings to defend their right to operate their businesses. The wholesalers continued to violate agreements, arguing that some restrictions were trivial, unreasonable, or unavoidable. The SoHo Alliance continued to fight against the non-compliance of World Farm. Disputes went to court again in 2001 when World Farm was ordered to pay an estimated $200,000 in legal fees and a $1,000 fine, as well as other costs (Williams, 2001). World's Farm's lawyer stated that they would appeal. World Farm continues to operate from this location; they have not left, as their opponents had hoped.

Chinatown's produce wholesalers are very powerful businessmen and women. They not only control access to produce marketing in Chinatown in New York, they exert control throughout the metropolitan areas of the East. They distribute to Washington D.C., Baltimore, Philadelphia, and Boston. Some Chinatown wholesalers own warehouses in other cities; others own or are invested in farms in New Jersey, Florida, Canada, and Mexico. Much of the wholesalers' control of the market stems from the structure of the production and retail sectors of the industry. Wholesalers work with many individual clients—farmers as well as merchants—who are competitors in their sectors. There is no unity among farmers or merchants, so none have the power to set prices. The wholesalers, therefore, are in a position to set prices. Price setting is the most tenuous aspect of this industry; prices fluctuate widely on claims of quality, overproduction, and underproduction. Rumors, as well as real events, can affect price setting. Furthermore, wholesalers only accept produce on consignment. Farmers are paid after delivery.

Due to the perishability of produce, farmers have to ship on good faith. Working on consignment increases the power of the wholesalers in their role as brokers; they determine prices after farmers have shipped their products. Farmers must accept the prices they are offered because they have already shipped their produce. This dynamic between the wholesaler and the farmers is dealt with in a number of ways that will be explored in the next chapter. The point that is important here is that both merchants and farmers are dependant on the wholesalers, who have control over the industry.

THE MICRO-MARKETS OF CHINTOWN

Produce sales in Chinatown are carried out on the street; each type of market makes use of sidewalk space to create an outstanding visual bounty to entice passersby. Every morning produce vendors meticulously stock their shelves with brightly colored fruits and vegetables with care and attention to details. Delicate herbs like watercress are packed in ice, and leafy greens (*Brassica* spp.) like bok choy and Chinese broccoli are stacked with the cut end outward to show their cleanliness and freshness. Fruits like durian, pomelo, litchi, and longan are hung above the shelves, making use of vertical space. Large squashes like winter melon are cut and sold in pieces by weight. In the winter months, when shopping continues into the darkness, vendors set up spotlights to aid evening shoppers.

Many of the fruits and vegetables sold in Chinatown cannot be found elsewhere in the NYC. Produce markets are an important part of the character of Chinatown, contributing to its "exoticness." In addition to providing food for city residents, the markets are part of tourists' experiences; I am never alone in taking pictures of produce in Chinatown. There are a number of

field guides that describe Asian produce and their culinary uses.[5] A colleague commented that when she moved to the Lower East Side and started frequently shopping in Chinatown, she had to purchase a guide to learn about the many vegetables she did not recognize. She has subsequently increased the variety of foods she consumes in her vegetarian diet. Chinatown would simply not be the same if the quality, quantity, and variety of produce disappeared from its streets.

The produce vendors in Chinatown are mostly first-generation Chinese immigrants who speak limited or no English. Their life unfolds on the streets of Chinatown through the heat and humidity of the summer, and the frigid air of the winter. The vendors have been the hardest set of people to get to know in my study. I was unable to elicit more than simple answers to my questions. The difficulty I encountered was in part because I do not speak any Chinese dialects,[6] have no personal contacts in Chinatown, and because vendors are very busy people. Even when I went to Chinatown with an interpreter, the produce vendors were just as reluctant to be interviewed, and perpetually busy. They need to be attentive to customers and cannot entertain many questions. I resolved to make my market survey mostly quantitative, supplemented with some observations and comments of my own as well as comments of wholesalers and farmers whom have interviewed, as well as with secondary sources (newspapers, reports and scholarly literature).

As stated above, Chinatown works on a micro-basis; most vendors operate on a very small scale, some sell as few as two or three types of vegetables on a sidewalk table, others have a store packed with produce-filled tables. There are two supermarkets in Chinatown, Hong Kong

[5] There are many examples, like: *Asian Vegetables: From Long Beans to Lemongrass, A Simple Guide to Asian Produce Plus 50 Delicious, Easy Recipes* by Sara Deseran and Richard Jung; *Asian Greens: A Full-Color Guide* by Anita Loh-Yien Lau; *The Asian Grocery Store Demystified* by Linda Bladholm.

Supermarket on East Broadway, and Dynasty Supermarket on Elizabeth Street. The quality of supermarket produce is very poor and people appear to shop there not for produce, but for other groceries. Produce is mostly sold by small vendors on the street.

The produce markets of Chinatown vary in infrastructure and permanence. There are stores and street vendors that anchor produce sales in the community, and others that are subject to change. Since I began taking market inventories in 2003, there have been a total of 88 produce markets present for at least one inventory. There are 40 markets, or 47 percent of the total, that have been present in every inventory, and that I count as permanent. The percent of the ephemeral markets has ranged from 16 to 36 percent from 2003-2005 (see Table 2.2).

I have categorized four different types of markets according to infrastructure and location: store, storefront, street vendor, and makeshift store (see Table 2.3, Figures 2G -2N). The stores represent 15 percent of the total markets. Stores utilize both the sidewalk space in front of the store (storefront) as well as the inside of the store for produce, and the inside and outside are operated by the same owner. There are 13 stores that sell produce—some exclusively handle produce, others are general grocery stores or supermarkets, one is a pharmacy run by a Vietnamese couple that carries Vietnamese herbs. The stores are the most permanent market type, they anchor produce sales by having a wide selection as well as being open everyday. The only day I ever saw a store closed was during Chinese Lunar New Year.

The storefronts make use of only the sidewalk space of a store for produce sales; the inside may be a grocery, fishmonger or other type of store. Storefront space may be managed by the store owner or rented to outside parties. Some storefronts are split among multiple tenants. Tenants can pay a premium for storefront space. Since the 1980's speculative capital has caused

[6] Cantonese was the first predominant dialect in Chinatown. It is still common, as well as Mandarin and more recently, Fukien (also called Fujian).

immense inflation in the value of Chinatown's real estate. In some cases, like the one described below, store owners take advantage of renters. Those that are established in Chinatown exert much influence over those who are not. Peter Kwong describes the tenure of one merchant:

> "Retail space has become so scarce that unusual situations have developed… One vegetable seller on Canal Street rents a 150-square-foot storefront, which he uses only as storage, and displays his produce on stands set up on the street. He pays $1,500 a month for the storefront, having also paid $20,000 as "key money" to the landlord." [Kwong, 1996; 51]

Space in Chinatown is very valuable. Frequently store owners and street vendors are at odds. Merchants feel that the vendors undermine their business. Street vendors are the most common type of market, representing 49 percent of all produce markets. Street vendors are located where there is heavy foot traffic, along Canal Street, at the subway entrance on Centre Street just south of Canal, and at the corner of Grand Street and the Bowery. Street vendors have their own locations. I have never seen a street vendor change location, although there are some vendors who are present everyday and others who work part-time and seasonally. There are itinerant vendors, those who buy two or three boxes of vegetables and set up a scale and a chair on the sidewalk, including women who are often seen sitting, shelling, and selling ginkgo nuts.

Some vendors make use of space that is in a state of uncertainty. An example of this is two "makeshift" stores that were set up on the edge of a parking lot. Produce shacks were built of plywood and painted bright colors. The shacks had an enclosed area for the vendor to stand behind a counter. One makeshift produce shack specialized in seasonal fruit and the other in leafy vegetables. The space where the makeshift stores were built was in an intermediate state—it was about to become a high-rise building, but for two years it served as an informal market space.

	2003		2004		2005	
Markets	Number	Percent	Number	Percent	Number	Percent
Absent	13	16%	26	32%	30	37%
Present	67	84%	54	68%	50	63%

Table 2.2: Presence and Absence of Markets in Chinatown. Data based on market surveys of eighty-eight fruit and vegetable markets tracked throughout Chinatown during a three-year period from 2003-2005. The number of markets seems to be declining. Street vendors, the most common type of market, are subject to variables like construction and inclement weather that discourage their presence.

Market Type, n=88	Number	Percent
makeshift	2	2%
store	13	15%
storefront	30	34%
street vendors	43	49%

Table 2.3: Typology of Markets in Chinatown. Data from market surveys of eighty-eight reoccurring fruit and vegetable markets from 2003-2005. See Figures 2B-2F for images of market types. Street vendors are the most common venue for fruit and vegetable sales.

There are other spaces in Chinatown that are informally used as market space. Before the information kiosk was built at the triangle between Canal and Baxter Street, vendors used this space. Confucius Plaza and a section of East Broadway under the Manhattan Bridge now serve as occasional market spaces. Pushcart vendors congregate in these two areas to sell extraordinarily cheap, low quality produce.

The street vendors are an integral part of Chinatown's retail business. In a survey of street traders conducted in 1995 for a sociological study, 122 vendors were counted (Lin, 1998). The largest category was produce vendors, with 44 vendors, or 36 percent of the total. One farmer who supplies a Chinatown wholesaler told me that he experienced a 25 percent decline in his sales one week that it was bitter cold in New York and the street vendors could not withstand being outside.

Street vending, however, is politically problematic. Street vending licenses for food are no longer available from the New York City government. NYC offers 3,000 permits, all of which have been granted, and an additional 1000 seasonal summer permits. The waiting list for city-issued permits is rumored to be over 25 years long. Permits, like yellow cab medallions, can only be bought, sold, or rented from existing owners, a situation that leads to inflated values. Many street vendors work illegally and are vulnerable to fines; others pay inflated prices for vending licenses from the few who posses them.

There are a number of street vendors in Chinatown who have permits. But legal or not, street vendors are constantly subject to the vagaries of policing, construction, and weather as well as street vending permits and lease arrangements. Street vendors tend to be considered a problem and have had to fight to stay in business. Merchants (store owners) and street vendors are often at odds because merchants pay property taxes and have much higher overhead costs

than do street vendors who can undercut store prices. Merchants do not want vendors on the streets. Both merchants and vendors in Chinatown have formed associations to protect their respective interests. The Grand Street Merchants Association and the Chinatown Vendors Association advocate for different uses of the limited space of Chinatown. The Vendors Association supports unregulated public access to Chinatown's streets for its vendors. It has defended this idea by demonstrating at City Hall and at community board meetings. The Merchants Association believes that the vendors make the streets congested, dirty, and unsanitary.

Many of New York's Mayors have taken the same view as the merchants and have sought to remove street vendors. In 1938, Mayor Fiorello Henry La Guardia attempted to clear the streets of Jewish, Italian, and other ethnic vendors by requiring of them proof of citizenship. Mayors Ed Koch, David Dinkins, and Rudy Giuliani cleared the streets to improve "the quality of life" for city residents. These campaigns have affected multiple ethnic groups in many neighborhoods, from elite property on Fifth Ave and in Times Square, Harlem, and Chinatown.

In the early 1990s Chinatown street vendors were ordered off the streets and were moved into Sara Delano Roosevelt Park at the eastern edge of Chinatown. The park was unused and unsafe, with vagrants and drug users as the primary residents. Hoping to simultaneously clean up the streets and the park, the Parks Department contracted the University Settlement House of the Lower East Side to oversee a market of 100 stalls, named the Dragon Gate Market, which opened in September 1994. The market did not last long for several reasons. The adjacent subway station at Grand Street was closed, greatly reducing the flow of people through the area. The vendors did not like the restricted hours of the market, although the market was open from 7am to 7pm. The city claimed that the vendors did not comply with the regulations of the market.

Vendors built permanent market stalls in the park when only temporary structures were allowed, and there were reports of unsightliness and illegal tapping into electric and water lines. The city, which initially encouraged the formation of Dragon Gate Market, called for its demise (Kirby, 1998). In 1999 the market was vacated and the vendors were eventually reassigned to the streets.

WHAT'S FOR SALE? THE FRUITS AND VEGETABLES OF CHINATOWN

In order to determine the species composition and seasonal variation of Chinatown markets, I conducted market inventories between 2004 and 2006. I developed a stratified sample of seventeen markets (20 percent of the total) to represent the proportion of market types in the sample. Some street vendors specialize in vegetables and others in fruits; some stores carry a full inventory, others just carry herbs. I conducted monthly inventories, supplemented by weekly visits during summer months to capture the impact of seasonal fruits on the market. I designed the data collection to enable the calculation of diversity measures commonly used to describe species diversity in ecological studies. I recorded the presence and absence of species and varieties of fruits and vegetables and select prices.

The measures of diversity that I use provide a number of insights into monthly market inventories as well as a means of comparison between the monthly inventories. Richness is the total number of different fruits and vegetables present. Comparing richness by month shows the seasonality of certain fruits and vegetables. The Shannon-Weaver Index (also called the Shannon Index) takes into account richness as well as the proportion of each type of fruit and vegetable within the market. The index assumes that the proportion of individuals in an area indicate their importance in the market. Evenness is the ratio of observed diversity to maximum diversity. It indicates how similar the abundance of different fruits and vegetables are. When there are similar

proportions of all species then evenness is one, but when the abundance of species are very dissimilar (some rare and some common) then the value increases (see the methods section in Appendix A for an explanation of how each measure was calculated).

I have found the total richness of fruits and vegetables for sale in Chinatown to be 209. The total richness is a compilation of distinct types of fruits and vegetables that I have seen in Chinatown since I began the inventories. I define "distinct types" of fruits and vegetables at the lowest taxonomic level if the taxa are well known. For some taxa this goes down to the sub-species level, the horticultural variety. An example is Chinese broccoli (gai lon), *Brassica oleracea var. alboglabra*. For other taxa in which the taxonomic level is confused by breeding, I simply use the species name with a morphological description of the varietal difference. An example is Asian pears, which are all crosses of *Pyrus serotina.* I differentiate them by using a color descriptor: *Pyrus serotina*-golden or *Pyrus serotina*-brown. For yet other taxa different parts of the same plant are used as different vegetables; for instance, the petiole of *Colocasia esculenta* is called "tun" and is a different vegetable from the corms of *Colocasia esculenta,* which are called "taro." I count tun and taro as two separate vegetables. Finally, fruits may be harvested at different stages of ripeness and used in different ways, so are considered different fruits. Unripe papaya, which I label *Carica* papaya-unripe, is used as a vegetable in a salad, versus two varieties of ripe papaya, *Carica papaya*-large and *Carica papaya*-small, which are eaten as fruits. Another example is mature coconut, *Cocos nucifera*-mature, of which the fleshy endosperm that adheres to the hard endocarp is eaten, or immature coconut, *Cocos nucifera*-immature, which contains water inside the cavity of the endosperm that is drinkable. See Appendix C for a complete list of fruits and vegetables sold in Chinatown. It is important to this study to determine richness by varietal differences, differences in the use of plant parts, and

stages of ripeness because there are sets of practices associated with each difference. Thus, the measure of richness of fruits and vegetables in Chinatown markets, 209, means that there are 209 different sets of culinary, cultural, agronomic and economic practices that are represented.

Not all of the fruits and vegetables sold in Chinatown are uniquely consumed as components of Asian diets. There are 87 items, 41 percent of the total richness, that are conventional items available in most grocery stores around NYC. The remaining 58 percent, or 122 items, are fruits and vegetables that are peculiar to Asian diets and uncommon or unavailable in other parts of the city. Although the production and distribution networks analyzed in this study only deal with certain Asian items, the market analysis will include all of the fruits and vegetables to fully capture the diversity in Chinatown markets.

I found that the richness of the markets varies on a monthly basis (see Table 2.4). In no month is the total richness of the markets that I have found over time, 209, represented. Rather, the total species richness accumulates over time. The greatest monthly richness, 148, was found in July. Richness is greatest in the summer because this is when the market is supplied by greatest variety of production locales (and thus climates), and many fruits are only available in the summer and early fall. Fruits like litchi and longan explode onto the market in July. Other fruits like jujube, rambutan, sugar apple, and Thai guava appear in smaller numbers. Vegetables like amaranth, boxthorn, hyacinth bean, lablab bean, and birdhouse gourd are only available at once a year.

In September and October the strangest vegetable in Chinatown is for sale: *Trapa bicornis*, the seed pod of the aquatic species, is also known as water caltrops, the devil pod, bat nut, goat head, bull nut, and buffalo nut. It bears these names for good reason. As described on the University of Connecticut's Ecology and Evolutionary Biology's website "…. this naturally

Month	Shannon Index (H')	Total Abundance (N)	Fruit and Vegetable Richness	Fruit and Vegetable Absence	Evenness
August	4.59	469	146	56	0.89
September	4.74	435	133	69	0.92
October	4.75	450	143	59	0.91
November	4.71	463	134	68	0.90
December	4.56	411	134	68	0.86
January	4.27	359	122	80	0.81
February	4.65	406	126	76	0.88
March	4.37	429	131	71	0.82
April	4.73	418	141	63	0.89
May	4.75	423	146	63	0.89
June	4.73	391	145	64	0.89
July	4.46	384	148	61	0.83

Table 2.4: Diversity of fruits and vegetables sold in Chinatown. Data based on market surveys of a sample of 17 markets from Aug 2005 – July 2006. The Shannon Index, $H'=\sum\{(ni/N)\ln(ni/N)\}$, is a combined measure of abundance and evenness. The total abundance, N, represents the combined totals of each fruit and vegetable (ni), where the presence of each product is valued at "1" if available at one store. For example, the maximum abundance for February would be 2142, if all 126 products were available at all 17 stores in the survey sample. Absence represents the number of fruits and vegetables not present at the specified time but that have been present at other times. Evenness is the ratio of observed diversity to maximum diversity, and is calculated by dividing H' by H'max.

sculpted botanical oddity looks like nothing so much as a leering goat-horned devil, an enraged bull demon, a flying bat, or an alien chupacabra! The illusion of an evil face appears on both sides of the pod, and the two faces are usually quite different in visage."[7]

Richness declines in November and reached a low of 122 in January. But in the winter months of December and January there are seasonal items. Pomelo, pomegranate, and two varieties of persimmon come into season in the winter. Likewise snow peas, snow pea tips, watercress, baby Shanghai choy, and bitter melon, which are available all year, are more abundant in the winter because of Mexican and Honduran production. Also, around Chinese Lunar New Year in January certain products are popular and become more abundant in the market. Chinese celery and daikon radish are popular because they are considered lucky vegetables, and clementines, sold with leaves and branches, are popular for offerings. These products are sourced specifically for the holiday. Farmers in Florida plant celery for the New Year. In 2005 farmers were upset because their harvest schedules were pushed back due to Hurricane Wilma and they didn't have as much celery as they could have sold during Lunar New Year.

While there is variation in richness and abundance of fruits and vegetables throughout the year, the market is relatively stable and constant. Most fruits and vegetables are evenly distributed across markets and are found with the same frequency over the year. Appendix D lists the relative frequencies of all fruits and vegetables sampled in the market. Using the data in this appendix, the monthly variation of items can be determined, as can the relative frequency with which each item is found over the course of a year. The distribution of relative frequencies for September, which is representative of each month of the survey, is summarized in Figure 2O.

[7] Retrieved on January 24, 2006 at http://florawww.eeb.uconn.edu/acc_num/200600008.html.

Relative frequencies are low, over half of the items for sale have a rate of below 0.18. The most common rate of occurrence for fruits and vegetables is 0.06. It is uncommon for items to be available in more than half of the markets at one time because markets vary their inventories to maintain competitiveness in a dense commercial area. Therefore the evenness of the markets hovers between 0.81 and 0.92. A measure of evenness close to one indicates that products occur in similar proportions. The small degree of change in evenness of Chinatown's produce markets between months means that the seasonal spikes are not great enough to affect the overall evenness of the markets.

Likewise, the diversity of items as indicated by the Shannon Index does not vary much on a monthly basis. The Index ranges from 4.37 to 4.75. The Index is similar month to month because the proportion of items is well distributed across the markets; there are not many items that dominate in abundance. In other words, the proportion of richness to abundance, which the Shannon Index measures, does not change much. Again, the seasonal spikes in diversity are not great enough to affect the index. But a Shannon Index of 4.75, the highest recorded index for the months of October and May is a very high value, only found in highly diverse plant communities.

Although the markets appear more bountiful in the summer, produce sales actually decline in summer months. Restaurants, as well as individual consumers, buy more produce in the winter. Wholesalers pare back their hours in the summer and work from 5:30am until 2pm, whereas in the winter the work day lasts from dawn until 7 pm. One wholesaler's explanation for this trend is that people don't want to cook in the summer. People also take vacations in the summer. But while money is lost on vegetables in the summer, fruits offset the loss. The value

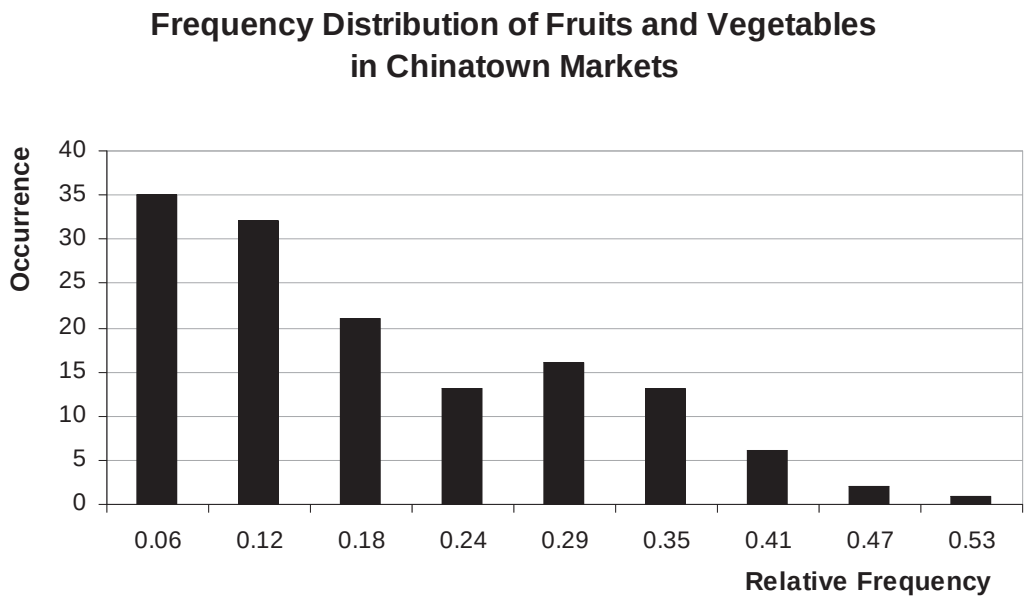


Figure 2O: Distribution of the relative frequencies of each fruit and vegetable sold across a sample of seventeen markets in Chinatown during September 2005, n=139. Relative frequencies are low, over half of the items for sale occur under a rate of 0.18. It is uncommon for items to be available in more than half of the markets at one time. Markets vary their inventory to maintain competitiveness in a dense commercial area.

POINT OF PURCHASE	**PRICE / lb Longan**	**PRICE / lb Shanghai Choy**
FOB (Farm, w/o freight)	$2.25 - 2.50	$0.20
Freight (paid by wholesaler)	$0.11 - 0.15	$0.11 - 0.15
Wholesale	$2.75 - 3.50	$0.23 – 0.26
Retail	$4.00 - 4.50	$0.60 – 1.00

Table 2.5: Example of pricing structure of longan and Shanghai choy given by wholesaler for summer prices. Longan is a high value product. People try to use it to make up for the lower prices of vegetables in the summer. Wholesalers often take a loss on vegetables in the summer because supply is high and demand is low.

differential between seasonal fruits and vegetables is astonishing; longan is eleven times more valuable than Shanghai choy (see Table 2.5). In the example this wholesaler gave, she may lose thirteen to sixteen cents per pound of Shanghai choy, but she may make twenty-five cents to one dollar and twenty-five cents per pound of longan.

Because fruits are more lucrative than vegetables, when seasonal fruits are available, everyone tends to sell them. Eighty-five percent of markets were selling litchi and longan at during the summer. Longan can be priced around $4.00 to $5.00 per pound when it is abundant, but when not many markets have longan—at the beginning or end of the season—prices will be $7.00 to $8.00 per pound. The prices of products that are supplied year-round are relatively stable. There are small margins of difference depending on quality and volume of the supply, affecting the consumer little. It does, however, affect wholesalers and farmers. A few cents' difference on a pound matters when there are tens of thousands of pounds sold at one time.

Chinatown markets offer an outstanding variety of products for low prices and most of the time, of good quality. In order for a marketplace that comprises many small vendors and a great diversity of products to be steadily supplied throughout the year, a dynamic, flexible network of production and distribution must be in place. The next chapter will introduce the people who have shaped the distribution networks, describe how they "globalized" Chinatown's food system and discuss how they maintain networks of trade.

Chapter Three

Social Networking in Global Agricultural Trade: The Expansion of Chinatown's Food System

The previous chapter showed that there are over two hundred fresh fruits and vegetables sold by over eighty street vendors and green grocers in Manhattan's Chinatown. The distribution networks that deliver this great diversity of products to the numerous, small retail vendors must be flexible and dynamic; the networks are constantly growing and changing. Entrepreneurs continually enter and leave the system, and are constantly looking for new suppliers as well as new products to sell. For example, Thai guava is the new popular fruit among Florida growers. Longan is now being imported from Taiwan, and litchi from Mexico. The shift in product availability is as much a result of international competition as inter-regional competition. When a product grows well in an area, everyone wants to grow it. Overproduction and market saturation push producers to look for new crops. Because of this dynamism and competition, successful farmers as well as brokers are always experimenting with new items and new places. Brokers do not shy away from global trade. Rather, Chinatown produce brokers use their social networks to develop new trade relations. The globalization of Chinatown's food system has occurred because individuals have been making contacts with friends, family, and past associates abroad. Globalization, once thought to inevitably result in the homogenization of practices and the erasure of local identities, has been shown to include multi-scale, network-oriented processes in which the particularities of place and culture are important determinants (Escobar, 2001).

Chinese-American wholesalers in Chinatown (I will also refer to the wholesalers as brokers) control access to Chinatown's produce markets. They have shaped how the industry is structured, its business practices, and its networks of exchange. The brokers choose the farmers they want to work with and the terms of sale. They have maintained this control because they have *created* an ethnic industry. Their ethnic identity as Chinese in America,[1] as well as the

[1] China is a multi-ethnic state with many nationalities and ethnicities within its borders that are culturally, linguistically and geographically distinct. Taipei recognizes nine major indigenous groups in Taiwan and Beijing

ethnic character of the foods that they sell have both served to define their businesses, as well as provide a concept for building their businesses. The Chinese-American brokers use their ethnicity to keep control over their markets.

Chinese wholesalers are said to be insular and unwilling to work with outsiders (non-Chinese). Brokers are believed to be unscrupulous in their business practices and untrustworthy. Early in my research I interviewed two agricultural extension agents, one from Cornell University and the other from the University of Massachusetts, who had worked on two separate projects that sought to connect local farmers with Chinatown markets. Both agents were highly discouraged by their experiences with Chinese wholesalers who were uninterested in collaborating with them. The disinterest led the agents to believe that the brokers would not work with people outside of their ethnic groups. This assumption later proved to be untrue; brokers work with many non-Chinese growers, on local and international scales. I also was refused an interview with a Chinese-American wholesaler in Florida on the grounds she did speak English well. After interviewing a trusted friend of this wholesaler, however, one call from him was all she needed to provide me with one of the longest and most vibrant interviews I have had. Suspicion and distrust are not only cited by outsiders to the industry as characteristics of wholesalers, insiders frequently imputed these traits to their colleagues as well. When I asked a Chinese-American farmer (who is the son of a Chinatown wholesaler) if I could talk to his father he said: "You could talk to him, but he will probably lie to you anyway." [2]

I argue that allegations of cultural difference, ethnic solidarity, trust, and distrust are both real and feigned in the Chinese produce industry, and that if they are feigned it is because there is

---

recognizes fifty-five on the mainland, including the majority Han (see Hutchings, 2001; pp. 127-131). Furthermore as Chinese emigrate, they gain further ethnic distinction such as Malay-Chinese or Thai-Chinese. These are very important distinctions, but for the case of comparing Chinatown's food system to other systems, the ethnicity of Chinese in the American context in sufficient.

an advantage to pretending. Chinese brokers organize an industry that serves ethnic products to ethnic populations in the United States. Their markets are based in spatially and ethnically defined enclaves in urban areas, often in enclaves that have their own political structure. Brokers work to keep out competitors to protect their markets. The intentional "isolation" of these business people shielded them from takeover by American food giants, and has allowed them to organize the industry as they see fit. But because Chinatown's food system is operating within the political economy of American agriculture, it too is composed of complex, constantly evolving transnational networks of trade. Chinatown brokers work with many types of growers and distributors, from small, Chinese run farms in New Jersey and immigrant Asian homegardeners in Florida (the homegardeners are the subject of Chapter 5), to agribusiness in California, large Chinese vegetable farms in Florida (the subject of Chapter 4) and contract farmers in Honduras (the subject of Chapter 6). Chinatown brokers are anything but isolated in an ethnic enclave. They are generators of transnational channels of distribution.

ETHNIC ENTREPRENEURSHIP IN CHINATOWN

Many books have been written about the social, political, and economic attributes of the Chinese in New York City (Zhou, 1992; Kuo, 1977; Kwong, 1996, 1997; Lin, 1998; Wong, 1988; Guest, 2003), as well as about he history of the Chinese in the United States (Kwong and Miscevic, 2005). These studies peripherally cover elements of Chinatown's food system as part of the overall economy of Chinatown. There have been other studies that have focused on the produce markets in Chinatown, specifically on the ethnobotany of Chinese fruits and vegetables[3]

[2] Interview conducted with farmer in Florida on May 3, 2005.
[3]Porterfield (1937 and 1951) conducted studies on produce markets in Manhattan's Chinatown. More recently, researchers at the New York Botanical Garden and Queen's Botanical Garden have conducted studies on Chinese

and the economic potential of vegetables sales for a development project in Honduras (Technoserve, 2000), but these studies do not consider the networks of exchange in which the markets are embedded.

Much of the debate surrounding the analysis of Chinatown in New York has been focused on the role of ethnicity in its political economic structure, and Chinatown's relationship to NYC society at large. In a historical analysis of Chinatown from 1870-1974, Wong (1988) used 1965 (the year of immigration reform, see Chapter 2) as a dividing line in the development of Chinatown. He found that prior to 1965 cooperation between Chinese and non-Chinese Americans was not common and that family, kinship, clanship and membership in associations and "Tong" associations were the common basis for business partnerships. Wong wrote that, "The ethnicity of the Chinese (Chinese values, Chinese kinship, membership in various Chinese associations and language) provided a solid basis for the economic activities of the Chinese in this period" (Wong, 1988: 128). He saw ethnicity as a resource for political, economic, and other goal-seeking activities, and suggested that ethnicity could be used as an adaptive strategy within the opportunity structure of the larger society, even in post-1965 Chinatown when links outside of Chinatown and use of city, state and federal social services within Chinatown were more common.

In a recent sociological study of Chinatown, Zhou (1992) also proclaimed the positive economic effects of ethnic solidarity. Zhou characterized Manhattan's Chinatown as an ethnic enclave, based on the ethnic enclave model Portes and Bach (1985) developed to explain the economic success of Cubans in Miami. The ethnic enclave model shows how economic activity within an enclave leads to social mobility and status attainment of ethnic groups. An ethnic

---

plants in New York City. More information can be found by contacting Michael Balick at NYBG or at: http://www2.queensbotanical.org:81/ethnobotanical/introduction.html.

enclave is organized so that exchange can occur primarily within the ethnic group, thus protecting immigrants from under-valuation of their skills in their new society (for a good review of this concept as it pertains to Chinatown in Manhattan see Guest, 2003: 37-44).

Both Zhou and Wong's characterization of the role of ethnicity in Chinatown appears too simplistic, and does not deal with the contradictions, injustice, and exploitation present in the enclave. The ethnic enclave can be a trap, manufactured by Chinese elites to keep the newest Chinese immigrants isolated and vulnerable to labor exploitation (Kwong, 1996, 1997; Guest 2003). Kwong sees ethnic solidarity as a manufactured concept to entice low wage workers to give their loyalty to Chinatown's elite. Chinatown has a deeply divided class structure; there are those that live outside of Chinatown who bring in the capital to employ those that have no choice but to live in Chinatown. Both Kwong and Guest have shown that it is inaccurate to conceive of Chinatown as an enclave whose inhabitants cooperate and work to mutual benefit.

Wong (1988), however, did recognize that the Chinese use their ethnicity to take advantage of opportunities presented by the political economic structure of the broader society. Ethnic entrepreneurship cannot be analyzed as an isolated unit within the enclave; rather ethnic businesses are imbedded in inter-firm relations on multiple scales (Werbner, 2001). The focus on labor earnings and opportunities in the ethnic enclave model obscures the organizational pathways that ethnic businesses create with manufacturers, wholesalers, and retailers. Indeed, it is inaccurate to conceive of Chinatown as a bounded, isolated space, as the idea of an ethnic enclave suggests. Chinatown is a site of transnational activity (Lin, 1998; Guest, 2003; Imbruce, 2006), rendering the boundaries of the enclave fluid, if not limitless. Through fieldwork in both Fujian Province and Chinatown, Guest shows how the Fuzhounese have mobilized transnational religious networks to establish religious communities in their new home, even under the duress

of labor and immigration exploitation faced by most Fuzhounese. Paul Stoller illustrates this very point in his study on West African street traders in New York City. He shows how immigrants work in a networked space, relying on complex, local national and international relations to conduct their business (Stoller, 2002).

Through case studies that I present in this chapter, I show how entrepreneurs in Chinatown's food system have used their ethnicity (in terms of language, kin, place of origin, and membership in social associations) to build business relations through social networking. I also show how shared ethnicity does not sustain unprofitable relationships, or guarantee fair business practices. I discuss how relationships fluctuate over time with changing social, economic, and political pressures, subsequently affecting networks of trade, and places and practices of production (these latter two aspects are the subjects of Chapters 4, 5, and 6).

How and why are relationships formed within Chinatown's food system? How do relationships affect the stability and fragility of the food system? The exploration of these questions contributes to a better understanding of social dynamics and the geographic expansion of food systems, a subject that has heretofore been discussed mainly in terms of macro-structural political economic dynamics. This discussion also also furthers understanding of the role of ethnicity in entrepreneurship in general, and in Chinatown's food system specifically.

SOCIAL NETWORKING: THE USE OF KIN, FRIENDSHIP, AND ASSOCIATIONS IN THE EXPANSION OF CHINATOWN'S FOOD SYSTEM

Seventy-one percent of the actors in Chinatown's food system came into the system through a social relation and sixty-two percent maintain trade with a social relation (see Figures 3A and 3B). Every farmer who grows Chinese vegetables has entered the system through a

relationship with a brokerage firm in Chinatown because brokers control market access. In many cases, brokerage firms were established in partnership with farms (in terms of either joint ownership or a verbal agreement to work together). In other cases, brokers have sought out farmers in new production locales. The establishment and expansion of firms and farms has depended on social relations. I have found four kinds of relationships to be important: (1) kin ties: brothers or cousins have partnered, children of brokers and farmers have opened their own firms or farms; (2) business and social associations: people have met through membership in associations; (3) friendship: friends or friends of friends have become partners; and (4) employment: prior experience as an employee in a brokerage firm or on a farm has propelled some people into ownership (see Figures 3A and 3B for a visual representation of the social relations between the firms and farms in the food system). In the next section I present examples of each of the four types of relationships linking firms and farms in Chinatown's food system followed by a discussion about the significance social relations in agricultural trade.

Kin Ties: Linking New York to Florida

Firms run by patrilineal kinsmen, such as cousins, uncles, and nephews, were most common in pre-1965 Chinatown (Wong, 1988). This trend was largely a result of Chinatown being virtually a "bachelor society" (or more accurately a society of married men whose wives lived in China). Families were relatively uncommon until the G.I. War Bride Bill was passed in 1945, and changed substantially with the immigration reforms of 1965. Many brokerage firms and farms have been established following the tradition of working with patrilineal kinsmen, although there are female entrepreneurs who have built their own businesses or who work in partnership with their husbands.

Two male cousins established Sang Lee Farms, the first Chinese vegetable farm on Long Island that was introduced in Chapter 2. They hired Chinese relatives and friends of relatives to work on the farm. When the original founders retired, their sons took over the farm. The second generation cousins worked together until 1992, when competition made farming harder. Fred Lee still operates Sang Lee Farms; Richard Lee left to open his own greenhouses to grow perennials for landscaping. Fred Lee and his wife work full-time on the farm and they have a core group of Chinese workers that have remained with them for years.

Another example of a father-son farm is Yee Farm. Tommy Yee, the son of a Chinese vegetable farmer in New Jersey, established a farm in Loxahatchee, Florida in 1974. Tommy and his wife Nancy are still farming in Palm Beach County, Florida. Nancy, who was born in Guandong Province and speaks Cantonese and Mandarin Chinese, handles sales. Tommy oversees the farm. They have been working with the same two wholesalers in New York since 1978, wholesalers who also worked with Tommy's father. In 2005, Tommy and Nancy's son joined the farm; he plans to take over when his parents retire.

When Tommy and the Lees began farming in Florida in the 1970's there were two other Chinese farms located in the area. One of those farms, W.C. Farms, survived alongside Tommy, but has recently changed ownership. A long-time Chinatown broker bought out W.C. in 1998. He sold his wholesale businesses in New York and Philadelphia and shifted his focus to farming. The broker encouraged his son to take over the farm; the son accepted the managerial role in 2000.

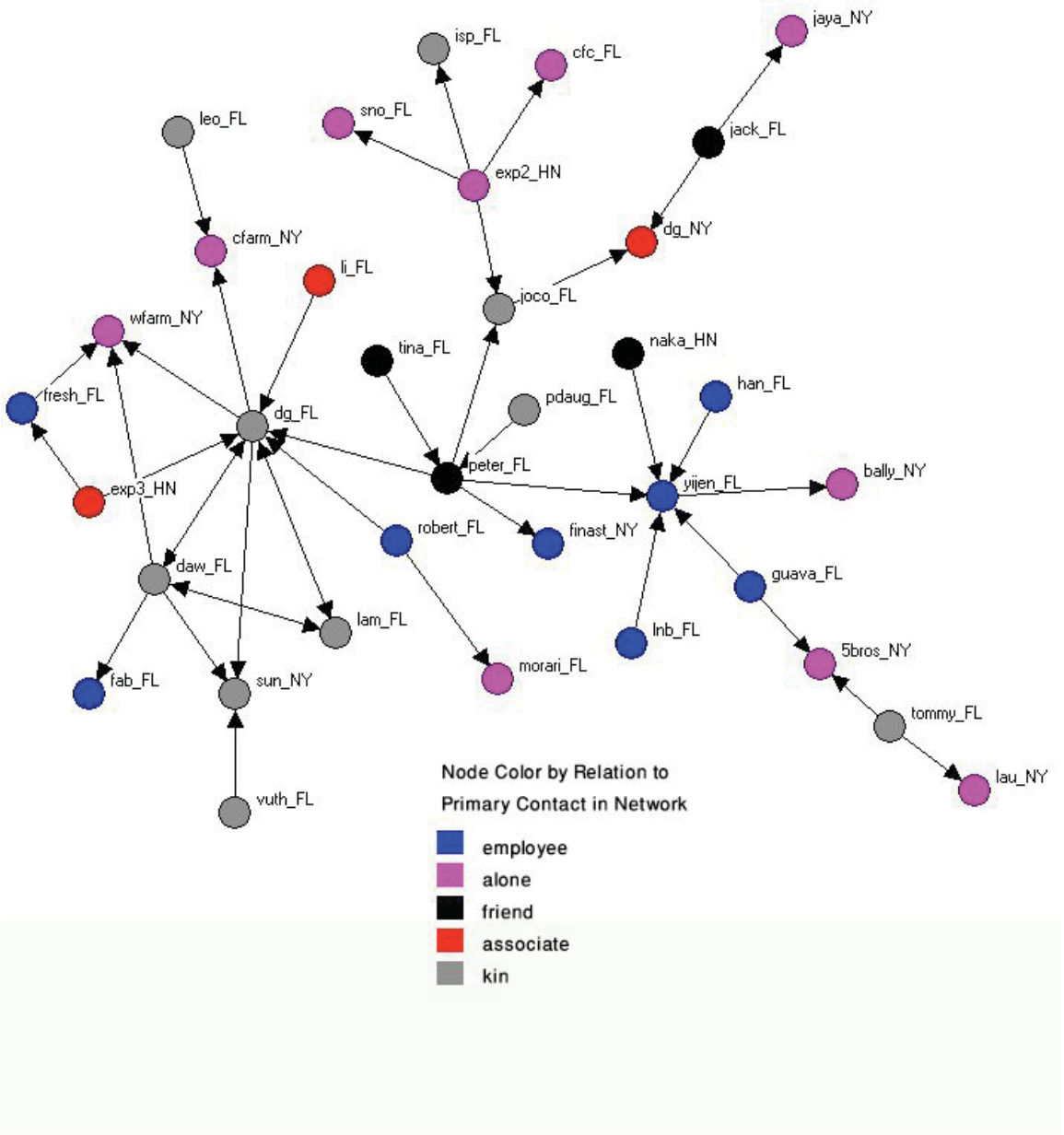


Figure 3A: Trade Network of Distributors and Producers of Asian Vegetables from Honduras, through Florida to New York City. "Nodes" represent exporting firms in Honduras (labeled _HN), importing and distribution firms or farms in Florida (labeled _FL), and distribution firms in New York City (labeled _NY). Arrows represent movement of produce from seller to buyer. Nodes are colored according to the relationship of the firm owner to their primary contact in the industry. 71% of the actors in this network came into the industry through an opportunity opened up by a social contact. 28% came into the network through kinship, 23% through former employment, 11% through friendship, and 9% through an association.

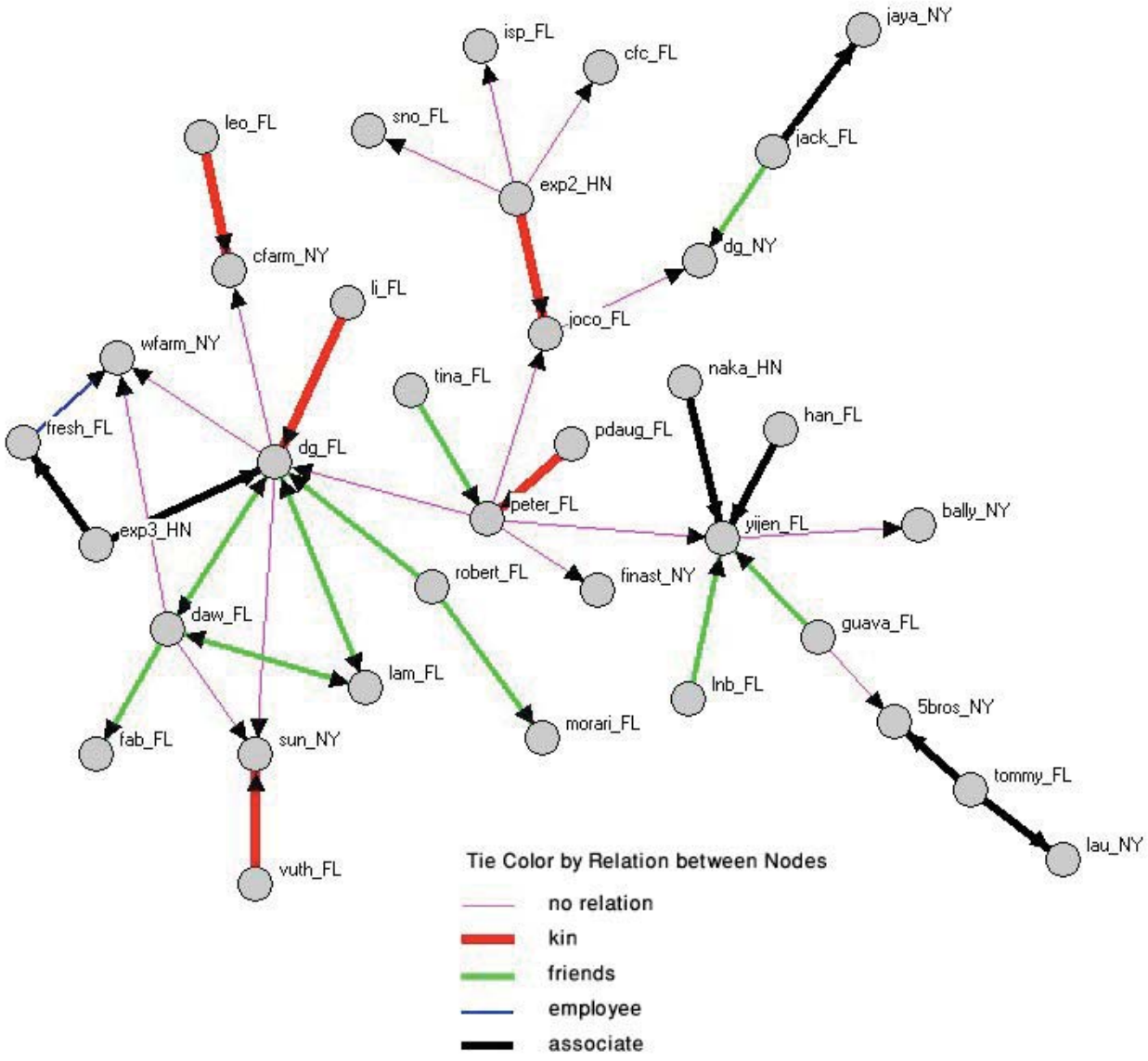


Figure 3B: **Trade Network of Distributors and Producers of Asian Vegetables from Honduras, through Florida to New York City**. "Nodes" represent each exporting firm in Honduras (labeled _HN), importing and distribution firms in Florida (labeled _FL) and distribution firms in New York City (labeled _NY). Arrows represent movement of produce from seller to buyer. The colors of the ties between nodes represent the relationship between the buyers and sellers. While some trade is done by people with standard business relations, "no relation", 62% of actors in this network maintain trade with someone they have had a previous relationship. 13% of the actors in this network trade with kin, 26% with friends, 18% with former associates, and 3% with former employees.

In addition to Sang Lee, Yee, and W.C. Farms, a New York wholesaler sent his brother down to Florida to open a hundred acre longan and Thai guava grove in 2000. A father-son farm and distribution firm in Florida City gained ties to a Cambodian supermarket owner in St. Paul, Minnesota through marriage. Another farmer bequeathed his daughter-in-law a forty-acre Thai guava grove upon her marriage to his son. The sons of three other farmers in Miami-Dade County have joined the family businesses and expanded the farms. Farms in the New York Metropolitan Area expanded through kin ties. Florida became, and continues to be, connected to New York through kin ties.

Taking Chances with Associates: Double Green, a New York City and Florida City Partnership[4]

The founders of Double Green Farm, Inc. and Double Green Produce, Inc. in Florida City, and Double Green Wholesales, Inc. in New York City met through a church in Flushing, Queens. Laura Huang, a Taiwanese immigrant and resident of Flushing took it upon herself to help the Wus, a Taiwanese family who wanted to move from Haiti to New York. She helped the Wu children get into a preferred school and helped the family find an apartment. Laura Huang and Yun-Feng Wu quickly discovered they were both interested in going into business. Wu suggested importing fish from Haiti because it was plentiful. Huang saw the need for vegetables for the growing Taiwanese population in Flushing. Since Wu had expertise in agriculture (he is an agronomist), he and Huang decided that they could open a production and distribution business. Wu would run the farm and Huang would run the wholesale warehouse in Manhattan's Chinatown

[4] All of the individuals from this point on in the chapter are protected by the use of pseudonyms.

Wu and Huang opened Double Green in 1985 but faced many challenges in their first years. It was more difficult than Wu expected to farm Chinese vegetables under Florida's ecological and economic conditions. In China, agriculture is very labor intensive. In Florida, however, it is too expensive to use the labor-dependant methods Wu knew from China. He was forced to develop new techniques and needed time to learn how to farm in Florida City. Laura, however, was not willing to wait and went on to find new farmers. Although the partnership dissolved, Wu and Laura helped one another realize their goals of opening a business and they both went on to build successful businesses.

Double Green in Florida Looks to Associates in Haiti and Honduras

Wu used his professional experience and his contacts in Haiti and Honduras to develop export agriculture. In Haiti he had been the Chief Agronomist of the Taiwanese Mission for development of agriculture. There is also a Taiwanese Mission in Honduras where Wu had many friends. In Honduras, the Mission is a key part of the Chinese vegetable industry. The Honduran Mission put Wu in contact with a new exporter of Chinese vegetables from Honduras. In 2005 Wu was importing three to four container loads of produce per week from Honduras. Haiti has more infrastructural challenges to exporting goods than does Honduras, and Wu's production there has waned. Production in Honduras, on the other hand, is growing. Since he has established himself as a successful businessman and farmer in Florida, he consults the Honduran mission on the production and marketing of Chinese vegetables. Wu was recently invited to Honduras to speak at a workshop for agronomists in Central America interested in the export of Asian vegetables to the United States. Wu now considers himself the "father of Chinese vegetables" in South Florida because he has brought so many people into the business.

Taking a Friend's Advice: Double Green in NYC Finds a New Grower in the Glades

After Laura Huang left the partnership with Wu, she looked for potential business partners through her social networks. Some friends went into partnership with her, others introduced her to their own friends as potential partners. She "took care" of growers who turned out to be good. By "taking care," Laura means giving her farmers a good price and keeping them aware of exactly what the market wants. Both of these aspects are critical to a farmer's and wholesaler's success.

One of the growers with whom Laura took an extraordinary risk is Jack. At the time, Jack was growing chili peppers for Pace foods. His friend and neighbor, Tommy Yee, however, grew Chinese vegetables for Laura. Jack spent a lot of time in Yee's packing house because he borrowed the vacuum cooler to pack his own peppers. Inadvertently, Jack learned about farming Chinese vegetables from Tommy.

At that time Laura was looking for a new grower, and requested to meet Jack. Jack felt he could not afford to take the risk of trying new crops, nor did he have the capital to expand. During their first meeting Laura offered Jack $25,000 to start growing vegetables for her. Jack left that meeting with a check and a verbal agreement to grow Chinese vegetables for Laura. Now he owns seventeen hundred acres south of Lake Okeechobee and ships about 1000 boxes a day of Chinese vegetables to New York.

From Employee to Owner: The Case of Yi Jen

Yi Jen worked for Yun-Feng Wu (Double Green) at his packing house in Florida. She aspired to own her own business and wanted to educate herself about the produce industry by working for someone else. When she was ready to go out on her own, she raised $70,000 in cash

from friends and family and set up a farm and packing house in Homestead, Florida. While Yi Jen was working at Double Green she had opportunities to be in contact with many suppliers. Yi Jen had lived in the Dominican Republic after immigrating from China and before coming to the U.S., so she spoke some Spanish. Yi Jen made a connection with a Honduran export company that was started by two Japanese-Dominican men whom Yi Jen happened to know them from her time in the Dominican Republic. When Yi Jen was ready to open her own business she called her acquaintances from the Dominican Republic. They were unhappy with their importer and were interested in building new relationships (see Chapter 6 for more details on the Japanese-Dominicans). In 1994, Yi Jen went into business importing Chinese vegetables from Honduras. The business between Yi Jen and her Honduran supplier has been the one of the most stable and most well-regarded in the Chinese vegetable trade today.

The Business of Expansion and the Significance of Social Relations

Chinatown's food system is built upon social networks. Kinship, friendship, former employment, and community associations have proven to be the means by which entrepreneurs form partnerships and trade relations. While social networking is undoubtedly a part of many industries, it is significant to note the importance of social networking in the expansion of agricultural trade because vertical integration and corporate mergers have been the dominant means of expansion in the industry. The cases presented here represent a rather small industry but are illuminating because they show that flexible, risk-taking individuals can prosper in the global agricultural economy. Analyzing the social relations embedded in global trade also presents the opportunity to understand trade based on social, rather than only economic, terms. In

Chinatown's food system, profit is the underlying motive, but it is not the only motivation of decision-making and practices. People accept monetary losses to preserve relationships.

Yi Jen, for example, does not work with many people. Rather, she builds strong relationships with the few with whom she does work. Yi Jen treats her business relationships like long-term investments. She will take a loss so that her farmers can turn a profit. Yi Jen has explicitly stated in an interview, "after all, what was one season's loss on one crop with one farmer, when you have had that farmer working with you for many seasons and you will have them for many more?" [5]

Tommy Yee has worked with the same two brokers in NYC for almost 30 years. Tommy has averred that, in business "one hand washes the other." In interviews he has stated that he knows that if he compromises with his brokers to their benefit, that they will return the favor.[6] Long-term stability appears to be more important to Tommy than garnering the highest price he can in the short-term.

Yi Jen's emphasis on cooperation, as well as Tommy's attitude of reciprocity are philosophies I heard espoused numerous times by successful farmers and brokers in Chinatown's food system and is why people build trade relations based on social relations. Trust and mutual respect, in addition to a quality product (from the farmer) and a good price (from the broker) are continually pointed out as necessary ingredients for long-term success. Timely payment is also crucial. Farmers are very vulnerable to market conditions because they sell highly perishable goods. Chinatown brokers in New York City work on consignment, which means they do not pay until after shipment is received. Farmers have to ship their product in good faith.. The brokers refuse to pay for a product that they haven't yet seen. If the produce is of poor quality or

[5] Interview conducted in Homestead, Florida on August 20, 2003.
[6] Interview conducted in Boynton Beach, Florida on April 3, 2004.

if there is overproduction and the market is flooded, the broker will not receive a high price. Everyone has experienced not getting paid for shipped produce. The only way to survive in a consignment system like this market is to find buyers and sellers who can be trusted. Trusted partners are found through social networks.

CHANGING RELATIONSHIPS, CHANGING PRACTICES

The examples above show the ways in which entrepreneurs in Chinatown's food system have established and expanded their businesses through relationships of trust. They meet potential partners through social networks and they strengthen and expand relations that prove to be mutually beneficial. These examples bring out social aspects of trade relations and show how individuals function in global markets. But these examples do not suggest that relations don't change over time and trust isn't broken. Actors in the system use the resources they have to overcome competition, sometimes to the detriment of others. Just as there are the examples of cooperation and respect built through social networks, there are examples of deceit and distrust that have ruined relationships. Shared ethnicity, language, kinship and friendship are not enough to maintain business relationships if they are not profitable, and sometimes social relations are used for exploitive purposes.

The mantra of Chinatown's wholesalers is that "Quality is no good!" It is true that the market demands very high quality produce, and wholesalers cannot sell produce of low quality (bruised, wilted, discolored items). Because wholesalers have the final say in price setting, farmers often feel that they are purposely told their produce is of low quality so that they can be paid less. Unless farmers fly to New York, there is no way to prove their suspicions correct. Also, wholesalers in New York sell produce to other wholesalers in Philadelphia, Boston, and

Washington D.C., so they try to keep prices down to allow for one more exchange before the produce goes to retail. Because of this dynamic, New York, the largest market for Asian produce, is considered a "dumping ground," a place to sell produce that cannot be sold elsewhere for whatever price a farmer can get.

Changes: Sang Lee

Sang Lee farm has a new shingle outside the farm gate. It announces Sang Lee's positioning in the farm-chic rurality of the North Fork of Long Island. The farm boasts of "over 250 varieties of naturally grown produce;" naturally-grown means "utilizing sustainable agricultural practices and integrated pest management."[7] Sang Lee's competitive advantage is their ethnic twist. Online or at the farmstand you can buy premium baby greens like mini bok choy and nyu choy for premium prices ($5.50 for 8 ounces of snow pea shoots). The farm, and its image, has drastically changed since its inception as the first Chinese farm on Long Island in 1948. But of course, agriculture on Long Island has also changed. Now it is an industry that fosters agritourism and caters to the elite summer lifestyles of Long Island's East End.

Fred Lee, son the founder of Sang Lee farm and current proprietor, just gave up his last account in Chinatown. It was a hard decision for him, but he couldn't emotionally or financially accept having truckloads of harvest returned, unpaid. This practice became more and more frequent when Fred's wholesaler could not sell his produce. It was simply too expensive compared to Mexican grown products. Not only did Fred lose the sale of his harvest, he would also have to pay to dump it. Fred's long-time associate offered him the chance to go to Mexico and set up a farm, but Fred refused. He wanted to stay on Long Island, so he did what the other farms around him were doing. He diversified his product line and markets directly to restaurants,

consumers, and caterers. He produces baby vegetables, cut flowers and heirloom tomatoes. He kept many of his Chinese vegetables, and now assembles bags of ready to cook stir-fry greens and sauce. He set up a farm stand and began to advertise his own organic philosophy. In this case, nternationally-grown produce was undercutting Fred's business, and loyalty was not enough to market his produce profitably.

Changes: Jack

Jack, the Florida producer, maintained a relationship with Laura, the Chinatown wholesaler, for ten years; in 2005 that relationship ended. In Jack's opinion, Laura lost her aggressiveness in the market. Without Laura fighting for a good price for him, working closely with him to understand his needs, and keeping him informed about market demands, as she had done in the past, Jack states that he could not continue to work with her. Jack clearly emphasizes that the Chinese vegetable market is not a niche market. There is no added value in growing Chinese vegetables, and competition is growing every day, particularly from Mexico, where high quality vegetables can be grown at a fraction of the cost. If he does not have a broker working for him, pushing his product and demanding the prices that he needs to make a profit, then he will not continue growing Chinese vegetables. In fact, in the 2003-2004 growing season Jack lost money on his Chinese vegetables. The other vegetables he grew carried his farm. Jack left Laura when another broker in Chinatown offered to buy his produce at higher prices.

[7] Information gathered on June 30, 2005 at: www.sangleefarms.com.

CONCLUSION

Entrepreneurship has been a traditional path to success by overseas Chinese. Many aspire to own their own businesses, or in partnership with friends or relatives. When businesses prospered, owners would help others start businesses, "That's why one often finds Chinese businessmen dominating a particular trade in a country—with many owners related" (Kwong, 1996: p.67). Personal relationships, or *guanxi*, have been described as the cornerstone of Chinese businesses, important for the establishment of trust and for facilitating smooth business transactions (Kiong and Kee, 1998), as we have seen in the examples above. Indeed, ethnic Chinese have established themselves strongly in commercial and financial sectors, particularly in Southeast Asia. The World Bank estimated that the combined economic output of the ethnic Chinese outside of China was about US$400 billion in 1991 and up to US$600 billion in 1996 (Yeung, 2000). But it can be easy to essentialize the role that shared ethnicity plays in Chinese business outside of China. The motivation to build personal business relations based on ethnic, linguistic, and kin ties may reflect not come loyalty or nationalism, but simply profit seeking. In her critique of narratives of Chinese nationalism and capitalism, Aiwa Ong states, "Despite the tantalizing appeal of "our kind of people", and the racialist construct of overseas Chinese, the official view [given by the Director of the Overseas Chinese Affairs in China] is that in practice, one cannot count on the loyalty of overseas Chinese, only on their desire to make a profit off China." (Ong, 1997: 338).

Ethnicity is used in networking; kinship, community associations, friendship, shared nationality, and language do unite entrepreneurs in Chinatown's food system. The ethnic character of the food products, as well as the community in which they are sold (Chinatown) further characterizes the system as separate from society at large, and shields these businesses

from takeover by American agribusiness and grocery corporations. Because Chinese language skills and a Chinese identity are needed to work within Chinatown to supply the retail end of this system, Chinese brokers control market access. Non-Chinese are involved at other points along the commodity chain—in farming and exporting from Latin America—but trustworthy relationships with Chinatown brokers are necessary for long-term success. Trust can be very elusive, it is not guaranteed by shared ethnicity, or the other types of social relations described in this chapter. Successful farmers and firms are constantly negotiating their business relationships, extending and intertwining the social network that unites those involved in Chinatown's food system.

Chapter Four

Multi-million Dollar Farms:
3600 Acres of Chinese Vegetables in South Florida

Chinese vegetable farming in Florida developed as an offshoot of an agricultural industry that was well established in New York and New Jersey to supply Chinese populations of northeastern metropolitan areas. Farmers from the northeast expanded their operations to Florida in order to exploit the warm winter climate of Florida. Sang Lee Farms was one of the first farms from the New York Metro Area to move to Florida in the 1950's (see p. 34). Chinese growers from New York, New Jersey, and the Toronto area followed the Lees to Florida, making it an important source of winter Chinese vegetables. Chinese farms are now scattered around Central and South Florida. Their contribution to the agricultural industry is substantial, particularly in Palm Beach and Hendry counties where 3600 acres of Chinese vegetables, i.e., the majority of production is currently located. This study focuses on the three large Chinese vegetable farms of Palm Beach and Hendry counties.

THE CHINESE VEGETABLE FARMS

There are currently three large farms in Palm Beach and Hendry County that produce the majority of Chinese vegetables in southeastern Florida[1] (see Figure 4A for a map of South Florida). The farms differ in their history, but share some basic socioeconomic as well as organizational characteristics (see Table 4.0). The owners of the Chinese vegetable farms have ties to brokers in New York City (see passages about Tommy and Leo in "Kin Ties: Linking New York to Florida" on p. 70 and about Jack in "Taking Friend's Advice: Double Green in NYC Finds a New Grower in the Glades" on p. 76) and they grow, pack, and ship produce to

[1] There are many small Chinese farms scattered throughout Miami-Dade, Manatee, Orange, Seminole, Bradford, St. Lucie and Hillsborough counties not included in this study, and several medium-sized Chinese farms in Miami-Dade County. There is another large Chinese farm not included in this study. It is a 2,000 acre farm on Florida's west coast near Tampa that grows more than 50 crops, from Chinese radishes, bok choy and long beans to a variety of melons and squashes, specialty vegetables and herbs.

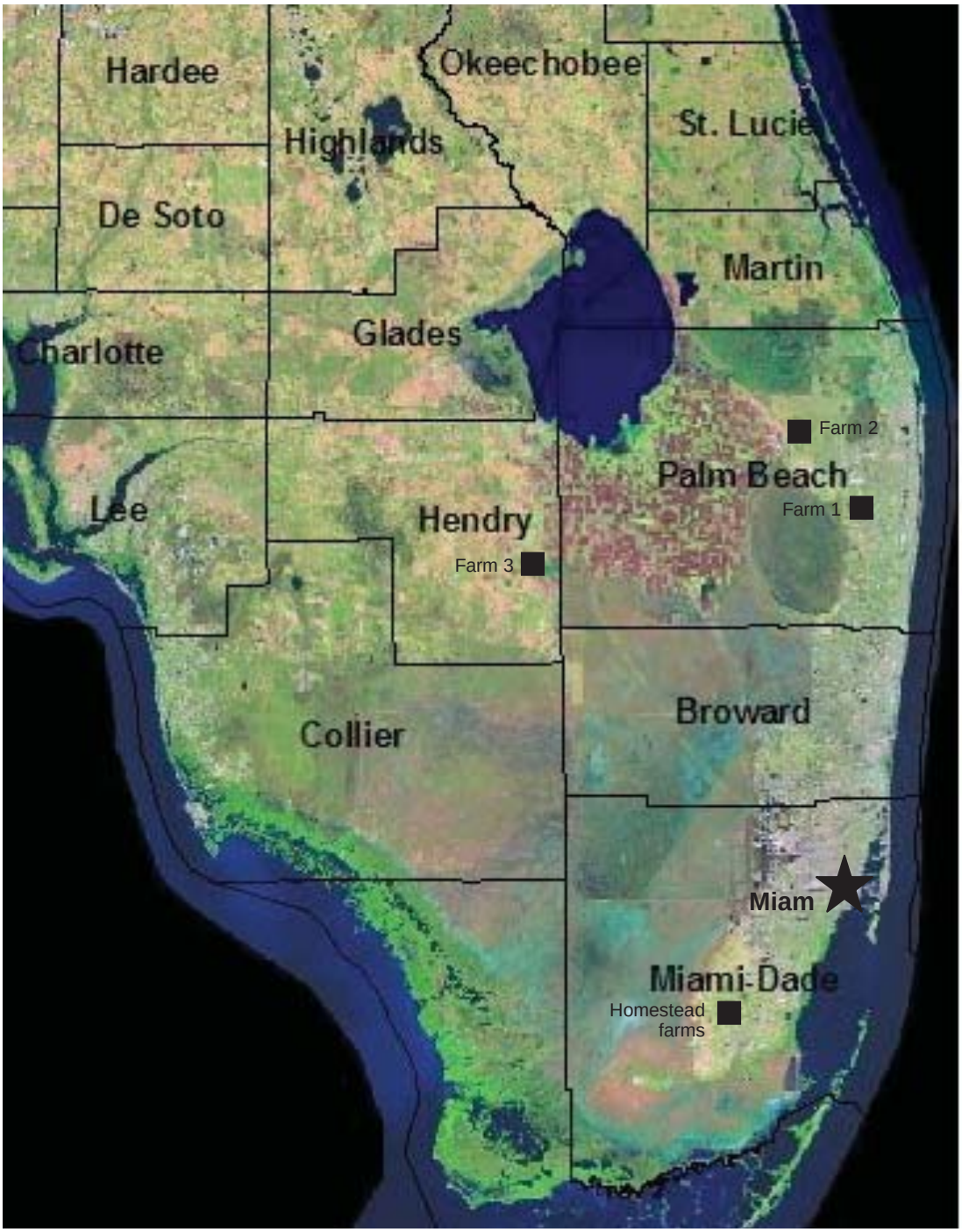


Figure 4A: Map of South Florida: County outlines are laid over a satellite image in order to show the main features of South Florida in relation to the farms in this study. The area south of Lake Okeechobee is the Everglades Agricultural Area, to the south and southwest are Everglades National Park and Big Cypress National Preserve, and the most densely populated part of South Florida is along the southeastern coastal ridge. Satellite imagery and county line data were provided by the South Florida Water Management District.

Table 4.0: Characteristics of Chinese Vegetable Farms in Palm Beach and Hendry Counties

Farmer Characteristics	**1**	**2**	**3**
Ethnicity	Chinese-American	Chinese-American	American
From a farming family	Yes	No	No
Full time farmer	Yes	Yes	Yes
Age of farmer	57	30	50
Years farming	30	5	20
Relative in Chinese vegetable business	Yes	Yes	No
Household size	4	4	4
Family members work on farm	Wife, son	No, children are babies	Wife, son
Other household income	No	No	No
Farm Characteristics	**1**	**2**	**3**
Acres	900	1000	1700
Harvestable Acres*	1205	2517	1147
Acres owned	450	0	1700
# of Chinese vegetables	14	16	14
# of non-Chinese vegetables‡	0	4	20
Maximum labor force	80	60	100
Annual output-volume in cartons, 2004-05	380,000	1,350,000	1,201,929
Annual gross income, 2004-05	$4 million	$15 million	$11 million

* harvestable acres takes into crop rotations and number of harvest cycles per year

‡ farm 1 strictly grows Chinese vegetables, farm 2 is experimenting with green beans, calabaza and lettuces in a joint venture, and farm 3 has maintained 66% of his acreage in eggplants, peppers, basil, and other specialty crops

New York City's Chinatown; the largest shipments occur from September to May. The Chinese vegetable farms discussed in this chapter are highly capitalized enterprises. They have costs and returns in the millions of dollars and range from 900-1700 acres in size.

Farm 1 [2]

Farm 1 is the oldest Chinese vegetable farm still in operation in Florida. It was established in 1974 by the son of a New Jersey farmer. The New Jersey farmer was a Cantonese immigrant who began farming in Warren County, New Jersey for the Northeast's growing Chinese populations. When the harvest season ended, the farmer would buy and ship vegetables from Florida to his customers in New York and Boston to keep them supplied until the next season (Snyder, 2004). Steve, the farmer's son, used to drive a truck between New York and Florida to pick up the vegetables they purchased from Florida. During this time he identified a "broken link" in the commodity chain. Brokers in New York couldn't supply a steady product, and farmers in Florida didn't have consistent buyers. Steve decided to begin his own farm in Florida growing vegetables to seasonally complement the crops grown on his father's farm in New Jersey.

From an initial 110 acres, Farm 1 has grown to its current size of 900 acres. The farm is divided into nine fields across Palm Beach County and, recently, into St. Lucie County to the north. Steve's son came on board in 2005 to manage the farm; their plans are to continue farming as they have for the past two generations. Steve is the only farmer in the group of three farms in this study who does not grow non-Chinese crops. He has an established reputation in Chinatown; he has been working with the same two wholesalers in New York since the 1970s. Steve and his

[2] Information on Farm 1 was gathered over two interviews on February 3, 2004 and April 28, 2005 in Boyton Beach, FL.

family state that they want to keep doing what they know how to do best; they don't experiment with new crops. They focus on ways to lower their costs while maintaining high quality produce.

Farm 2 [3]

Farm 2 has been a competitor of Steve's since the 1970s. In 1998, however, Farm 2 was sold to a Chinese produce broker with outlets in New York and Philadelphia. The broker sold his wholesale businesses and shifted his focus to farming. When his son Leo finished his MBA, he became manager of Farm 2.

Leo worked with the previous owner of Farm 2 for two years before he assumed primary responsibility for the farm in 2000. Leo is working to expand the size of his farm and his number of buyers. He just acquired two hundred acres in the Everglades Agricultural Area and is renting space at the packing house of a large corn grower who has many supermarket accounts. Leo hopes to grow lettuces for supermarkets. He is also involved in a joint venture with a string bean and squash grower. Leo aspires to enter mainstream markets because he feels that there is not as much growth potential in the production of Chinese vegetables.

Farm 3 [4]

Farm 3 is geographically isolated from the other two farms in Palm Beach County. It is located in the middle of sugarcane country, south of Lake Okeechobee. Jack used to grow peppers and basil under corporate contracts, but shifted his focus when a Chinese broker in New York City made him a substantial offer (see p. 76). Jack now runs the largest farm, 1700 acres,

[3] Information on Farm 2 was gathered over two interviews on February 5, 2004 and April 29, 2005 in Boynton Beach, FL.
[4] Information on Farm 3 was gathered over two interviews on January 25, 2004 and April 27, 2005 in Clewiston, FL.

and grows one truck load a day (roughly 1000 boxes) of Chinese vegetables for one broker in New York City. But Chinese vegetables only account for thirty-three percent of his business; Jack grows many other ethnic and specialty crops. He grows for Mexican, Indian, and Hmong populations across the country, as well as for gourmet food purveyors. Jack markets the same products in multiple ways to satisfy the varied needs of his customers.

Jack is a self-taught farmer. He learned much about growing Chinese vegetables from his broker who used to fly to Florida on a regular basis to teach Jack. Jack also experimented with many crops not traditionally grown by other Chinese-American farmers. He has grown blanched chives (yellow, etiolated chives grown under mulch), and green and red amaranth (which he says he introduced to Chinatown). He likes to grow less common, higher priced specialty crops.

GROWING PRACTICES

The three Chinese vegetable growers in this study have a range of experiences, but they all insist that they are still learning. Jack says that the unpredictability and problem solving involved in farming is what he loves about his work. Two University of Florida extension agents whom I interviewed consider these farmers to be "pros" who do not need much help from the Cooperative Extension.[5]

The following section will give a brief overview of general as well as some specific examples of growing practices. It is not meant to be comprehensive or definitive. Farming is very dynamic; each of these farmers has shown that he is constantly acting and reacting to fluctuating political, environmental, economic, and social conditions.

[5] I interviewed former Palm Beach County Extension Agent Ken Schuler on April 28, 2005 and current Palm Beach County Extension Agent Darrin Parmenter on April 26, 2005 in Florida.

Table 4.1: Planting and Harvest Times for Chinese Vegetables in South Florida.
Data from University of Florida-IFAS Extension Service.

Vegetable	Planting Time	Days To Harvest	Harvest Time
Chinese mustard	Sep-Mar	30-40	Sep-Apr
Chives	Sep-Mar	50-75	Oct-Apr
Chrysanthemum leaves	Sep-Mar	40-50	Oct-Apr
Chinese Broccoli	Oct-Jan	75-90	Dec-Mar
Chinese Cabbages	Oct-Jan	60-70	Nov-Mar
Daikon (Radish)	Oct-Feb	60-70	Nov-Apr
Kohlrabi	Oct-Mar	70-80	Nov-Apr
Eggplant	Jan-Mar, Aug-Sep	75-90	Mar-May, Oct-Nov
Winter Melon	Mar-Apr	140-150	June-Aug
Chinese Okra	Mar-Sep	50-65	Apr-Nov
Bitter Melon	Mar-Sep	80-90	May-Nov

Growing Season

Most Chinese vegetables are continually sown from early to mid September through late April (see Table 4.1). Each farmer has his own rotation schedule and turns over beds from two to five times each season. The rain and high temperatures of the summer prevent successful growing of *Brassica* crops, so there is much less planted from June through August. Some farmers grow non-Chinese crops that are better suited to summer conditions.

Land Preparation and Planting

Planting fields are divided into blocks. The sizes of the blocks vary, but are on average two acres. There are typically 100 feet between irrigation canals, with cross ditches for surface drainage. Beds are 44 inches wide with six feet between centers. There are three to four rows per bed (Figures 4B and 4C). Sugarcane windbreaks are used on some fields. Windbreaks can be as close as 15 feet. Windbreaks have advantages and disadvantages. They keep the crops moist by not allowing the passage of wind, which is not good for leafy vegetables. But windbreaks do help

prevent young crop destruction from sand storms and can prevent pest infestations from moving between blocks.

Raised beds are formed and prepared for planting with a cage cultivator. A surface sprayer is used to increase surface moisture before seeding. Four rows are used for smaller sized crops such as Chinese broccoli, baby bok choy, Shanghai bok choy, and yu choy; rows are made 11 inches apart. Two to three rows per bed spaced 14 inches apart are used for larger sized crops such as napa or bok choy. Chinese radishes may be grown three rows per bed in the fall and spring, and four rows per bed during the winter. Closely spaced crops such as broccoli and yu choy are precision seeded and usually not thinned. Slightly larger crops, such as baby bok choy and Shanghai bok choy, may be precision seeded or hill planted and thinned. The large sized crops (napa, bok choy, and Chinese mustard) are hill planted and thinned (Schuler, 2001).

Fertilizer, Herbicides and Pesticides

The coral rock base makes the soil basic, so a fertilizer containing acid is used to adjust the ph. After seeding, reemergence herbicides are used (Figure 4D). Usually two to four side-dress applications of fertilizer are made depending on rainfall and length of crop season. Dry fertilizer is usually used early in the season when it can be incorporated by cultivation. Liquid fertilizer may be knifed in after the crop begins to close over the row. Weeds in the row are pulled by hand when crops are thinned and hand weeding may be done a second time depending on weed pressure. Weeds in the ditches are removed so that they do not interfere with water flow.

The farmers follow integrated pest management plans. Napa cabbage and bok choy face the most severe pest pressure and “soft” or “harsh” pesticides may be used depending on the

severity of the outbreaks (see Schuler, 2001 for a more complete description of pesticide use). Farmers employ a number of preventative strategies to control pest and disease outbreaks. In order to keep up with pest populations, two of the three farmers hire a pest scout who methodically checks each field for pest infestations on a weekly basis (Figure 4E). Other non-chemical pest control techniques are used to encourage natural enemies of pests. Sweet alyssum is planted as a nectar source for predator wasps that eat leaf minors, sunflowers attract predators for thrips, and bird boxes provide a nesting place for birds that eat insect pests (Figure 4F). Crop rotation is also used to spatially and temporally reduce the risk of pest and disease outbreaks, although since most of the crops are *Brassica spp.*, they are hosts to the same pests.

Irrigation

Subirrigation (also called seepage irrigation systems) that irrigate by water table management are used in Palm Beach and Hendry Counties. Water is introduced into parallel open ditches from canals and flows under the root zone through the soil profile to raise the water table to a level that allows for sufficient wetting of the plant roots. Water moves by gravity through the soil profile under the root zone, and into the root zone by capillary action. Water losses occur due to deep percolation below the crop root zone as well as to subsurface lateral flow to surrounding areas.

Mismanagement of the water table can lead to increased physiological disorders like bacterial soft rot, and to increased risk of disease. One farmer noted that he keeps his water table seven inches below the surface of the soil. He found that if it is higher, there is a greater chance

Figure 4B (above): Newly prepared land for planting. Irrigation canal can be seen to the left.
Figure 4C (below): Crops planted three rows to the bed. Wind breaks are adjacent to canals

Figure 4D (above): Newly seeded beds are being dusted with herbicide.
Figure 4E (below): A weekly pest scout monitors pest populations.

Figure 4F (above): Bird boxes are used to attract eat insect pests.
Figure 4G (below): A truck picks up harvested crates in the field.

Figure 4H (above): Contracted laborers methodically harvest and pack Shaghai bok choy.
Figure 4I (below): Bok Choy ends are cut and arranged upright for cleanliness.

of damage due to *Phytophthora,* a fungal blight (commonly called late blight or potato blight). At the time of my visit, he was conducting a field experiment with the University of Florida to determine the best water table height. Adjustments of canal levels are used to prevent frost in the winter. Canals are raised to absorb heat during the day, and release heat at night. Row covers are also used if there is danger of frost.

Farm 3 is in the C-139 Basin and is required to follow the water management rules of the area (see section below on the Politics, Agriculture and the Environment of South Florida). Jack,. Farmer 3, has a 300-acre water detention area to mitigate phosphorus pollution of the surrounding natural wetlands. All overflow from the farm is pumped into the detention area to undergo natural filtration. There is a sketch map of Farm 3 in Appendix G that shows the layout of the fields in relation to the conservation area.

Harvest

Packing takes place in the field (Figures 4G – 4I). Contracted laborers cut and arrange vegetables directly into the boxes. Efficiency of the harvest, both in time and quality of the pack, directly affects the profit margin. Farmers have slightly different approaches to managing harvest; these are discussed below in the section on competition strategies. Boxes of harvested products are taken from the field directly to the packing house where they are cooled with water or with a vacuum cooler in order to bring the field temperature of the crop down to refrigeration temperatures quickly. Packed and cooled boxes are stored in temperature-controlled coolers while they await shipment.

Table 4.2: Seed Sources for Chinese Vegetables

Takii and Company, Ltd. Kyoto, Head Office 180 Umekoji Inokuma Shimokyo-Ku Kyoto, Japan American Takii, Inc. 301 Natividad Rd. Salinas, CA 93906 ph: (408) 443-4901 fax: (408) 443-3976	**Hung Nong Seed Company** Seoul, Head Office Woojin Building 1338-20, Seocho-Dong Kangnamku, Seoul 135, Korea ph: 553-0971-80 fax: (02) 555-5602 Hung Nong California 768 St. Francis Blvd. Daly City, CA 94015 ph: (415) 992-6991	**Sakata Seed Corporation** Yokohama, Head Office 1-7 Nagata Higashi 3-Chome PO Box Yokohama Minami #20 Yokahama, Japan 232 ph: (045) 715-2111 fax: (045) 715-2112 Sakata Florida Office PO Box 1103 Lehigh, FL 33970-1103 ph: ph. (941) 369-0032 fax: (941) 939-2715 Sakata Seed America PO Box 880 8095 Serene Dr. Morgan Hill, CA 95037 ph: (408) 778-7758 fax: (408) 778-7768
Known-You Seed 26 Chung Cheng 2nd Rd Kaohsiung TAIWAN, (REP OF CHINA) ph: (07) 2919106-9 fax: 71450 KNOWNYOU	**Evergreen Y.H. Enterprises** P.O. Box 17538 Anaheim, CA 92817 U.S.A. Tel/Fax : (714) 637-5769	**Corona Seeds WorldWide** 590-F Constitution Ave. Camarillo, California 93012 USA Tel:(805)388-2555 Fax:(805)445-8344

Seed Sources

Most farmers order seed from a variety of seed sources across the United States and East Asia. Farmer 3 saves seed from celery, Chinese eggplant, and amaranth. Otherwise farmers have reported using the seed companies listed in Table 4.2

PRODUCTION VOLUME AND VALUE OF CHINESE VEGETABLES

Palm Beach County Agricultural Extension has kept detailed production statistics on the two main growers of Chinese vegetables from 1987 to 2001, and continues to monitor general trends. The Extension website includes the Chinese vegetable sector in the agricultural profile of the county:

> "With an estimated $1.12 billion in total agricultural sales for 2003-04, Palm Beach County leads the State of Florida, all counties east of the Mississippi River, and its one of the ten largest in the United States. Palm Beach County leads the nation in the production of sugarcane and fresh sweet corn. It leads the State in the production of rice, bell peppers, lettuce, radishes, Chinese vegetables, specialty leaf, and celery."[6]

Indeed, Chinese vegetables are big business in Palm Beach County. In the 2004-2005 growing season, from 3877 harvestable acres there were 1.77 million packages sold, with a farm value of $19 million. Growth in the sector stagnated between 1987 and 1998. Since Farm 2 came under new ownership, however, there has been a sharp rise in overall production. Between 1998 and 2004 harvestable acres increased by 38%, the volume of sales increased by 114%, and the value has increased by 160% (see Figures 4J, 4K, and 4L).[7] Not only has the extent of production increased, but there is more production per acre (see Figures 4M and 4N). Hendry County Extension does not keep records on Chinese vegetable production; Jack is the only farmer who grows Chinese vegetables in Hendry County. He provided me with a detailed cost and returns analysis of his crops for seasons 2003-04 and 2004-05. During that period he produced 187,000

[6] Quoted from the Palm Beach County Agricultural Extension website: http://www.pbcgov.com/coopext/agriculture/ag_facts.htm

[7] In addition to the two main growers in Palm Beach, Farms 1 and 2, there are three large lettuce and leaf growers in the Everglades Agricultural Area that are not included here but also grow Chinese cabbage on muck soils. They farm roughly 500 acres of Chinese cabbage (napa, bok choy), about 2% of their overall production (Darrin Parmenter, personal communication). Their production statistics are not included in this study.

boxes valued at $1.77 million in 2004-05. Chinese vegetables make up only twenty percent of his sales volume.

Approximately twenty-five vegetables comprise the category “Chinese Vegetables” in Palm Beach and Hendry counties (see Appendix E for a list of vegetables with images). The diversity of Chinese vegetables grown in Florida has increased over the past fifteen years. The percent composition of vegetables has shifted to reflect new market preferences (Table 4.5) In 1996, baby bok choy, cilantro, shanghai bok choy and winter melon were added to the suite of vegetables grown in Florida. Chinese celery as well as chives were added in 2001, and Shanghai baby bok choy in 2004. The percent of napa and bok choy has decreased from 53% of the total crops in 1987 to 27% in 2004 to accommodate the new vegetable preferences. The baby vegetables in particular have become very popular, mirroring the trend in mainstream baby vegetables.

Vegetables are the most valuable agricultural commodity group per acre in South Florida. Vegetables average over 3.5 more than sugarcane and three times more than citrus (see Table 4.3). The average value per acre of vegetables in Palm Beach is $5,568 with a median of $6,400; it is a little lower in Hendry County. The range in value of vegetables, however, is vast. Specialty peppers (chili peppers) are by far the most valuable, at $39,977 per acre, with bell pepper second ($21,212 per acre) and specialty eggplant third ($19,840). On the lower end in the $3,000-4,000 range are sweet corn, beans, cucumbers, herbs, radishes and cabbage.

Chinese vegetables are among the least valuable vegetables, but their value per acre has been increasing over the years (Figure 4N). The value of each vegetable varies according to

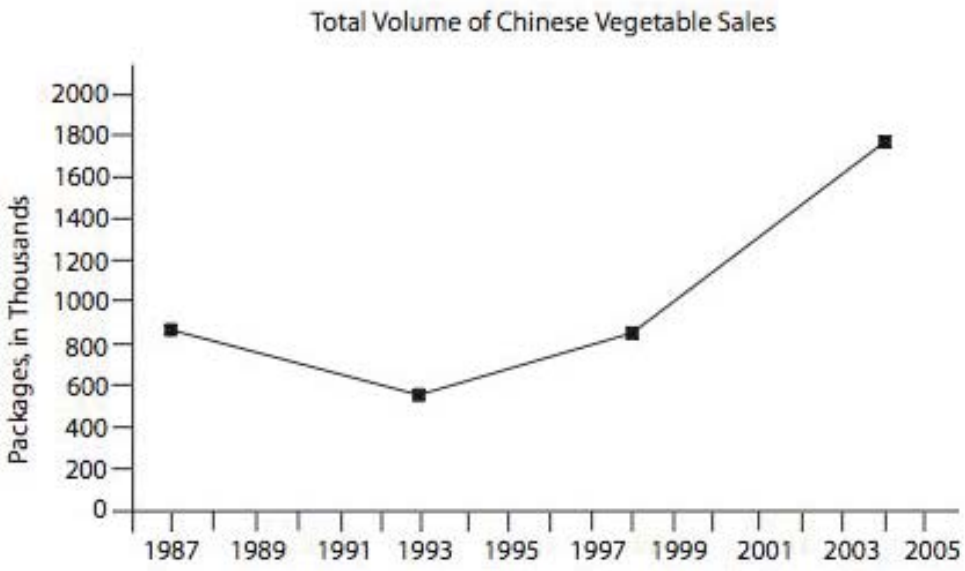


Figure 4J: Between 1998 and 2004, the volume of sales has increased by 114%. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1987-2001 and by author for 2004.

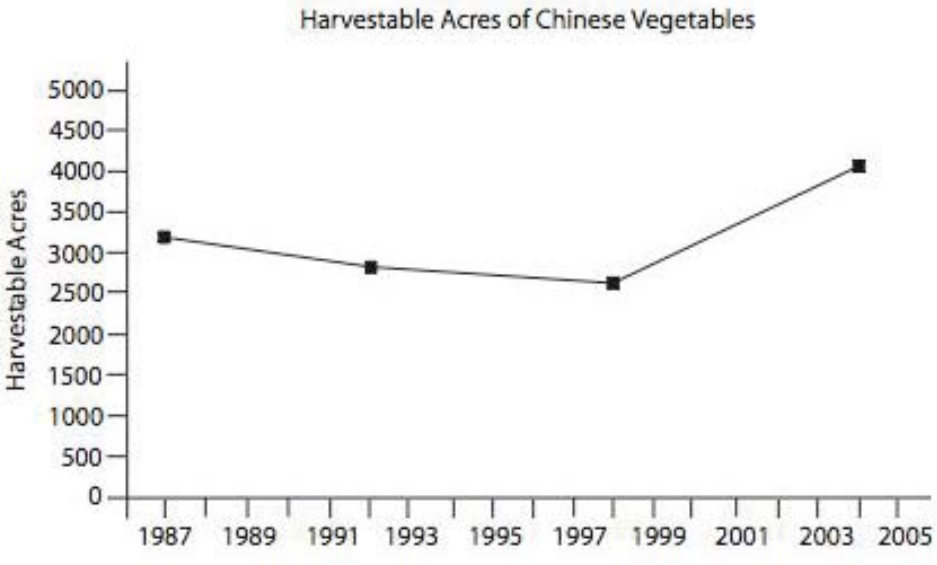


Figure 4K: Between 1998 and 2004, harvestable acres have increased by 38%. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1987-2001 and by author for 2004.

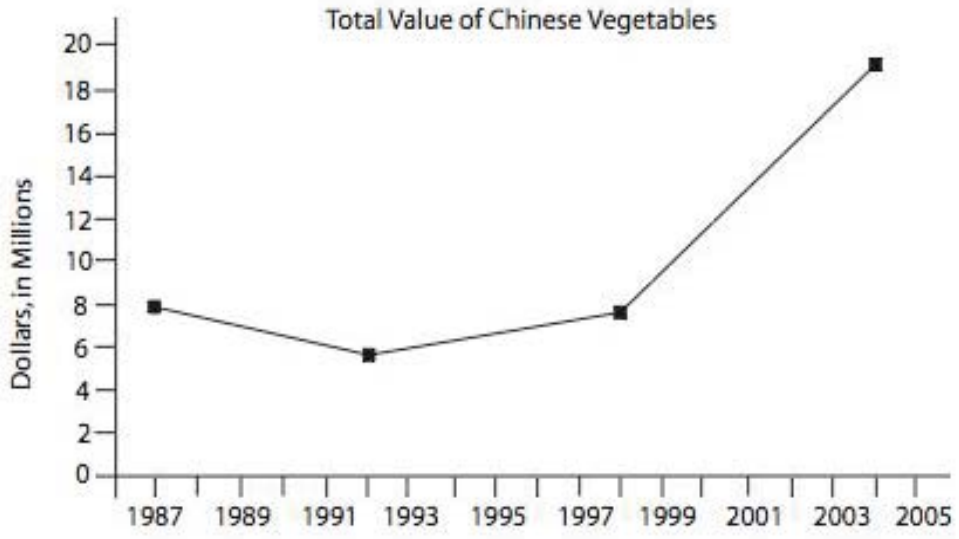


Figure 4L: Between 1998 and 2004, the value of vegetable sales has increased by 160%. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1987-2001 and by author for 2004.

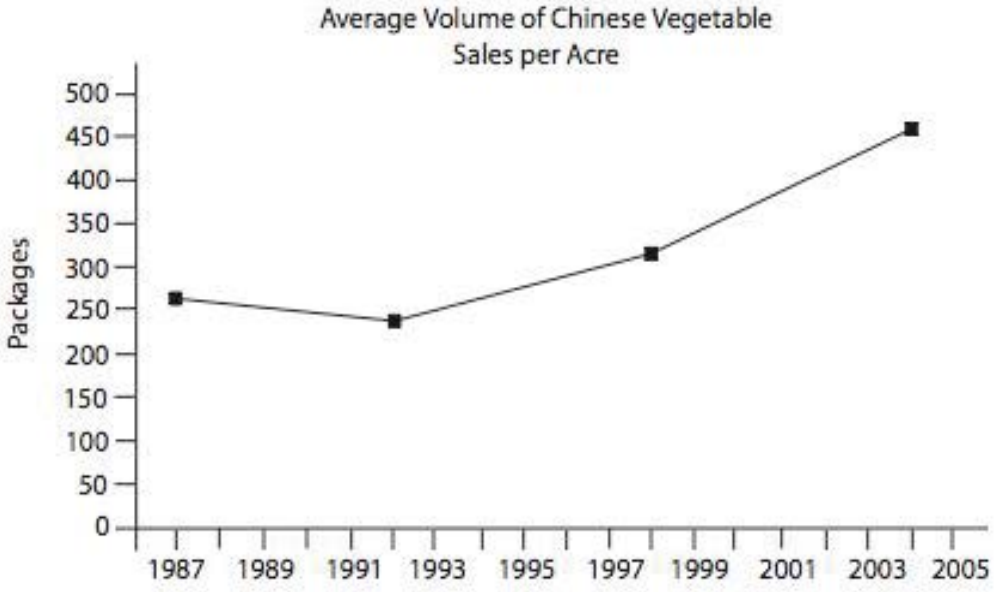


Figure 4M: The volume of vegetables sold per acre has been rising, making Chinese vegetables more valuable. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1987-2001 and by author for 2004.

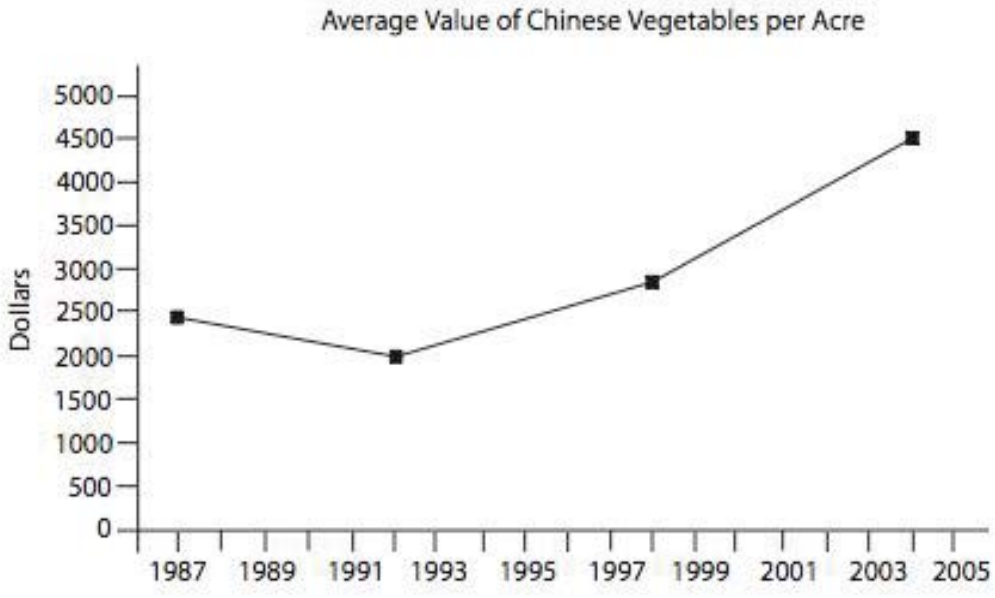


Figure 4N: The value of vegetables sold per acre has been increasing alongside the rise in volume per acre. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1987-2001 and by author for 2004.

Table 4.3: Palm Beach and Hendry Counties Most Important Agricultural Commodities
Data is from Palm Beach County, University of Florida-IFAS Agricultural Extension. Vegetables and Rice figures represent harvestable acres, meaning the same acres may be counted more than once if there are multiple plantings per year. The other commodities are described in grow acres.

County	Commodity	Acres	Value ($)	Value per acre ($)	Year
Palm Beach	Vegetables	51,116	276,895,372	5,416	2003-04
	Sugarcane	416,825	606,189,130	1,454	2003-04
	Rice	21,860	7,541,700	345	2003-04
	Sod	11,006	38,820,000	3,527	2003-04
	Total	526,090	1,009,186,881	---	2003-04
Hendry	Vegetables	30,000	149,254,000	4,975	2002-03
	Sugarcane	85,000	76,876,000	904	2002-03
	Citrus	100,000	191,925,000	1,919	2002-03
	Cattle	450,000	16,071,000	36	2002-03
	Total	665,000	434,126,000	---	2002-03

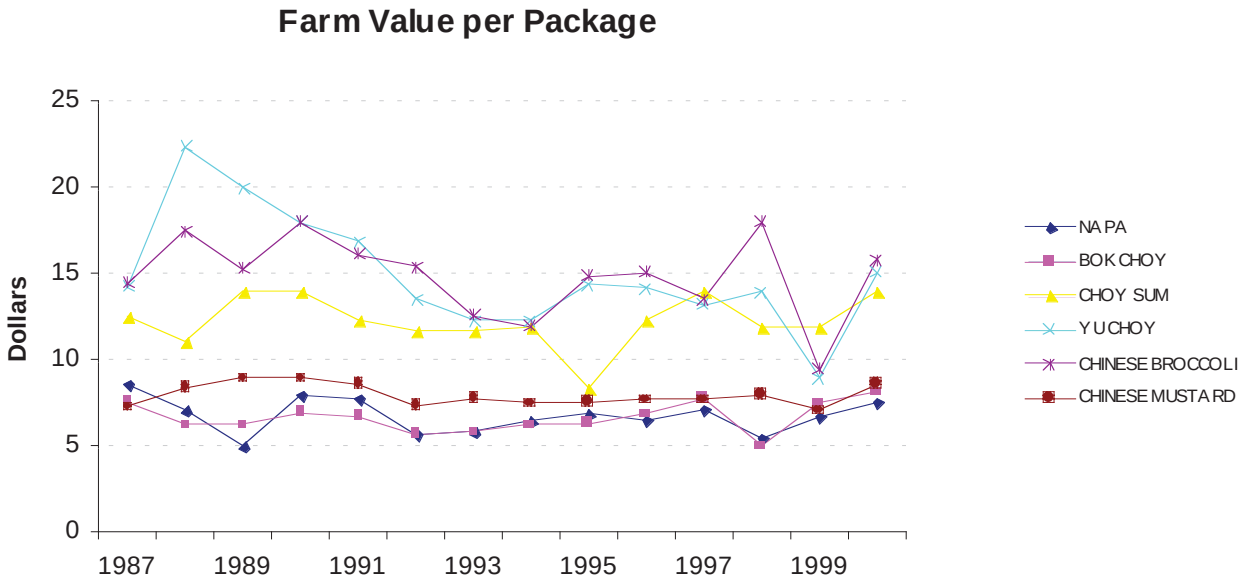


Figure 4O: The prices obtained on farm for vegetables have not grown over the years. The increasing values per acre a result of the rising production volumes rather than market prices. Data presented for Palm Beach County, Farms 1 and 2. Data collected by Ken Schuler 1989–2001.

Table 4.4: Reported average prices of select crops for the 2004-05 growing season. Prices differ considerably per farm although farms part of the same markets.

Crop	Farm 1	Farm 2	Farm 3
Napa	6.70	12.00	11.73
Bok Choy	7.50	8.00	11.93
Baby Bok Choy	7.50	6.00	15.00
Yu Choy	9.00	15.00	22.00
Chinese Mustard	7.12	8.00	8.25
Chinese Radish	6.50	8.00	7.20
Chinese Celery	17.00	--	29.62
Kohlrabi	10.30	--	10.00

Table 4.5: Shift in composition of vegetables grown in Palm Beach County – Shifting production trends reflect shifting market demands. The percent volume of Chinese vegetables produce in Palm Beach County has shifted between 1987 and 2005. In 1996 baby bok choy, cilantro, Shanghai bok choy and winter melon were added to the suite of vegetables grown; in 2001 Chinese celery and chives and in 2004 baby Shanghai choy were added. The percent of napa, bok choy and yu choy decreased to accommodate the new vegetables. Data for 1987-2001 collected by Ken Schuler, former Extension Agent of Palm Beach County, and by the author for 2004-05.

Crop	1987-88 % volume	1992-93 % volume	1996-97 % volume	2001-02 % volume	2004-05 % volume
Napa Cabbage	32	31	21	13	24
Bok Choy	21	16	9	12	3
Chinese Radish	13	8	11	18	10
Yu Choy	12	20	14	9	13
Chinese Broccoli	10	11	7	9	12
Chinese Mustard	8	8	10	6	12
Choy Sum	3	5	2	2	1
Kohlrabi	1	1	1	2	1
Baby Bok Choy			10	10	15
Cilantro			2	3	1
Shanghai Bok Choy			10	12	2
Winter Melon			3	4	2
Chinese Celery				0.3	0.1
Chives				0.5	0.2
Baby Shanghai Choy					4

fluctuating market prices and harvest volumes per acre. Kohlrabi has been the least valuable at $1700 per acre and Chinese celery the most valuable at $4400 on average per acre. Values fluctuate because there are no set prices in the industry; pricing is determined by the volume and quality of production in Florida, Mexico, California and other places that produce Chinese vegetables. Farmers have reported different average prices for each crop in the same year (see Table 4.4). Although prices have fluctuated over the years (see Figure 4O), the average value of Chinese vegetables per acre has increased since 1987. Average value per acre, therefore, is not associated only with price; it is associated with the volume sold per acre. Even if prices go down, if volume increases the overall value per acre can increase. Also, farmers are producing higher priced crops, like baby bok choy, yu choy, and Chinese broccoli. From the production data presented here, farmers appear to be improving production.

SOUTH FLORIDA'S BUILT, AGRICULTURAL, AND NATURAL ENVIRONMENT

Although Farms 1, 2, and 3 in this study are independent and self-sufficient farms, their agronomic and business practices, as well as their potential to continue farming in the future are shaped by their environment. Production volume and value of Chinese vegetables has been increasing in spite of numerous environmental constraints. Land use in South Florida consists of three starkly different models: a densely populated and rapidly urbanizing eastern seaboard, a highly productive agricultural area on drained wetlands, and the vast preserves of sawgrass prairies, mangrove and cypress swamps, pinelands, and hardwood hammocks, as well as marine and estuarine environments.

The natural and altered physiographic features of South Florida contribute to very different patterns of land use in Palm Beach and Hendry counties. Palm Beach County

encompasses 2,023 square miles and is located between Lake Okeechobee, the Everglades and the Atlantic Ocean. The eastern part of the county, the Atlantic Coastal Ridge, is highly developed, and agriculture is predominantly found in the Sandy Flatlands and Everglades Agricultural Area in the central and western parts of the county. In 2004, there were 493,880 acres dedicated to agriculture in Palm Beach County, representing 39 percent of the total land area of the county. Hendry County is predominantly wetlands and drained wetlands for agriculture. It is landlocked, located in south central Florida, west of Palm Beach County and southwest of Lake Okeechobee. Its area is 1,190 square miles (761,600 acres), 90% of which is agricultural land (refer to Figure 4A for a map of South Florida).

While Palm Beach County has undergone extremely rapid suburbanization in the past several decades, Hendry County is the frontier for development. In Hendry there are 36,210 people and 12,294 housing units (United States Census, 2000). The population density is 31/mi^2, with 11 housing units per mi^2. There are four towns, the largest of which is Clewiston with a total population of 6,460. Palm Beach County is almost double the size of Hendry County in area, but half of that area is the Everglades Agricultural Area (EAA), which is largely devoted to agriculture. The population of Palm Beach County is predominately located on the Atlantic Coastal Ridge, an area that is approximately 10 miles wide along the eastern coastline of the County. Therefore, in approximately the same land area as Hendry County, the population is over thirty-one times the size in Palm Beach; there are 1,131,184 people. The population density is 573/mi^2, and there are 556,428 housing units at an average density of 282/mi^2. In 1998 the Sierra Club designated Palm Beach County as the most sprawl-threatened medium-sized metropolitan area in the nation.

Although the population of Palm Beach County has grown 138% from 1970-2000, the county is still the most valuable agricultural county in the state, and among the top ten in the nation. Its production in 2003-04 was worth $1.12 billion. Hendry County is below that in value at $434,126,000, although its agricultural area is greater (see Table 4.3). In Hendry, the predominant agricultural activity is cattle pasture, occupying approximately half a million acres. The value per acre of cattle production is very low, in part because the pasture acreage in Hendry embraces wetlands, palmetto thickets, and pine forest. Some of this land is becoming conservation land; the state has recently purchased 100,000 acres from private owners for preservation. The state is primarily interested in conserving land that is contiguous with Panther Glades State Preserve, Big Cypress, and Everglades National Park.[8]

The agricultural importance of South Florida is undisputed; it provides the nation with 70% of its winter fruits and vegetables. In 1997-98, S. Florida contributed 55.7% of the cane sugar and 22% of the total sugar produced in the United States (Schueneman, 2002). South Florida was intentionally engineered to be exactly what it is: central to the nation's food supply. In the 1950's the Army Corps of Engineers began draining the wetlands south of Lake Okeechobee to create the Everglades Agricultural Area (EAA), an area of 700,000 acres that spans eastern Hendry and western Palm Beach Counties. The Central and South Florida Flood Control Project is the primary means of flood control, drainage, and irrigation of South Florida. The project consists of the channelized Kissimmee River that flows into Lake Okeechobee, the impounded Lake Okeechobee, three Everglades water conservation areas totaling 869,800 acres, and an intricate system of over 1400 miles of canals and levees with pumping stations and flood gates. Runoff from rainfall is removed by pumping stations and forced into the conservation

[8] This information was provided by Gene McAvoy, University of Florida Extension Agent in Hendry County.

areas, or siphoned off into the Atlantic Ocean and Gulf of Mexico. Runoff from the EAA used to be backpumped into Lake Okeechobee.

The EAA represents one-third of the historic 2.3 million acre Everglades wetland system. The C-139 basin, where Farm 3 is located, is an extension of the EAA. The C-139 basin covers approximately 170,000 acres located southwest of Lake Okeechobee entirely within eastern Hendry County, west of the EAA basin. Both the EAA and the C-139 Basin are highly productive agricultural areas with rich organic peat or muck soils (histosols). The major crops in the EAA basin include sugar cane, vegetables, and sod, and secondary crops including rice and citrus. The main agricultural products in the C-139 basin include vegetables, citrus, sugar cane, and cattle.

Sugarcane is the second most valuable agricultural commodity for the state of Florida next to citrus. The rapidity of change in S. Florida agriculture is astonishing. Putting Florida's cane crop into perspective: prior to the Cuban embargo in 1961, Florida had only 50,000 acres of cane.[9] Some people feel that if and when the Cuban embargo is lifted, the Everglades Agricultural Area may experience a drastic change in sugar production. Citrus canker has also lead to the destruction of many citrus groves. Some citrus growers have turned to other crops. If sugar growers were to abandon South Florida, an immense amount of land would be free for other uses.

POLITICS AND AGRICULTURE IN SOUTH FLORIDA

The alteration of the water regime of South Florida, initially to support agriculture and increasingly to support residential development, has been a major cause of wetland decline and

[9] To read more about the agricultural situation in Florida see the University of Florida's website: http://edis.ifas.ufl.edu/SC032.

degradation and has pitted agriculture against the environment. Agricultural fertilizers and tillage practices have exacerbated the water quality problem. Oxidation of the peaty muck soils as they are drained, dried, and tilled causes the release of nitrates into the water cycle. The formation of excess nitrogen leads to eutrophication of the Lake and contamination of drinking water from leakage into the Biscayne Aquifer. Phosphorus runoff from chemical-intensive sugarcane and vegetable farms has changed the native plant communities of the Everglades. There has also been a negative effect on the fauna supported by native plants.

The environmental impacts of the fundamental alteration of the complex hydrologic patterns have led to many political challenges for South Florida. In 1988 the U.S. Attorney's office in Miami filed suit on behalf of the Fish and Wildlife Service and the National Park Service against the Florida Department of Environmental Regulation and the South Florida Water Management District, for pumping water which exceeded pollution standards into the Everglades without a permit. A settlement to clean up the pumped effluent from the EAA was reached in 1991, but counter legal challenges to water regulation by agricultural interests delayed action.

Finally, in 1994 the Everglades Forever Act (EFA) decided that Stormwater Treatment Areas and Best Management Practices (BMPs) implementation for the EAA and C-139 basins offered the best available technologies for achieving interim phosphorus water quality goals of the Environmental Protection Agency. Everglades Agricultural Area farmers are required by the EFA to reduce the total phosphorus in the runoff from their land by 25% each year by implementing BMPs to clean the water. The annual phosphorus load reduction is calculated by comparing the current year's amount with that of the 10 year base period of 1978-1988, before BMPs were in place and adjusted for differences in rainfall between the two periods. Unlike the

EAA basin's goal of achieving a 25-percent reduction of total phosphorous loads from historic baseline levels, the goal of the C-139 basin is to maintain total phosphorous loads at or below historic baseline levels. The EFA mandated that landowners within the C-139 basin should not collectively exceed the annual average phosphorus loading observed during the base period extending from October 1, 1978 to September 30, 1988.

EAA farmers have implemented a variety of BMPs to reduce the levels of phosphorus coming off their farms. The main BMPs include efficient fertilizer application, control of erosion and sediment, and effective storm water pumping operations.[10] Instead of pumping water directly off farm into water conservation areas, the EFA mandated the creation of Stormwater Treatment Areas (STAs). STAs are large, constructed wetlands that remove pollutants from stormwater runoff. Runoff from the Everglades Agricultural Area is routed through an inflow canal to STAs. The water was first diverted into two upper cells where the initial nutrient removal occurred. Water was then routed to two smaller cells for secondary treatment. Phosphorus is naturally removed in aquatic systems by deposition and/or being taken up by aquatic plants. When the water has passed through the STAs, it is then discharged to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (the first of three water conservation areas), located to its east. The EFA further mandates that specific water control districts located in the EAA that previously discharged to Lake Okeechobee divert their discharges south through the EAA, through use of STAs and BMPs.

DEVELOPMENT AND AGRICULTURE

Now that agricultural runoff is better managed and nutrient loads reaching the Everglades have been reduced, South Florida is dealing with another great pressure: development. Farmers are no longer the enemy to those concerned with preserving open space. In the face of sprawling residential developments with sod lawns and artificial lakes, developers are considered to be far worse than farmers. The Vice President of the Audubon Society of Florida commented that, "it's obvious the continuation of agriculture in the EAA would be more benign environmentally than having the area turn into South Florida's version of Los Angeles Valley" (Santaniello, 2004). For those who thought the remoteness of the EAA would protect it from development, there are signs that this may not be so. A Tampa-based developer approached a farm in the EAA, and expressed interest in converting 1,500 acres of that property into an aero-club development with a runway for private planes, one to two acre home sites, a golf course and stores. Current residents and farmers in western Palm Beach and Hendry Counties have seen an inflation of land values as a result of this speculation. A Hendry County Agricultural Extension Agent told me that three years ago he bought 40 acres that include natural wetlands for $4,000/acre. Now that land is worth $15,000/acre. If this trend continues it is unclear whether it will be profitable to farm such expensive land. Since cattle pasture has a very low return per acre (about $0.03 in Southwest Florida), rangeland has already turned into vegetable production areas or preserved wetlands. Conversion to more intensive, lucrative types of agricultural land use may be a solution, but it must be realized that intensive land use will have more nutrient runoff which can easily throw the delicate water system out of balance.

---

[10] The South Florida Water Management District's website is a good source of information on Best Management Practices and Stormwater Treatment Areas as mandated by the Everglades Forever Act: http://www.sfwmd.gov/org/wrp/env_rest_efforts.html.

Between 1992 and 2002 Palm Beach County lost 16% of its farm land; it declined from 637,934 to 535,965 acres. To counteract these trends, the County adopted the Managed Growth Tier Systems[11] in 1999, and designated use-specific development areas: urban and suburban, exurban, rural, agricultural reserve, and the Everglades. However, this plan has not reduced the inflation of land values, and farmers struggle with the cost of land, as well as the possibility that rented land may be sold off to developers. Farmers also have to deal with new, non-agricultural neighbors, who are sensitive to pesticide drift. Critics argue that the Tier Systems will do little to control growth in the EAA, however, since the plan does not specifically restrict development there.

COPING WITH THE PRESSURES OF FARMING IN SOUTH FLORIDA

Development pressures have been affecting all of the farms described above, but Steve's land is closest to the edge of development. Steve farms on five non-contiguous fields in Boynton Beach and Lake Worth where property is valued as high as $80,000/acre. He owns only one of those fields, for which he sold the development rights; the other fields are leased. His two Loxahatchee locations are his largest and he may lose those in the next few years. He is preparing for this loss by moving his production to St. Lucie County north of Palm Beach where development pressure is lighter. He bought two small to medium sized citrus farms and is in the process of converting them to Chinese vegetables. He has been growing vegetables on one of the groves for three years now, and should have more in production in 2005-2006 growing season.[12]

Palm Beach County, like many other counties in the nation, has a program to buy development rights from farmers to protect agricultural land from development. On the surface,

[11] http://www.co.palm-beach.fl.us/pzb/planning/mgplanning/mangrow.htm

development easements seem like a good deal for agriculture. Farmers get paid for the development rights and the land stays in agriculture, preserving its rural character and open space. Steve, however, regrets selling the development rights to his field. He was offered $1,500 per acre in a place where land is selling for $40,000 per acre. If he wanted to sell his property, he could not get market value for land that cannot be developed. He feels that it is unjust to expect farmers to bear the financial burden of preserving open space.[13]

Leo, Farmer 2, has also stated that he wishes to become a landowner, but currently leases all of his land. The majority of his land is in Loxahatchee, and he has another 300 acres on muck soils in the Everglades Agricultural Area. Although he leases, he says that he is not worried about losing his land because his landlord is a public proponent of agriculture. However, Leo is faced with another challenge of changing land use in Palm Beach County. As the value of land increases, new forms of land use that can be sustained on such valuable land appear. Polo clubs and stables are becoming more popular on the edges of residential and agricultural land in Palm Beach County. Horse owners have contested some of Leo's practices that disturb their horses, suggesting that different rural land uses (in this case agriculture and horse stables) are not always compatible.[14]

Jack, Farmer 3, is the most secure of the three farmers in his land tenure situation. He has been able to buy all of his farmland and he owns 1700 contiguous acres. Although his farm is located in the C-139 Basin far removed from the suburban and urban coastline, his land is not

[12] Steve indicated his intentions to expand production to newly converted citrus groves to me during an interview on April 28, 2005 in Boynton Beach, FL.
[13] Land preservation was also discussed in the interview with Steve on April 28, 2005 in Boynton Beach, FL.
[14] Information gathered in interview on April 29, 2005 in Boynton Beach, FL.

undesirable to developers. He was made an offer in 2005 that he refused; at that time he had no plans to quit farming.[15]

Competition and Marketing

In addition to development pressures, farmers are constantly fighting competition from California and Mexico. As is discussed in the next chapter, Honduras is not a competitor of the Florida farmers since Honduras farms grow complementary crops. But the low production costs in Mexico and the economies of scale in California undercut Florida's prices. Florida farmers benefit from any disruption in supply from California and Mexico. Extreme weather events cause booms and busts in crop production. When one place suffers the loss of crops due to extreme weather, other places benefit. The following anecdote illustrates this point. In the 2004 season there was flooding in Mexico that caused farmers to lose much of their crop. Leo, in Florida, reacted immediately by seeding several blocks of gai lan (Chinese broccoli). He harvested the gai lan when there was none available from Mexico and sold it at $18 per box, a very high price. The horrific hurricane season of 2005 affected South Florida.[16] Vegetable farmers lost everything during Hurricane Wilma. The hurricane set the harvest schedules back one month, causing great monetary losses. While I have not documented the effect of Wilma on Californian and Mexican production, I expect that they profited from Florida's production losses.

The Chinese vegetable farms retain control over the marketing of their produce by packing and shipping their own produce. Instead of growing vegetables and selling them to a local packing house to pack and market their harvests (like many Florida farms do), they grow, pack, and sell their own produce. This business model has certain advantages for the farms.

[15] Information gathered in interview on April 27, 2005 in Clewiston, FL.
[16] Information gathered in interview on April 29, 2005 in Boynton Beach, FL.

Packing and shipping produce enables farmers to sell directly to wholesalers rather than through a third party broker. Farmers control the quality of their pack. They can decide what is “good” verses “bad” quality produce, and they can market their produce under the farm name; produce boxes proudly display the farm name, address, and phone number. Boxes serve as advertisement and make the farmers well-known in Chinatown. By building their reputation they attract the interest of new customers.

Pricing is extremely tenuous in this system. Although pricing basically follows the laws of supply and demand, because there are relatively few brokers who control the market, price setting can also reflect relative power. Different farmers are paid different prices for the same vegetables in the same seasons (see Table 4.4 for reported prices). Brokers manipulate the system. Brokers are the ones who obtain and deliver information about supply and demand. They also have much to gain or lose from this information. Rumors about a disruption in supply can just as easily affect pricing as can a real hurricane.

Inconsistent pricing is one reason why relationships between farmers and brokers are extremely important. Farmers need to know that their brokers are working to get them the best possible prices. A good broker is always aware of the national and international situation. Steve attributes the longevity of his success to his relationship with his brokers. He takes the feedback from his brokers seriously and uses their suggestions to produce a marketable product. He has been working with the same two wholesalers in New York since 1978. He knows what to plant and how much to plant because he trusts the opinions of his brokers. He also understands that not all of his products will be profitable. Of ten crops, only eight may be profitable. He states that he can accept the loss on two crops because he understands that prices fluctuate, and that if he accepts a low buying price when prices are low, his broker will make it up when the price is

high. He feels that volume and consistency of supply are most important in maintaining business relations for the long term.[17]

Leo is in a different situation, he sells his products to his father's wholesale companies. Although his father recently sold his businesses, he is still involved and Leo does not have to fear that he will be taken advantage of by his Chinatown broker. His concern lies in another area. He is working on changing his customer base, and expanding sales outside of Chinatown. He says that he is trying to reverse the industry maxim that 80 percent of product goes to 20 percent of the customers. He doesn't want his customers to have power over him. An obstacle to doing this in Chinese markets is that Chinatowns work on a micro-basis; retail vendors are very small (which is why brokers control sales). Leo wants to work with supermarkets. While products like napa cabbage and bok choy are regularly sold in mainstream supermarkets, most Chinese vegetables are not. Leo would have to convince supermarket buyers to try new products, or he would have to grow what they want. He is currently involved in a joint venture growing calabaza (a variety of squash preferred by Hispanic customers) and green beans; this combination shows that he is trying to move some production outside of the Chinese market. At the time of our interview, he was waiting to hear about a new contract with a supermarket that may allow him to add 200 more acres to his farm. Even if this deal doesn't come through, Leo feels that his business is progressing simply because he can now take the time to solicit buyers in whom he is interested, rather than just respond to buyers interested in him.[18]

Jack had, in fact, been losing money on his Chinese vegetables. His costs and returns from the 2003-2004 season revealed that he had a net loss. This illustrates why it is important to grow a diverse profile of crops. Jack's eggplants, peppers, basil other herbs carried his farm. Jack

[17] Information presented in this section was gathered in interview on April 28, 2005 in Boynton Beach, FL.
[18] Information presented in this section was gathered in interview on April 29, 2005 in Boynton Beach, FL.

blamed his Chinatown broker for not giving him the prices he needed to be profitable. He was getting paid $5.40 on average when other farmers were getting paid between $6.70 and $9.00. Jack's produce had become well-known in Chinatown and there was another broker interested in working with Jack. Jack left his broker of ten years to start working with someone new.[19]

Aside from having reliable buyers, farmers can increase their competitiveness in the marketplace by lowering their labor costs. Labor costs tend to be more variable then other costs lincluding rent (or mortgage payments), fertilizers, pesticides, seed, and gasoline. The management of labor costs is concentrated in two main areas; self exploitation and harvest. Each farmer works very long hours. Steve and his wife regularly put in over 12 hour days. Jack works seven days a week, and requires his field workers to do the same. Leo laments that he has to spend all his time overseeing field workers and does not have enough time to develop long-term business strategies.[20]

The Florida farmers find it hard to compete with Mexico on the quality of their pack because labor costs in Florida are much higher. There is skill and knowledge involved in packing, so it is important for farmers to have experienced workers, or constant supervision in the field during harvest. The way that vegetables are packed greatly affects the profitability of the product. The flowering vegetables (choy sum, yu choy, gai lon and flowering chives) need to be picked at a moment in which the buds are formed so that they will not open during transport. Consumers prefer the flowering varieties with unopened buds. Discolored, wilted or damaged outer leaves need to be removed on all leafy vegetables and cabbages, but not so many leaves that volume is lost. Plants need to be cut clean and straight at the base of the petioles, which requires cutting above the soil surface and keeping one's knife clean. Vegetables need to be

[19] Information presented in this section was gathered in interview on April 27, 2005 in Clewiston, FL.
[20] Information gathered in interview on April 29, 2005 in Boynton Beach, FL.

packed with the petiole ends facing up in the box (see Figure 4I). Consumers look for clean and fresh looking ends as a measure of quality. In a highly competitive market like Chinatown, quality is paramount.

CONCLUSION

The three farm cases presented here illustrate how the expansion of Chinatown's food system has shaped a new agricultural industry in South Florida. Through social networks farmers and produce brokers from the New York Metropolitan Area developed production in Florida. Since the 1970s production has been growing and new farmers as well as second and third generation farmers continue to enter the industry. But farmers today have to cope with local as well as global changes. As Chinatown's food system is expanding to more areas with starkly different agronomic and economic conditions, Florida farmers must continually adjust their practices to remain competitive. The Chinese vegetable farmers use irrigation, soil fertility, and pest control practices conventional to South Florida, but an important difference between them and other farms is their use of crop diversity. Because they grow at least thirteen different crops they can cope better with production problems and price fluctuations. Thus far the farmers in this study have been largely successful; crop diversity and an overall increase in production volume has been compensating for deflated prices in overproduced crops. But with increasing development pressures and rising production costs, Florida farmers are unsure about the future of Chinese vegetables.

Chapter Five

Bringing Southeast Asia to the Southeastern United States: Commercial Homegardens in Homestead, Florida

Chinatown markets in New York City have been diversifying to reflect the demands of new immigrants coming to the United States from Southeast Asia. In Manhattan's Chinatown there is one Thai market and two Vietnamese markets, as well as several other markets that cater to a variety of Asian peoples. The vast diversity of demand in Chinatown's markets has led to the development of new distribution networks for agricultural commodities as well as new types of agriculture. In Homestead, Florida, the manifestation of these two intersecting trends is visible across the agricultural landscape. Southeast Asian immigrants have been moving from their first homes in the United States to southern Florida in order to pursue agricultural livelihoods. They are producing specialty herbs, vegetables, and fruits traditional to Lao, Thai, Vietnamese, Cambodian, Filipino, and other Southeast Asian diets. Farmers from Southeast Asia now living in Florida have been tapping into the distribution networks of South Florida that deliver produce to Chinatowns of the East Coast and Midwest. But the farmers have not only brought new crops to South Florida, they have brought new styles of farming. Most interesting is a style of commercial "homegarden."

Homegarden farmers in Florida manage crop diversity as an economic strategy. The analysis of this type of agriculture is particularly salient for several reasons. It represents a striking contradiction to the generally held idea that small scale, biodiverse farming systems such as homegardens are not commercially viable. Secondly, it exemplifies the functionality of small, family farms in an era of dominance of agribusiness in North America. Finally, it furthers the argument that crop diversification can be used to achieve economic stability. In a nation that is struggling to protect small farmers, to develop niche markets, and to aid minority farmers to purchase and operate farms through state and federally mandated programs, the example of the South Florida homegardens should not be overlooked.

Agriculturally-experienced immigrants from Southeast Asia have brought an alternative vision of agriculture to southern Florida. Southeast Asia has a rich tradition of homegardens. Homegardens are characterized by their complexity of structure and multiple functions (Méndez et al., 2001). They are understood to be "intimate, multi-story combinations of various trees and crops…. around homesteads" (Kumar and Nair, 2004). Homegardens are a popular subject of study because they are an interesting model of sustainable agroecosystem; they often foster efficient nutrient cycling, high biodiversity, low use of external inputs, conservation potential as well as socioeconomic benefits (Tourquiebiau, 1992; Padoch and de Jong, 1991). Most analyses of homegardens, however, have been done in tropical Asia and Latin America. While there was one study done in Spain (Agelet et al., 2000), homegardens are little understood in the political economic context of developed nations, particularly in North America. Furthermore, it has been suggested that commercialization leads to the dissolution of homegardens; that commercial production in homegardens is impossible (Kumar and Nair, 2004). A recent study of recently commercialized Vietnamese homegardens contradicts this claim. Although anecdotal evidence suggested that commercialization was leading to decreased diversity in the homegardens, quantitative analyses did not substantiate these claims (Trinh et al., 2003). In fact, there were higher numbers of total species in the more commercialized sites in southern Vietnam, where monocultures of single commodity crops like longan and rambutan (*Dimocarpus longan* and *Nephelium lappaceum*, respectively) are popular, as compared to other sites.

South Florida is similar to the Vietnamese case in that agriculture is highly commodified, yet total species diversity at the landscape level is high. There are at least 23 species of tropical fruits and 25 species of vegetables grown in monoculture, hundreds of species of horticultural plants, and approximately 100 species of specialty crops grown in mixed cropping systems that

are the subjects of this study (see Appendix F for a listing of the specialty crops). An important distinction to make about Florida's homegardens, as compared to others, is that they did not *survive* commercialization, they are not remnants of a past tradition of the area, nor were they formerly rooted in subsistence production. Instead, the Florida homegardens emerged as an agricultural solution to the complexities of competing in an industry increasingly dominated by agribusiness firms and rendered borderless by international trade agreements. Homegarden farmers strategically choose to use crop diversity to exploit economic niches on the small plots of land they have available to them. They do not fear competition because they realize that their choice of crops and their reliance on many different types of crops gives them a competitive advantage in the face of high-yielding monocultures and the importation of fruits and vegetables.[1] Homegarden farmers also express that their multi-strata style of farming helps to maximize area in the small plots of land to which they have access. One Homestead farmer, an immigrant from the Philippines, noted, "It's not how much space you have, it's how you use it. I would rather be small and diverse than big and specialized."[2]

Agricultural diversification has been a counter-trend to specialization, the form of production that has dominated post-World War II agriculture in developed nations (Ilbery and Kneafsey, 1997; Ilbery and Bowler, 1998; Evans et al. 2002). There are many empirical studies on agricultural diversification in North America and Europe, although the research questions that predominate in regions vary (Goodman, 2003). Canadian researchers have been questioning the means of diversification, as well as the geographic scale of diversification, i.e., whether it is on a regional or farm scale (Bradshaw, 2004; Machum, 2005). Ilbery and Bowler (1998) suggest that

[1] My interviews indicated that market flooding and international competition were major concerns of large scale vegetable and tropical fruit growers whereas these were not concerns for the homegarden farmers.

[2] Quoted from interview with homegarden farmer in Homestead, FL on August 13, 2003.

in Europe the agricultural trends of intensification and specialization have been reversed, and now diversification and dispersal are rising. Research in Europe has largely focused on quality of food production, re-embedding food networks in regional relations, and implementing change in food supply chains as a means of rural development (Marsden et al., 2000; Murdoch et al., 2000 and Ploeg and Dijk, 1995). In the United States research is focused on the importance of local food systems as more just and sustainable alternatives to industrial (and global) agribusiness (Allen, 1993; Kloppenburg et al., 1996), with agroecological principles of soil and water conservation, biodiversity, and biological pest controls as central to this alternative agriculture (Altieri, 1989; Altieri and Nicholls, 2005; Gliessman, 1997).

The Florida homegarden case suggests that conventional and alternative agriculture may not be antagonistic styles or philosophies of farming, rather they can be interdependent. Florida homegarden farmers have found their advantage in the marketplace through their choice to produce a variety of crops, yet they do not exist outside of single commodity agribusiness. Rather, they survive *because* of it. The homegarden farmers produce for specific immigrant populations from South and East Asia that are concentrated in urban centers around the United States and Canada. The farmers need the tropical climate of South Florida to grow many of their crops, locating them at a distance from their markets. The homegarden farmers depend on the marketing and distribution infrastructure established in southern Florida to pack, transport, and sell products to markets up and down the East Coast, as far north as Toronto and west as St. Paul, Minnesota. It is because of the volume produced by large growers in Florida, as well as the container loads of produce imported from the Caribbean and Central America, that homegarden farmers can easily and inexpensively reach their markets. Together, farmers throughout the Americas who grow Asian fruits and vegetables are organized by urban produce brokers and

production point distributors into a food system that I have referred to as Chinatown's food system (Imbruce, 2006). The homegarden farmers benefit tremendously from this infrastructure, and may not be able to survive without it.

The case of the Florida homegardens provides empirical evidence that complicates the tendency among scholars to dichotomize conventional and alternative agriculture. The relationships that exist between use of space and agricultural practices are varied, rendering space a problematic indicator of alternativeness in agriculture (Hinrichs, 2003). Sonnino and Marsden (2006) provide many examples of case studies that muddy the demarcation of conventional and alternative food networks. Although it has been recognized that the ideology of alternative food systems has been better theorized than the practice itself (Allen et al., 2003), we continue to face the challenge of defining the many manifestations of "alternativeness." The farmers described in this paper do not espouse a politics of alternative agriculture as it is discussed in the U.S., yet their practices clearly set them apart from most agriculturalists in their region, and the nation at large.

Although this paper draws on a small sample of ten farms, it describes a striking trend that began in the 1980's and continues today.[3] The commercial homegardens have been in existence for almost two decades, yet there is little recognition of some of the new crops they

[3] The actual number of the Asian homegarden-type farms in southern farms is difficult to quantify, the significance of this group of farms is better understood qualitatively. All interviewed individuals agreed that there has been a steady increase in Asian -un farms, although ethnic distinctions reported within the broad category Asian vary among interviewees. USDA's Agricultural Census of 2002 counted 103 Asian-operated farms in Miami-Dade County, up from 32 farms in 1987. From this category it is not possible to know what type of farms they are. Dr. Mary Lamberts at the UFL-IFAS Miami-Dade Extension provided working phone numbers for 8 farmers growing Asian specialty products and Marta Berrones at the USDA Farm Service Agency in Homestead provided a list of an additional 20 Asian growers whom she knew to grow 'ethnic' crops. Of these 20 farmers, 9 had phone numbers that were no longer in service. Dr. Yuncong Li of the Tropical Research and Education Center in Homestead reported to me in an interview that there were 20 Asian growers, 3 of whom regularly came to meetings. The most striking number of farmers growing specialty Asian products quoted by a farmer and distributor that is part of my sample is 60-70. But this number includes full-time as part-time farmers, wild plant collectors, Asian as well as Mexican and Cuban farmers. It also includes farms outside of Miami-Dade County, as far north as Atlanta.

have brought to the area (Lamberts, 2005), and no analyses of how they grow or market their produce. Diverse systems are often overlooked by agronomists because they do not fit into the single commodity approach of agricultural extension and USDA census surveys, nor the dominant paradigm of farming. Indeed, the homegarden farmers have a different vision of agriculture, and they realize that they work apart from the growers around them. The son of a Lao farmer who is planning to take over the family business told me, "There is a cultural divide in the local growers' organizations. Asians do not participate in the meetings, we should organize ourselves."[4]

OVERVIEW OF MIAMI-DADE COUNTY

> "*Miami-Dade County is home to what has been called the "crown jewel" of Florida agriculture. The subtropical climate, abundant water, and curious and innovative entrepreneurs from all over the world have created one of the most diverse agricultural communities on the planet*." [Degner et al., 2002; 10]

Miami-Dade County is well recognized for its agricultural diversity at a landscape level. It has a number of unique features that distinguish it from other agricultural regions around the state as well as the country. One feature is the size of farms in the county. Miami-Dade has the highest number of small farms in the state of Florida. Of 2,244 farms, 89% are smaller than 50 acres. The average farm size across the county is 40 acres, significantly smaller than the state average (236 acres) and national average (441 acres). The median farm size is five acres, the lowest legal unit of land division in the agricultural sectors of the county. Contrary to national trends, the number of small farms has been increasing over the last two decades, particularly in the size class of one through nine acres which showed a 63% increase from 1997 to 2002 (US

[4] Quoted from an interview with farmer on August 20, 2003 in Homestead, FL.

Census of Agriculture, 1997 and 2002).

Miami-Dade County produces a large variety of high-value agricultural products. In a recent study, the University of Florida's Institute of Food and Agricultural Sciences identified 23 species of tropical fruits, 25 species of vegetables and herbs, and hundreds of species of ornamental plants in commercial production across the county (Degner et al., 2002). Miami-Dade is an important source of conventional vegetables, including tomatoes, snap beans, and summer squash; tree fruits including mango, avocado, litchi, and longan; as well as ornamental plants like palms and orchids. Miami-Dade County ranks second in farm sales in the state. Fresh vegetable production represents the largest use of agricultural land in the county, 41.7%, and it is the highest grossing at $491 million. The nursery industry has the next highest gross at $439.8 million, although it uses only 11.8% of the land. Tropical fruits generate $137 million and use 16.1% of the land (Degner et al., 2002; sales figures based on 1997-98 crop years).

Another unique feature of Miami-Dade County is its tropical climate (Greller, 1980). This climatic distinction makes Miami-Dade County the sole producer of many sub-tropical and tropical crops on the continental United States. The Tropic of Cancer, 23.4 degrees North latitude, is approximately 140 miles south of Homestead, the main farming zone in the county. The area is wet and hot in the summer (May to November) and cool and dry through the winter (December to April). In Homestead, the average annual high temperature is 83.9° F and the average annual low is 64.2° F. Subfreezing temperatures may occur about once every two years with moderate to severe damage to agricultural commodities. Average annual rainfall is approximately 56 inches and annual rainfall sometimes exceeds 80 inches. The greatest amounts of rainfall generally occur in June and September. There is occasional flooding during the wet season, which lasts from May through October. The few feet in elevation difference across the

county does make a great difference in flood risk; some fruit trees suffer from subterranean flooding and so "high" land (approximately 7 feet) is considered more desirable for orchards.

Miami-Dade is also the most populous county in the state. According to the 2000 Census, there were 2,253,362 permanent residents. This population has increased by 16.3% since 1990, and is projected to continue to rise. Most of the population is located on the Atlantic Coastal Ridge, or Miami Ridge, but it is moving into the south Dade agricultural area (refer to Figure 4A in Chapter 4 for the map of South Florida). Since the agricultural land of southern Florida is squeezed between the protected land of the Everglades and Biscayne Bay National Parks and rapidly urbanizing land, agricultural land is the only "open" space that can be developed. Approximately 60.8% of Miami-Dade County is protected under federal, state, and local parks, preserves, water conservation areas, and recreation areas. The severe development pressure has ignited policy debates and much community activism in favor of agricultural land preservation as well as government-sponsored studies aimed at retaining rural and agricultural land uses.[5] The demand for real estate has sky-rocketed, inflating land values in some cases from $10,000 to $60,000 for a five acre plot. In the two years I have conducted my research in the are I have seen housing developments such as "Farm Land Estates" and "Avocado Grove Estates" succeed in subdividing 5 acre units to build single family homes starting at $300,000 on half an acre of land. For those farmers who own land they are assured of their equity, but among those who do not wish to see the rural character of south Dade disappear, these changes have led to much debate.

[5] Miami-Dade County Department of Planning and Zoning commissioned the Agriculture and Rural Area study in order to "retain the agriculture and rural land uses through the enhancement of the economic viability of commercial agriculture in Miami-Dade County." A sixteen member Citizens Advisory Committee advised the county and consultants throughout the study. The results of the study can be downloaded at http://www.miamidade.gov/planzone/ag/agras_home.asp.

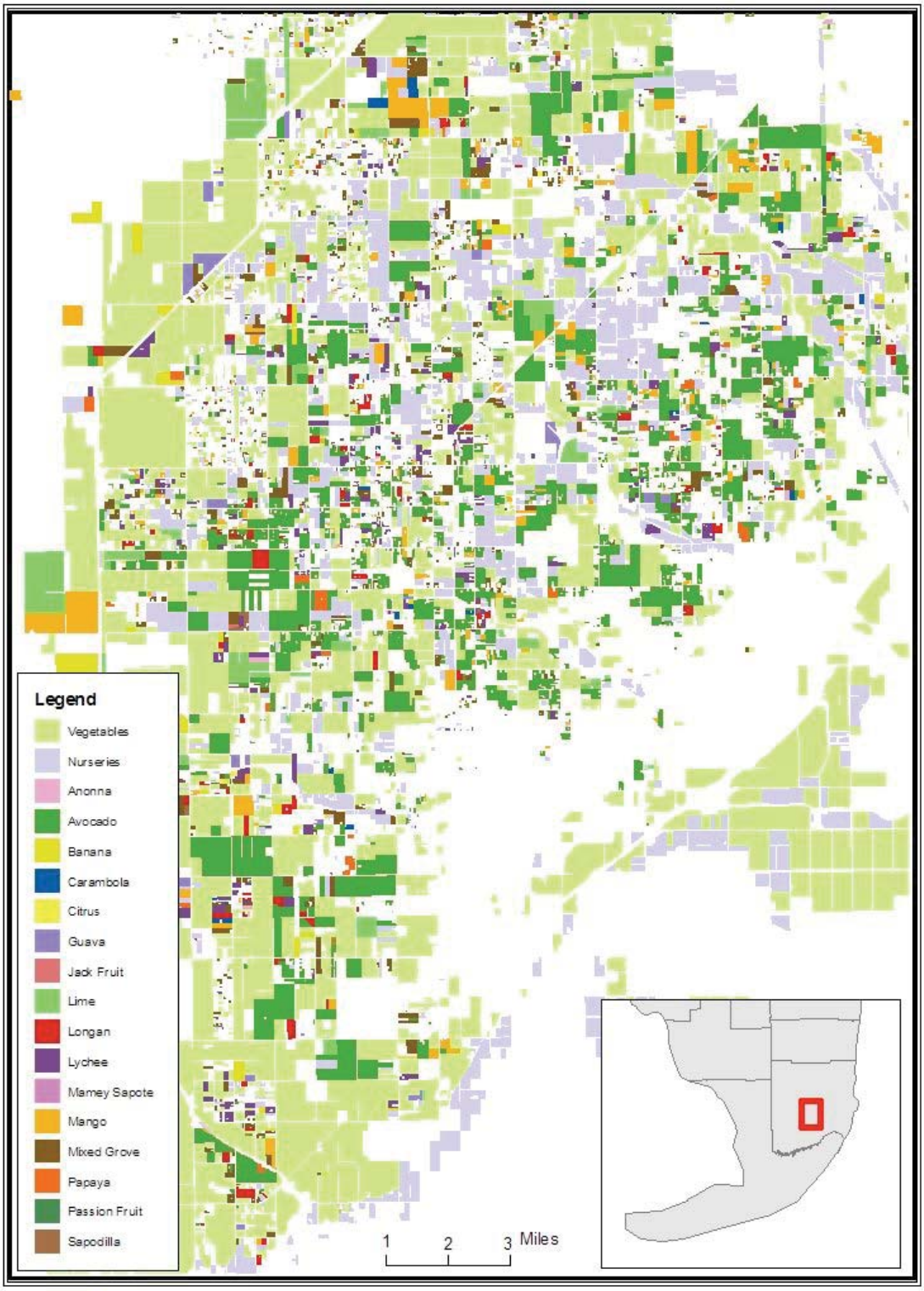


Figure 5A: Agricultural land use in Miami-Dade County is diverse at the landscape level. Agricultural fields are colored according to primary crop. While the data for this figure do not represent mixed vegetable and fruits farms, it provides evidence of crop diversity at the landscape level. The data for this figure was collected for the Agricultural Land Retention Study and was provided by Dr. Robert Degner from the University of Florida at Gainesville.

Many farmers have lost contracts to rent land, lost the ability to purchase or rent new land at the high prices, and have experienced extraordinary rent increases.

DIVERSICATION OF AGRICULTURE IN MIAMI-DADE

The Homestead homegardens began to emerge 23 years ago. This was a very exciting, dynamic time for agriculture in South Florida. Beginning in the 1980's there was a tropical fruit "craze." Hobbyists, entrepreneurs, commercial fruit growers, and agricultural researchers were united in experiments in growing and selling new Florida fruits. Chris Rollins, the director of the Fruit and Spice Park in Homestead, [6] expressed the attitude of those days well when he said, "In South Florida we used to plant lemons and grapefruit; now we're into carambolas and mamey. Some growers are cutting down limes and avocados and are putting in longans, litchis, atemoyas and sugar apples" (Vietmeyer, 1985).

Several factors contributed to the shift in production. Experimentation in fruit crops was encouraged by instant market success. Many growers chose these new crops because they were culturally "exotic" or botanically interesting. The market appeared to be insatiable. Prices that were unobtainable for the traditional fruits of south Florida (like citrus, avocado, mango) were easily obtained with the new fruits. For example, a grower was guaranteed $6.00 per pound for litchi and longan because supply was limited and competition from other production areas was virtually non-existent. To fruit growers, tropical fruits were a "gold mine." They did not need to know or even understand the market, the demand was present. One of the commercial fruit

[6] The Fruit and Spice Park in Homestead houses a living collection of over 500 species and varieties of tropical fruits. It is open to the public and acts as the 'face' of tropical fruit production in the area. It often hosts cultural and educational events, many aimed at promoting awareness of the fruits grown in southern Florida.

growers I interviewed in 2004 commented about this time, "You could put anything in the ground and an ethnic group would come out of the woodwork to buy it."[7]

International trends in migration and trade liberalization fostered these new agricultural markets. The analysis of immigration trends at this time reveals that by the 1980s there were relatively recent, yet large and growing, Asian and Hispanic populations in the United States. Between 1960 and 1980 the foreign-born population in the U.S. from Asia and Latin America increased five-fold. In 1980 there were 2,539,777 Americans born in Asia and 4,372,487 born in Latin America[8] (see Chapter 2, p. 35 for more on immigration). Also by the 1980s the diversification of fresh fruit and vegetable production and consumption was well underway on a national as well as international level. The sale of "exotic" produce was a lucrative and fast-growing segment of the fruit and vegetable trade (see Chapter 1, p. 4, 5 and 14 for more on diversification).

Two natural disasters further propelled South Florida's crop diversification. Hurricane Andrew, a category five hurricane, touched down in Homestead in 1992 causing major damage to fruit trees. Faced with the decision of what to replant, growers began replacing the staple tropical fruits of the area (mango, avocado, and Persian limes) with new fruits. An agricultural census taken in 1993 to capture the effects of Hurricane Andrew showed that avocado acreage declined from 8,987 to 5,965, Persian lime acreage declined from 6,071 to 1,668, and mango acreage from 2,424 to 1,398 (Degner et al., 1997).

At the time of Hurricane Andrew, there were close to 60 acres of litchi (*Litchi chinensis*) planted in the area. Hurricane Andrew caused severe damage to all of the tropical and subtropical

[7] Interview with commercial fruit grower in Homestead, FL on February 20, 2004.
[8] See the following website for tabulated statistics from 1960 – 1990 US Census reports: http://www.census.gov/population/www/documentation/twps0029/tab03.html

fruit groves (Crane et al., 1993), however, litchi trees were able to recover faster than other fruit trees. This motivated growers to plant more litchis in the Homestead area (Knight, 2001). By 2001, the estimated area planted to litchi in Florida was 330 acres with an estimated annual production of 1,500 tons of fruit and by 2003 there were 650 acres. Longan production also increased. Before 1992 there were under 100 acres, by 2003 there were 800 acres. Mamey sapote (*Pouteria sapota*) production increased from 150 to 500 acres, as did other tropical fruits like Thai guava, sapodilla, papaya, and jackfruit.[9]

The second natural disaster that contributed to the restructuring of the fruit industry in southern Florida was an infestation of citrus canker (*Xanthomonas axonopodis* pv. *citri*) discovered in urban Miami in 1995. Despite extensive eradication efforts resulting in the removal or cutting back of over 1.56 million commercial trees and nearly 600,000 infected and exposed dooryard citrus trees statewide, the infected area continued to increase. The canker was further exacerbated by the presence of the citrus leafminer (*Phyllocnistis citrella*) which accelerates the spread of citrus canker (Gottwald et al., 2002). As a result of much research and policy evaluation, a new regulation—the "1900-ft rule"—was established in January 2000 and put in practice in March 2000. The rule requires all exposed and infected citrus trees be eradicated in a 1900 ft radius (0.41 square miles or 1.06 km^2). The rule was highly politically charged and was challenged in court, but upheld. The rule now serves as the operational basis of the citrus canker eradication program. Some residential areas that have been subjected to the 1900 ft eradication method have remained free of canker for the prescribed two-year period and thus have been released from quarantine and can now replant if they wish. However, the lime industry is all but

[9] The acreages reported here are based on estimatess given in interviews by Carlos Balerdi, Tropical Fruits Extension Agent, Miami-Dade County Cooperative Extension Service on July 30, 2003 and by Jonathon Crane, Tropical Fruit Crop Extension Specialist, Tropical Research and Education Center on August 1, 2003.

extinct in Miami-Dade County, with about 150 of 3500 acres left in 2003 (John Crane, personal communication August 1, 2003). Farmers continue to grow kaffir lime, Persian lime, and pomelo on a limited basis knowing full well that they risk disease and eradication. Their trees are regularly surveyed by agricultural extension agents.

DEVELOPMENT OF COMMERCIAL HOMEGARDENS

As the profile of crops grown in southern Florida was diversifying, so was the profile of its inhabitants. Agriculturally-experienced immigrants from Southeast Asia were attracted to Miami-Dade County due to the tropical climate. They brought knowledge of tropical and sub-tropical fruit and vegetable production from their home countries to Miami-Dade and developed not only new crops, but also a new form of agriculture: the commercial homegarden. The commercial homegarden in this context is type of small-scale production system that is biodiverse, mixing perennial and annual crops, trees, shrubs, and herbs for the purpose of commercial sales. The oldest homegarden that is a part of this study is 23 years old. The Filipino-American farmer of the oldest garden began in 1982. He is acknowledged by others to have developed one of the first farms of this type, and to have introduced winged bean and lablab bean (*Psophocarpus tetragonolobus* and *Lablab purpurus*, respectively) to the area.[10] Southeast Asian farmers continued to develop new farms throughout the 1980s, 1990s and 2000s. The two youngest farms in this sample are each two years old. The growth of Asian-operated farms has been further documented by USDA Agricultural Census statistics. Between 1987 and 2002 the

[10] In addition to furnishing this information in interviews that I conducted with him, the Filipino farmer was featured in an article by Noel Vietmeyer about south Florida's new bounty entitled "Exotic edibles are altering America's diet and agriculture" published in 1985 by Smithsonian Magazine.

Asian-operated farms in Miami-Dade County increased in number by 322%, from 32 to 103 farms, and in land area by 410%, from 564 to 2311 acres (US Agricultural Census, 1987 and 2002).

Land zoning regulations in Homestead's agricultural areas support the maintenance of homegardens. Land is divided into five acre units, [11] so most homeowners have fruit trees on their property to supplement their incomes. There are many part-time farmers in this area; 60% of tropical fruit growers in the county work on them part-time. The homegarden farmers, however, intended their backyard garden to be their primary source of income. They began as, and most continue to be, full-time farmers.

Table 5.0: Characteristics of surveyed households in Homestead, Florida

Characteristic	**Households, n = 10**
Farm founder born in Southeast Asia	10
Founder had other previous career(s)	8‡
Farmer from farming family	10
Farmer full time	8†
Average age of farmer	43 yrs, range 25-65
Average age of farm	12.5 yrs, range 2-23
Children work on farm	4*
Average # of permanent hired labor	5
Other household income	3

* within the total sample this data point was not obtained for one household, 3 did not have children and one had very young children

† the 2 main operators who were not full time were (1) retired, (2) also worked with husband's orchid business

‡ the 2 operators who did not have a previous career are children who took over the farm from their parents

[11] The precedent of five acre zoning is now under much contestation as developers are fighting for subdivision rights to construct housing units. Currently 184th St is the dividing line between 5 acre zoning and subdivision. To the west is the agricultural land, and to the east where the Florida Turnpike and US Route 1 are easily accessible there is beginning to be more suburban-like development.

There are many socioeconomic commonalities within the surveyed sample of farmers (see Table 5.0). All are immigrants from Southeast Asia (specifically Thailand, Cambodia, Laos, and the Philippines). They grew up in farming families in their home countries. Most were the children of rice farmers. They had lived in other parts of the United States before moving to Florida. They chose to move to South Florida to begin farming as their primary source of income. Two farmers in the sample farmed in central Florida and moved south for the warmer, mostly frost-free climate. Those who had not farmed had other previous work experience. Of these, their personal work histories vary. One farmer was a professional agronomist. He worked for the International Rice Research Institute in the Philippines, and later for a large nursery in Miami-Dade grafting mango cultivars. Another farmer had a bachelor's degree in electrical engineering and worked for many years in New England in engineering. He recounted to me why he decided to move to Florida and become a farmer. He said, "After visiting my friend who lived in Homestead, I dreamed of living in a climate like my home in Cambodia and growing Cambodian fruits and vegetables. I told my wife I wanted to move to Homestead."[12] Another two farmers were grocery store owners, and the others did piecemeal work for hourly wages. A Thai farmer who grew up on a farm in Thailand said he decided to go into farming because, "you can't build equity if you work for minimum wage."[13] Most people in this sample were introduced to the area by a friend or family member.

For 70% of the sample, the farm is their only source of income. All farmers work full time on the farm, but in three households children and wives work outside of the farm. For all but one of the households with children out of high school, the children work on farm. In three of the four households with adult children, at least one child is planning on taking over the farm

[12] Quoted from an interview with a farmer on August 10, 2003 in Homestead, FL.
[13] Quoted from an interview with a farmer on February 6, 2004 in Homestead, FL.

when the parents retire. The other children are attending college or are working outside the farm. Family members aid mostly in farm administration and marketing. In four households, children are relied upon for English language skills. Hired labor is sought for physical farm tasks. Each farm has a permanent core, on average, of five workers. Temporary crews are hired to harvest and pack. Most temporary laborers are Mexican and Guatemalan migrants and are hired through contractors or on the street.

STRUCTURE AND TENURE OF HOMEGARDENS

When compared to what other researchers have described as homegardens, the farms under discussion are similar to the general model in structure, but differ from the norm in that their primary function is cash income. Farmers and their families consume some of the products they grow and plant a few items exclusively for home consumption. The underlying goal of this style of farming, however, is to achieve economic growth by maximizing production in a given area through crop diversification. It is a different approach than the more commonly practiced agriculture based on economies of scale, the goal of which is to increase production of like goods and services in order to diminish costs.

The surveyed farms comprise multiple fields and cropping systems. Farm sizes range from 2.5-109 acres across 1-9 fields (see Table 5.1). The homegarden "core" is the original field which includes the farmer's house; this core takes a popular form of backyard homegarden described by other authors (Angel-Peréz and Mendoza 2004). In the homegarden core, mixed cropping systems are managed. In subsequently acquired fields, mixed cropping systems, orchards, or annual row crops (vegetables and herbs) are managed, increasing the overall size of the operation (see Figure 5B for a distribution of field type and size per farm). The core is

distinct from the other fields and orchards in that it was the first field to cultivated, is the most intensely planted, and is biodiverse.

The number of managed fields per farmer changes; expansion and contraction occurs in times of opportunity and crisis. Only one farmer in this sample has not expanded. She operates the smallest and one of the most intensely managed farms. On 2.5 acres she has approximately 80 raised beds for herb production. While she is alone in not having expanded beyond her backyard garden, others like her who manage only mixed cropping systems (that is they do not have orchards or row crops) have the smallest operations with at most two fields. In Appendix G you can see sketch maps of several farms showing crops.

All farms that only practice mixed farming are in the smallest operation category (from 2.5-12 acres) and are located on farmer-owned (rather than leased) land. The specialized treatment these fields receive, in terms of crop selection and structural features common to this style of farming (which will be described below), is too great an investment to put into leased land. Owning land is also preferable as a means of building equity; most farmers interviewed expressed a desire to secure their financial futures post-retirement through land ownership.

Leases are most commonly held on orchards and open fields for row crops outside the home, core field. Leasing is very common in the Miami-Dade agricultural area, and contracts are constantly turning over. It is possible to lease mature orchards, or to obtain long leases on young or new orchards. Whether leased or owned, managing multiple fields creates flexibility in the farming operation. Farmers can downsize if necessary, expand when opportunities arise, experiment with new crops, or rotate crops that are diseased, not producing, or not selling well. In contrast to those who manage only mixed cropping systems, those who manage additional

Table 5.1: **Characteristics of surveyed farms in Homestead, Florida**
Data collected by author during August 2003 and February 2004.

Characteristic	Mean	Range
Size of farm (acres)	39	2.5-109
# of fields per farm	3	1 - 9
Size of fields (acres)	13	2.5 -45
# of acres owned	14	2.5 -40

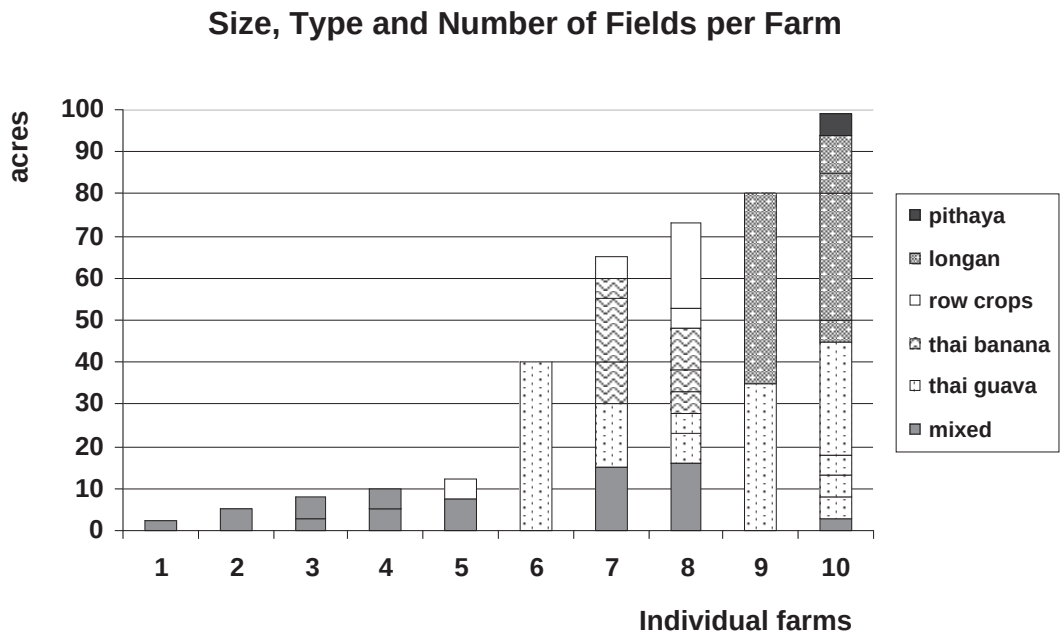


Figure 5B: Farms range from 1-9 separate fields managed as mixed cropping systems, annual row crops or orchards. Each bar per farm is partitioned into the number and types of fields which make up the farm. The types of orchards are listed here by dominant crop, but some include a few individuals of other species, or are interplanted. The 40-acre Thai guava orchard in farm 6 is interplanted with lemongrass and the 30 acre longan orchard in farm 10 is interplanted with Thai guava. The row crop fields also include more than one species. The 5-acre field in farm 5 is Thai basil intercropped with boniato leaves, the 5 acre field in farm 7 rotates between Thai eggplant, long bean and long squash, the 5-acre field in farm 8 is half mint, and half boniato leaves, and the 20 acre field in farm 8 is half bitter melon and half Thai basil.

orchards will lease 63% to 100% of their land (with the one exception of a farmer who was given land as a wedding present).

Currently the surge in real estate prices that many urban areas across the United States, including Miami, are experiencing is affecting out-lying agricultural areas. The inflated land values are making it difficult for farmers to afford new land or find available land and lease rates are rising. One farmer who recently turned over his lease experienced a doubling of his lease rate this year. It had been at a fixed rate for the past ten years. Although he manages the highest number of fields per farm of the sample, he cannot afford to buy any land. The only piece his family owns is the five acres where his mother lives and began farming. Another family looking to acquire an additional five acres to increase its operation to 15 acres was unable to afford new property. They told me, "We had our eye on a piece of land, but we were too slow on acting on it and someone else bought it. Now we can't afford to buy something."[14] The newest farmer in the sample moved to Florida about seven years ago and waited five years to acquire a lease on land. He converted 60 acres of mango to Thai guava and longan orchards.

Features of the Homegarden 'Core'

The following section describes several defining features of the mixed cropping systems, the "core" of the homegardens. To reiterate, the core is located around the home of the farmer and is the system initially developed by the farmers. Subsequently acquired fields are managed also as mixed cropping systems, or as orchards and row crops. Orchards and row crops are described below.

The homegarden core is a biologically diverse cropping system. It is a multi-stratum, multi-zone garden that uses vertical as well as horizontal space intensively. It is from 2.5-16

acres in size. Habitats are created for moisture-loving and aquatic plants, as well as for shade-tolerant and sun-loving plants. The structural features discussed below that have come to characterize the homegarden core have spread through farmers' social networks, or by simply "peering over fences." A Cambodian farmer revealed that, "Although people think they have secret techniques, there are none here. You can drive around and see what other people are doing."[15] Farmers are constantly watching each other to learn from each others' successes.

Biological diversity

Farmers choose their crops based on their knowledge of the unfulfilled demand for fruits, vegetables, and herbs previously common in their diets. Because the farmers in this survey are from a variety of countries and regions within Southeast Asia, each has tended to specialize in different crops. Seventy percent of the farms grow a wide variety of herbs, vegetables, and fruits as well as some medicinal and ornamental species. Thirty percent specialize in fewer than four fruits (see Figure 5B for species composition by farm). Of the 93 crops that are grown across this sample (see Appendix F) only one species (Thai guava) is grown on all farms. On the other hand, 28 species are grown on only one farm (see Table 5.2). In a report on the vegetable sector in Thailand completed by the FAO,[16] one-third of the "underutilized" vegetables listed for Thailand are growing in Florida's homegardens. Some species are discussed in more detail in the next section on vertical stratification.

Vertical stratification

[14] Quoted from an interview on February 15, 2004 in Homestead, FL.
[15] Quoted from an interview on February 20, 2004 in Homestead, FL.
[16] See the following website for more information on underutilized vegetables in Thailand: http://www.fao.org/docrep/004/ac145e/AC145E02.htm

A distinctive feature of the homegarden is the vertical stratification of plant life (see Figure 5C and 5E). Stratification is determined by a combination of the natural form of plants and management practices of the farmer. The selection of shade tolerance in understory species, planting density, and pruning are practices that significantly affect the light gradient. Light levels influence and in turn are influenced by plant productivity. The composition of the strata will also affect aeration in the garden. High humidity may be preferred by some species, but can also encourage fungal development and plant disease. The composition of successful vertical stratification in which each plant is yielding well reflects a sophisticated understanding of plant form and management.

The homegarden core can be highly stratified with several layers of vegetation (see Table 5.3). The canopy is made up of fruit and leguminous trees 8-15 ft high. Fruit trees are commonly mango, litchi, and longan. Legumes are typically tamarind and *Acacia* spp. There can be several layers in the understory, including small trees, woody shrubs, large herbaceous plants, vines and ground cover herbs. The small trees (3-6 ft) are generally light-loving species and are interplanted with canopy species to allow them sufficient light. Thai guava, the most commonly planted small tree, is easily vegetatively propagated and quick to bear fruit. It is frequently interplanted with larger, slower growing species to maximize production per unit area. Other common small trees are kaffir lime, sugar apple, and sapodilla (*Citrus hystrix*, *Annona squamosa*, and *Manilkara zapota* respectively). Sugar apple has sparse foliage and lets a lot of light through to herbaceous plants planted underneath. The kaffir lime leaves are harvested year

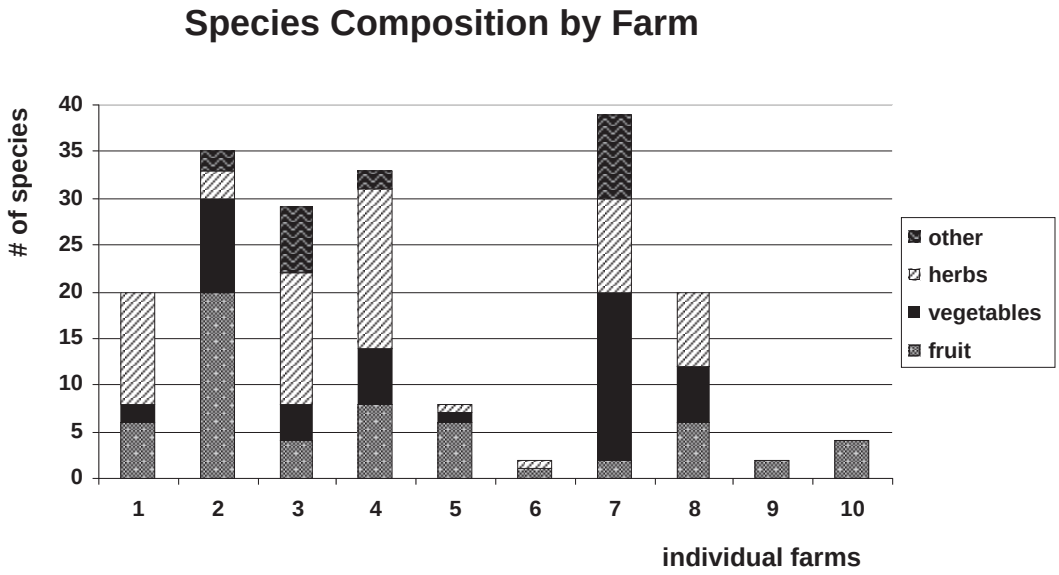


Figure 5C: The categories in this figure are described in the list of species in Appendix F. The herbs grown on these farms are exclusively grown by homegarden farmers. Some of the vegetables and fruits are grown by American, Chinese, and other farmers across southern Florida.

Table 5.2: Species Distribution across Farms
Data collected by author during August 2003 and February 2004.

Variable	Species
Total # species	94
# spp./farm	mean 19, range 2 - 38
# spp grown in all farms	1*
# spp. grown on only 1 farm	28

*Thai guava is currently one of the most popular fruits, recently grown in monoculture because of its market value, easy vegetative propagation, early yields , and it bears fruit year-round.

Table 5.3: Species Composition of Strata in Homegardens
Data collected by author during August 2003 and February 2004.

Strata	Species
Canopy	*Litchi chinensis, Dimocarpus chinensis, Tamarindus indicus,*
Understory	*Colocasia esculenta, Pandanus odorus*
Ground	*Houttuynia cordata, Piper lolot, Mentha piperata,, Ocimum basilicum, O. tenuiflorum*
Moisture-loving	*Marsilea crenata, Polygonum odoratum, Limnophila aromatica, Barringtonia acutangula*
Fences	*Murraya keonigii, Coccinia grandis, Cocos nucifera*

round. The kaffir lime is grafted to lemon rootstock to produce trees without thorns for easier harvest. Grafted trees also fruit faster than growing from seed. The kaffir lime, like all citrus, is under strict surveillance in southern Florida by the IFAS/UFL Extension Service because it is prone to citrus canker, a disease that destroyed the Persian lime industry in the area.[17]

There are two strata of shade tolerant herbaceous plants in the understory. There are large herbs (1-3 ft) like *Colocasia esculenta* and *Pandanus odorus*. *C. esculenta* is grown for its petiole, which is called tun in Lao and Thai, instead of for its corm (known as taro, dasheen, eddoe, among other names). Because the corms are not harvested, the plant proliferates vegetatively and new petioles and leaf blades can be continually harvested. Leaves of *P. odorus*, or pandan leaf, are also harvested. An extract is made from pulverized leaves to impart a sweet flavor to rice and desserts. Pandan leaf also spreads vegetatively, but is pruned back in the winter months to foster denser growth in the hotter summer months. There are ground cover herbs (0.5-1 ft) like giap ca (*Houttuynia cordata*) and *Piper lolot*. The two species spread vegetatively to form dense patches. The patches suppress undesirable species, but do present a danger of invasion to other parts of the garden. Invasion is controlled through harvest and by ground cover cloth (discussed below).

The shrub layer contains two species, neem and noni, that have well-known medicinal as well as culinary values. Farmers described the species to me as foods, so I believe that to be the main reason for their cultivation. In Thailand in particular, neem and noni are considered "underutilized species" by the Food and Agriculture Organization, so it is surprising to see them cultivated in Florida. However, species are usually considered underutilized because they could

[17] As mentioned previously in this paper, the citrus canker eradication program in Florida is operating under the "1900 ft rule". If canker was found on kaffir lime or pummelo trees, which are also found in homegardens, all citrus within a 1900ft radius would have to be removed.

be cultivated on a wider scale, but are not.[18] Underutilized species are typically grown on a very small scale or in backyard gardens, so it makes sense that the homegarden farmers would chose to cultivate them in the U.S. as well in their countries of origin.

Morinda citrifolia was found growing on one site and was acknowledged by my informant to be the medicinal "noni" fruit. Noni has a long history of medicinal use in Southeast Asia and the South Pacific and now is the basis of a large industry with over 200 companies selling noni products in more than 50 countries (International Noni Communication Council, 2005) However, noni is cultivated in homegardens not for medicinal use, but for its large, shiny leaves which are used as a wrapper for stuffed or rolled foods. *Azadirachta indica*, widely known as neem and used as an insecticide, as mosquito repellant, and as a topical and internal medicine, is also a common food item in these homegardens. The extremely bitter leaves are considered a health food, and the sweet flowers are also eaten. New leaf growth is preferred to old leaves, and constant pruning is undertaken to encourage new growth, keeping the plant smaller and fuller than it would naturally be.

Pools and wet beds

Aquatic and semi-aquatic plants are grown in the homegardens in innovative ways. The most complex aquatic habitat is a series of slightly terraced, plastic-lined pools that feed into a central drainage canal (see Figure 5C). There is only one aquatic plant grown in one garden at present in this way: the Lao herb pak van (*Marsilea crenata*); in the past more plants grown in this fashion. Pak van cultivation is a noteworthy part of the composition of these garden types, however because it represents an intricately developed and time-consuming management regime.

[18] For more information on underutilized species around the world see Pareek et al. (1998).

Figure 5D: The pool system to grow the Laotian herb pak van (*Marsilea crenata).* Along the edge of the pool the vertical strata of the garden are apparent.

Figure 5E: Shade cloth is erected to grow tender or shade-loving herbs. This herb, *Pandanus odorus*, is also being grown in a plastic-lined bed to maintain soil moisture. Next to the bed is the black ground cover used to prevent weed growth in uncultivated areas of the homegarden

Figure 5F: Planting shade loving herbs under trees is a common feature of homegardens. Here the ground covering herb *Piper lolot* is planted under *Tamarindus indicus* trees.

Figure 5G: Winged beans grown on trellises with ground cover underneath. Mango trees are noticeable to the right of the beans.

Figure 5H: Chinese eggplant grown in rows (i.e. row crops) with plastic mulching. A longan orchard is behind, with a row of wax jambu inbetween.

Figure 5I: A longan orchard with pithaya planted along the perimeter fence.

Water level is maintained by opening and closing a faucet at the upslope of each pool. Water overflows through the pools, spilling over into the main canal or onto adjacent beds, particularly in the rainy season. Algae and duckweed quickly develop in these pools, and manual weeding is done frequently. No tools are used because of the fear of ripping the plastic lining of the pools. One to two times a year the pools are emptied, the plants and soil taken out, and the linings are cleaned. The old soil and plant matter is used to mulch and fertilize other beds. The pools are aesthetically pleasing. They attract fauna including wading birds and frogs. Each time I have visited this garden there was a red ibis feeding in the pools.

Areas adjacent to the pools are used for semi-aquatic plants. During the summer rains the pools tend to flood, reaching neighboring beds. The drainage canal is used for moisture-loving species. The only wild-collected species in these gardens is a riverine tree called ka don in Laotian (*Barringtonia acutangula*), that has beautiful, cascading red inflorescences.

Water-logged soils are maintained in other ways as well, such as in raised beds, plastic-lined beds, or individually potted plants sitting in water. In these moist bed arrangements, irrigation pipes are set up so that each wet bed has its own faucet and its water content can be carefully controlled.

Shade Cloth

Shade cloth is used to increase shaded surface area when the sun is most intense in the summer, or in the winter to increase the tenderness of leafy herbs (see Figure 5D). Many herbs are eaten fresh in soups and are preferably harvested when they are young, delicate and tender. Herbs such as *Polygonum odoratus* and *Limnophila aromatica* are popular herbs that are grown under shade. These herbs are also grown in moist soils.

Ground Covering

Herbs that reproduce by vegetative propagation are used to form ground covers to suppress weeds and trap organic matter, as mentioned above. Another ground cover feature is common to these gardens: black, permeable tarp on all uncultivated areas of the garden (see Figure 5D and 5F). One farmer claims to be the innovator of this method, and others followed suit. He alleges that he was tired of mowing the weeds each week, so he decided to keep them from growing. The tarp keeps the gardens neat and tidy and also reduces the labor of weeding and use of herbicide. Herbs and annual vegetables are often planted in a small hole in the tarp, or in narrow row openings. The largest open areas of the tarp are where trees are planted. Here leaf litter is common, acting as mulch and suppressing weeds, retaining moisture and recycling nutrients. The tarp suppresses the spontaneous regeneration of plants; everything growing in the garden has been planted.

Fences and trellises

Many properties in the Homestead area of Miami-Dade County where the homegardens are made are square or rectangular plots adjacent to other farms, orchards or homes. Fences are commonly used to delimit property, as well as to keep thieves out. In the homegarden, vines are grown on perimeter fences. Shrubs and trees are also planted along fences. Tindora, a self-seeding vine, is popular for outer and inner garden trellises. Curry leaf, which forms dense hedges, is used as a barrier. Small trees like dwarf coconut palm and sapodilla are also planted on perimeters. Pithaya is grown on fences (see Figure 5H).

Annual Row Crops

Three farmers in the sample manage fields for annual row crops. Crops grown as row crops include Thai basil, boniato or sweet potato leaf, mint, bitter melon, Ceylon spinach, long bean, Thai eggplant, and Chinese okra (see Figure 5G). Crop selection, methods of planting, and times of planting vary from year to year. Sometimes multiple crops are interplanted, other times 5-15 acres may be planted to a single crop. Farmers typically try to exploit off season production times for specific crops, to garner higher market prices. They watch the international and regional production patterns to know when it is a good time for them to plant. For example Thai basil can be sold at $2.50/lb in the winter, double its summer price. Farmers also plant crops that are not grown on a large scale either regionally or internationally. Chinese eggplant is imported in large volumes from Honduras and Chinese cabbages and leafy greens (*Brassica spp*.) are produced on large farms in other parts of Florida. Instead of planting high-volume crops, homegarden farmers choose to grow crops like bitter melon, sweet potato shoots, and Malabar spinach.

Orchards

Orchards are managed by half of the farmers in this sample. The most common fruits grown in orchards are longan (see Figure 5H), litchi, Thai guava, and Thai banana. Thai banana plantings are renewed every three years since production begins to decline at that point. Farmers who grow Thai banana usually have a few fields of different ages. Most orchards have a few trees of several other fruits mixed in, particularly along their perimeters. Jackfruit, coconut, sugar apple, and sapodilla are grown this way. More recently pithaya, or dragon fruit, is becoming popular. Pithaya is grown on fences, or in sets of three individuals growing up a central stake.

One farmer in the sample recently planted a five-acre orchard of pithaya and another farmer interplanted three acres of pithaya with Thai guava.

New orchards are often interplanted with herbs such as lemongrass or Thai basil while trees have not yet reached fruiting stage. New longan and litchi orchards are sometimes interplanted with Thai guava, since it is fast-growing and reaches fruiting stage more quickly.

Thai guava has become a very popular fruit to plant in the last few years. Where litchi and longan have reached a point of over-saturation in the area, resulting in a decline in price, Thai guava is more limited in its production. Also, Thai guava is not currently imported on a large scale. Florida litchi growers compete with Mexican imports (Rafie and Balerdi, 2002) and Florida longan growers compete with Taiwanese imports. Although Florida has the advantages of lower transport costs and higher quality fruit, Taiwanese and Mexican fruit undercut them in costs of production.

MARKETING STRATEGIES OF HOMEGARDEN FARMERS

The homegarden farmers are part of Chinatown's food system (Imbruce, 2006). The majority of their produce is shipped to cities along the eastern seaboard with large Asian populations as well as Toronto, Chicago, Houston, and St. Paul. The farmers also sell locally, but the local market is not large enough to support them. They market their produce in a variety of ways. They sell retail and wholesale. They ship through local packing houses and they ship directly from their own farms. Several farmers have become packers and shippers as well, buying and selling products from other farms. From using existing marketing channels to developing their own, the homegarden farmers are constantly negotiating market fluctuations and looking for ways to maintain or increase their profits through marketing, rather than increasing

production. Because the majority of the crops that they grow are specialty crops that are not grown on a large scale, these farmers are largely shielded from the problems of overproduction and international competition that plague other growers in the area.

As I mentioned above, the homegarden farmers do not exist outside of or in spite of conventional agriculture. They exist because of it. In many ways, their marketing success hinges on the existence of large regional and international growers. Homegarden farmers take advantage of the marketing infrastructure that exists because of the high volume production of certain specialty crops. One farmer described this strategy well. He said, "I like to take advantage of existing packing, trucking and cooling systems. Sometimes in the summer I will work with my neighbor to complete a pallet and I call a trucking company and they come here to pick up stuff. Other times I borrow the forklift and loading space at the local packers and I give them bananas in exchange."[19]

The markets that the homegarden farmers grow for are just as specialized as their crops. They grow almost exclusively for Southeast Asian, Indian, and Chinese populations across the United States. Local markets are not enough to sustain them. They have to ship to urban areas like New York, Atlanta, Boston, Washington D.C., Toronto, Chicago, Minneapolis, and Houston where large Asian populations are located. Normally it is difficult for small, specialty farmers to compete in distant markets because they cannot produce the volume needed to make long distance shipping economically feasible. This is not an issue, however, for the homegarden farmers in Homestead. This area produces a large volume of Asian fruit and vegetables for the country's Asian populations. Furthermore, the port of Miami is the main point of entry for produce from the Caribbean and Latin America. From Honduras alone there are over 20 container loads of Chinese vegetables imported on a weekly basis that are distributed by

Homestead packing houses and Miami shipping firms. Homegarden farmers piggyback on the transport of these goods.

The firms that broker southern Florida's Asian produce developed alongside the diversification of Miami-Dade's agriculture. Farmers did not have to worry about market access. The first distributor of South Asian fruits and vegetables in Miami was attracted to the business because he saw that there were so many people from South Asia in the United States who wanted mango, green or unripe in particular, but had no commercial access to it. In 1977 he began shipping boxes of mangos direct to customers by Federal Express. His clients were asking him for Indian vegetables in addition to the fruits he was selling. No one was growing the vegetables. He felt that if he wanted to increase his profitability he had to import from abroad. The mango shipper recognized that he was on the cusp of major changes in agriculture around the world, not just in Miami-Dade County. He knew that the Dominican Republic was exporting produce. With little more than Indian seed, a "knowledge" packet of information on cultivation practices and a translator he went to the Dominican Republic to find farmers who would give Indian vegetables a chance. By 1987 he was importing crops like Indian bitter melon, tindora, and Indian eggplant. Now he has a warehouse in Miami where he imports and distributes 800-2000 boxes per week of up to 72 different fruits and vegetables.[20]

Over the next decade three more packing houses would become established in Homestead, and four more importing/shipping firms in Miami that specialize in Asian fruits and vegetables. Some firms developed as sister companies to brokers in New York City's Chinatown, others to exporters in Honduras. The brokers, along with their affiliate distribution

[19] Quoted from interview on February 13, 2004 in Homestead, FL.
[20] Quoted from interview on February 16, 2004 in Miami, FL.

firms at other points in the commodity chain, shape new areas of production, in Florida and offshore.

While the homegarden farmers have these firms to rely on for marketing purposes, they do not sell their entire supply to them all of the time. They are constantly looking for ways to increase their own profitability through sales. Brokers typically mark up the products they buy by 10%. If there are two brokers involved, there is a 20% increase in profit to be had by a farmer if he were to market directly to retailers. One farmer said that he can increase his profitability by 40% if he sells directly to retailers. In the Homestead area there is only one Asian grocery store and a handful of restaurants. There are more Asian grocery stores up the eastern seaboard from Miami to Ft. Lauderdale, to which Homestead farmers do deliver, but the market is quickly saturated. Also, it costs labor time and gas to deliver. One farmer commented that he didn't feel that delivering to Miami was worth his time. He said, "I'd rather sell to individuals in his community at cost."[21]

Another type of local sale occurs at the household level. Customers will go to the farm in order to buy direct. Farmers like this type of sale because there is no transport involved. Preparation of small orders can be laborious however; if the order is not already harvested, they will go into their fields on the spot to gather the order. Or they will accept orders form passersby and accommodate then immediately. Some farmers have developed strategies to accommodate small orders. One farmer now uses a box about one-third the size of the standard box. This aspect of the business is important economically, and culturally as well. It makes the farmers visible to residents, and fosters social connections. One farmer said that a form of cultural tourism has developed around his farm. Lao and Thai vacationers in Florida will stop by his farm

[21] Quoted from interview on February 13, 2004 in Homestead, FL.

Figure 5J: Workers packing longan on the loading dock of a Homestead area distributor who imports and buys local Asian produce.

Figure 5K: A refrigerated truck being loaded at a Homestead area packing house. This distributor imports and buys local produce.

Figure 5L: A makeshift packing area set up at a homegarden during the summer fruit season.

Figure 5M: Boxes of freshly packed longan are being loaded into a contracted truck to enable packing and shipping from the orchard.

because they heard from friends about items growing there that they have not been able to find outside of their home country. This brings him a lot of pride, but he abashedly admitted, "I like to leave my driveway gate open, but sometimes there are too many people stopping by and I just don't have the time to spend with them."[22]

Although local sales are very important, they only account for 10-33% of the homegarden farmers' businesses. In order to maintain the profitability that direct sales can offer, farmers sell at the retail level to distant cities. One farmer went to New York City to personally develop contacts. He gave out free samples and began relationships with new buyers by offering low prices. When his buyers determined that he was reliable, he increased his prices. Other farmers use the "Blue Book" to find customers; this is the produce industry's listing of accredited firms. Shipping presents more of a challenge than does finding customers. Shipping is done by air or truck. Shipping by air is expensive, but is necessary for delicate herbs with a short shelf life. The specialty herbs can be sold at high prices; $2.50-4.50 per pound from the farm, and up to $6.00 retail. If they ship by land, they use independent truckers who charge by the pallet.

Cooperation between homegarden farmers makes it possible for homegarden farmers to ship directly. A pallet is 44-55 boxes, so the farmers rely on one another to fill orders if they don't have enough to sell on their own. Also, since each farmer has varied crop inventories, they may offer customers products from other farmers and buy from them. By pooling their resources farmers can increase sales. One farmer noted that his customers like to think of him as "one stop shopping." If they request certain items that he does not have, he will either try to grow them, or buy them from someone else if they are growing the items in question. Some farmers buy and sell to simply increase their flexibility in taking and filling orders, others have developed it as a

[22] Quoted from interview on August 15, 2003 in Homestead, FL.

standard part of their operation.

Shipping on a regular basis requires some basic infrastructure, a shed or covered area to wash and pack, and a cooler to store product before shipping. Three of the farmers in this study have focused on developing the shipping aspects of their business. They purchased walk-in coolers and built packing sheds. By becoming regular buyers of produce from area growers, they expanded the economic potential of the trade network. The largest distributor of Southeast Asian specialty products is the best example of this. He works with about 60-70 growers, ranging from people who have a few fruit trees in their yards to Cuban producers who grow boniato leaves on a large scale. He provides market access to many who would otherwise not have it; about half of his growers are part-time and they deliver produce from as far as Tampa on the weekends. He also buys from women who wild collect species such as *Solanum torvum* (called cherry, pea or Cambodian eggplant) that rapidly spread around the landscape.[23] He told me, "You wouldn't believe the old women that come to me with Cambodian eggplant they said they found growing, or with lime leaves from their backyard. People are not supposed to have them [*S. torvum*] growing, but these women do, and they are happy just to earn enough money just to play bingo."[24]

CONCLUSION

The Southeast Asian homegarden farmers share a strategy to stay small and specialize in a variety of products. They are opportunistic in utilizing many ecological niches in their gardens as well as in utilizing multiple marketing niches. They like to be a source of "one stop shopping"

[23] *Solanum torvum* is considered an invasive species and is on the Florida State as well as Federal Noxious Weed list.

[24] Quoted from interview on February 13, 2004 in Homestead, FL.

for their customers. The versatility and flexibility of these farmers give them strength in the face of competition with larger growers. While they do cultivate some crops that are grown on a large scale regionally as well as internationally, they shield themselves from external competition by specializing in Southeast Asian herbs, vegetables, and fruits. The crop composition of each farm also contributes to the cultural landscape of the Homestead area since it reflects the preferences of cultural groups in the countries from where the farmers have come.

Although some scholars of Miami-Dade agriculture celebrate its diversity, they allege that the diversity of agriculture in southern Florida works to fragment it as an industry, a factor that may lead to its demise (Degner et al., 2002). Indeed the diverse mix of farmers in the county does not lead to a shared vision, but the varied approaches that farmers bring to the same pressures are what is allowing them to grow. The differences between farmers are complementary, not conflicting. The small, highly diverse farmers do not survive in spite of large growers and international growers, they survive *because* of them. The small farmers benefit from the marketing infrastructure that exists due to the volume of produce imported and supplied by large area growers. Long distance trade is only cost-effective in large volumes. A shipping container can hold approximately 1000 35lb boxes. One of the main reasons why small farms cannot survive as markets grow more distant is because they have to "get big or get out." But urban areas with large Asian populations across the United States and Canada—the main markets for these farmers—are home to a diverse mix of Asian immigrants from cultures that typically eat many fruits and vegetables. The market itself is so varied, that there is room for many types of specialty growers. The large regional growers and numerous international growers enable sophisticated marketing infrastructure such as a "cold chain" (refrigerated loading docks and transport).

The Southeast Asian homegardens of southern Florida challenge many assumptions about the viability of high diversity, intensive agricultural systems on a commercial scale. While agricultural research today generally dismisses biodiverse agriculture (Brookfield et al., 2002) and the general trend in agriculture around the world has been crop specialization with increased commercialization (Pretty, 1995), the group of farmers discussed in this chapter does use diversity for economic gain. They also demonstrate a way for small-scale, family run farms to survive in the competitive, global marketplace. American small farmers have largely not survived the political-economic restructuring of global agriculture and thus have been relegated to the margins of agriculture (Adams, 2003). In response, proponents of alternative modes of agriculture have been united in a political agenda to resist the dominant agricultural structure and reinvigorate small farms through initiatives such as community supported agriculture, direct marketing, agritourism, and food micro-enterprises like wine and cheese making (Allen et al., 2003). But the commercial homegardens of south Florida offer a way of utilizing, rather than avoiding, the global agricultural system to create an alternative. The very nature of what constitutes alternative agriculture is so varied and complex that we cannot presume to know all of its manifestations (Watts, 2005). Alternatives may be present within existing markets and distribution networks, particularly in immigrant food systems that have not been explored in this context. Research into agricultural commodity chains and systems is still relatively new to the social sciences (Friedland, 2004). The Southeast Asian immigrant farmers in Homestead exemplify the innovation that people from other farming traditions bring to the countries to which they immigrate. They also show how specialty niches can be occupied by small farmers who simultaneously take advantage of existing consumer demand and marketing infrastructure.

Chapter Six

“Vegetales Orientales” in Comayagua: New Agro-Exports for Honduras

NON-TRADITIONAL AGRICULTURAL EXPORTS AND CONTRACT FARMING

Honduras' colonial and post-colonial history has been shaped by the agro-export industry. Like many other Central American countries, Honduras' history is characterized by heavy foreign investment in the export economy, accompanied by social and economic instability, and environmental degradation. When agricultural diversification strategies were introduced in the 1960s, cotton, sugar cane, and beef were vigorously promoted by U.S. interests. Each product experienced periods of rapid expansion followed by decline, reflecting changes in global markets and world financial systems. The result was a cycle of "booms and busts." Economic and social crises intensified in the 1970s when world recession and international debt troubles led to an escalation of struggles over land. The government reacted with repressive actions. The outcome was a largely impoverished and weak civil society (FitzGerald, 1991). Many forests were converted to pasture, and land and coastal ecosystems were degraded from heavy pesticide use (Williams, 1986).

Honduras' export history is dominated by the interests and activities of American companies. Beginning in the last two decades of the 1800s, the Rosario Mining Company of New York City controlled Honduras' main export, precious metals. By 1900, when the mining boom was over, private capital from American investors had developed the banana trade; the United Fruit Company (now Chiquita) and Standard Fruit (now Dole) controlled Honduras's fertile Atlantic coast. By 1929, the United Fruit Company owned or controlled 650,000 acres of the best arable land, along with railroads and ports. In the mid-1980s the top five firms in Honduras were still U.S.-owned, and the activities of U.S. companies made up sixty percent of the Honduran economy (Stonich, 1993). In the 1980s, sixty-three percent of Central Americans were living in poverty (Stonich, 1993)

The 1980s were also the time when non-traditional agricultural exports (NTAEs) were touted as a panacea for impoverished nations. The Caribbean Basin Initiative (CBI, the forerunner of the Central American Free Trade Agreement) became policy in 1984. The CBI encouraged export-led growth through a shift in production from the traditional tropical exports of sugar, cotton, beef, coffee, and bananas that were suffering from deflated prices, to non-traditional exports of fresh fruits and vegetables, frozen, processed, and preserved food products, shrimp, lobster, cut flowers, and live plants. An important goal of export-led growth was to raise the income of small producers. Looking at total earnings from NTAEs during this period, the policy appears successful. In 1983 NTAE earnings in Honduras were $423 million, and in 1993 they were up to $1.3 billion. But NTAEs have been criticized for their many unfavorable "side effects," namely inflation of land values and landlessness, increased marginalization of smallholders, labor exploitation, food insecurity, increased pesticide use, and natural resource depletion. Diversification is considered a great economic success, although existing evidence suggests that considerable environmental and social inequities persist (Thrupp, 1995; Torres-Rivas, 1991).

Included in the critique of NTAEs has been the parallel development of a new kind of relation between producers and distributors: contract farming. Export companies abandoned the historical model of the company farm in which they owned or leased land and hired laborers, in favor of working with small farmers. Contract farming has been a means for small farmers, both subsistence and market-oriented farmers, in less developed nations to enter international commodity markets and participate in the cycling of global capital. Contract farming takes many forms but always involves an agreement between a purchaser and a seller. The seller is contracted by the purchaser to grow specific types and amounts of crops. The size and structure

of purchasers and sellers may vary; a purchaser can be a state agency, private, local or foreign firm, or a public/private joint venture that handles marketing and distribution, and a seller can be a small farmer or a large plantation. Many crops, from traditional exports like banana, oil palm, sugar and rubber, to non-traditional exports such as melons, broccoli, asparagus, and flowers, are being produced and sold through such arrangements around the world.

Although the structure of contract farming varies widely, it commonly includes two fundamental features: provision of guaranteed markets to farmers and some control reserved by the purchasing firm and the state over production practices (Grossman, 1997). Contract farming solves some problems related to means of production that exporting firms have faced in other purchasing arrangements such as open market sales and vertical integration. A system of open market sales, in which farmers compete for buyers at the current market price, provides no control over production processes and quality, and no stability of supply for purchasers. The model of vertical integration—the historically important model of export production through which firms manage their own farms, presents problems of labor recruitment and motivation, and places much economic risk—from natural hazards, etc.—on the shoulders of the exporting firms.

Contract farming, on the other hand, theoretically is advantageous to both buyers and producers. Farmers have guaranteed buyers, reducing the wide fluctuations of demand and price on the open market. Price stability is normally greater in contracting situations. Also, small farmers who would normally be unable to acquire the agricultural inputs needed to achieve export quality standards, have access to inputs under contract farming because purchasing firms provide them with credit. Purchasing firms benefit because the riskiest and least profitable part of the commodity chain is left to farmers, but purchasers still retain control over production to ensure compliance with pesticide and export quality standards. Purchasers typically prefer

working with small farmers rather than with large landowners because small producers grow subsistence crops in addition to export crops (thus a subsidy to capital), have a propensity toward self-exploitation, and tend to maintain production in the face of low commodity prices due to the need for household reproduction (Grossman, 1997). Through contract farming many small farmers in the tropics have moved from purely subsistence farming or production for national markets, to production for international markets.

State involvement with contract farming is considerable because it is seen as a means of rural development. Private capital provides agricultural extension services, relieving the state of this responsibility. Contracting supposedly increases income and farm productivity and facilitates technology transfer. Faced with mounting foreign debt, food import dependency, and declining value of traditional tropical exports, governments are turning to contract farming as a way to take advantage of affluent northern consumers, off-season production, and niche markets, as well as a way to increase the investment of private capital in rural development.

But contract farming has been shown to often foster injustice and difficulties for purchasers as well as producers. Systems of grading and pricing fruit are often non-transparent and can be manipulated by purchasers in times of oversupply and market saturation. Rejection of shipped fruit is the biggest complaint among farmers who sometimes see half to all of their harvest deemed “unacceptable to export standards.” It must also be acknowledged that farmers do not always adhere to contracts, they lie about chemical use to lower production costs, they use their credited inputs on non-contracted crops, and they sell their crops to alternative buyers, thus breaking contracts and contributing to severe losses to purchasing firms.

Yet with the imperfections of contract farming and losses suffered on both sides of the contract agreements, small farmers as well as purchasing firms continue to pursue contract

farming. Some researchers have found that the incentives for small scale producers to participate in contract farming reflect a weakness of rural input and output markets (Masakure and Henson, 2005). The choice by small farmers to maintain contractual relations when they know that export firms do not pay the best prices and will not purchase their entire crop is largely a result of a lack of good alternatives. For purchasing firms, the level of government and non-government support and tax breaks available if they work with small farmers perpetuates the system.

The system of contract farming in Comayagua for growing Asian vegetables displays many of the aspects of contract farming that other researchers have already described. At the core of the debate over contract farming remains the question of whether it is just another example of exploitive labor relationships between agro-export firms and small, powerless farmers, or if it is indeed a viable way for farmers to raise their standards of living, levels of expectation, and skill sets in order to have more life choices. This chapter explores that issue as well as the questions: "How has the expansion of Chinatown's food system from New York City to Honduras changed agriculture in Comayagua?" And: "What are the successes and challenges of the production of Asian vegetables in Comayagua?"

ASIAN VEGETABLES IN COMAYAGUA, HONDURAS

This study is the first to systematically describe and analyze the contract farming of Asian vegetables in Comayagua, Honduras. In this chapter I describe how the industry came to be situated in Honduras, how farmers produce Asian vegetables, and how purchasing firms distribute and market the vegetables. I also show how Honduran farmers and firms fit into the Chinatown food system. I discuss the pressures and pitfalls of the industry, and how these are perceived by firms, farmers, and professional agronomists. I also explain how the development

of the industry, although initiated by Japanese-Dominican entrepreneurs, has since become an iterative process involving multiple firms, government agencies, non-profit research and development agencies, and foreign aid agencies. I show that exporting firms have expanded their functions and have become part of a professional network of people working in the interest of Honduran small farmers.

I found that the case of Asian vegetable production in Honduras supports the central theses of this dissertation, i.e., that ethnic entrepreneurs rely heavily on their social networks, and that purchasing (distribution) firms are small and entrepreneurial. Further, I found that, with thirteen new Asian crops introduced to the Comayagua Valley, crop diversity at a landscape level has increased, the diversity of production practices used across the landscape has risen, and economic opportunities for farmers in Comayagua have improved.

Agriculture in the Comayagua Valley of Central Honduras

The Comayagua Valley extends roughly from the city of La Paz in the south to Siguatepeque in the north, a distance of about 37 kilometers. The elevation of the valley varies from 535 to 590 meters and the surrounding mountains reach just over 2400 meters in height. The mountains support dry pine forest, featuring *Pinus caribaea* and *P. oocarpa* in pure stands or mixed with various species of deciduous and evergreen *Quercus* spp. There are patches of scrubby vegetation in the valley and foothills that are sources of firewood. Otherwise, most of the land area is in agricultural use. See Figures 6A, 6B, and 6C for maps and images of Honduras and the Comayagua Valley.

Figure 6A: Map of Honduras

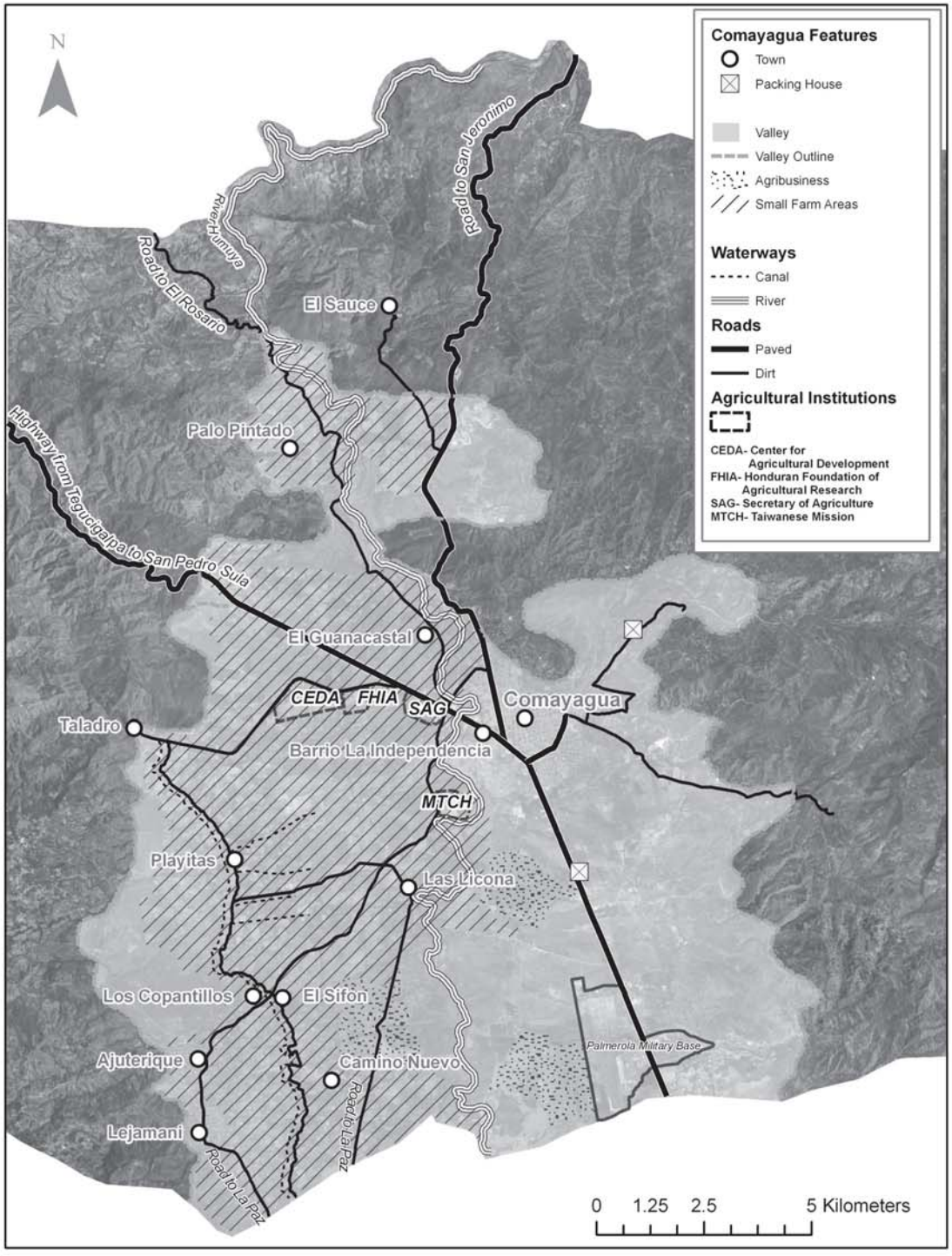


Figure 6B: Map of Comayagua Valley highlighting agricultural features. The towns listed are places of residence of Asian vegetable farmers and the small farm areas are where their fields are located. In addition to the roads and the River Humuya on this map, there are many tributaries and dirt roads that provide access to irrigation and transport. The packing houses are where the farmers bring their harvests to be sorted, washed, and packed.

Figure 6C: Comayagua Valley looking east from the hills above Lejamani. Small farms are in the foreground; larger fields managed by agribusiness firms and Palmerola Military Base are in the center of the valley.

The population of the Department of Comayagua has been growing. In 1988 it numbered 249,070 inhabitants, increasing to 352,881 by 2001 (INE, 2000). Thirty-eight percent of the department's population is considered urban. Comayagua is the capital city of the Department of Comayagua, and the largest city in the department; there are numerous small villages. The city of Comayagua has been growing rapidly. The population increased from 38,656 in 1988 to 60,078 in 2001. The majority of residents of the department are of mixed indigenous and Spanish descent.

Agriculture is the most important economic activity in the Comayagua Valley; it is currently Honduras' primary source of fresh vegetables for export (see Table 6.0 for a description of the valley's current acreage of export vegetables). Export agriculture has been developing since the 1960s, but prior to 1985 export was sporadic. The production of tobacco, which was promoted as an export throughout the 1960s and 70s all over Honduras, was found in the valley but was of minor importance. Significant exports such as bananas and oil palm were, and still are, concentrated on Honduras' Atlantic coast. Other important export crops like melons and shrimp are located along the Pacific coast, and coffee is grown in mountainous regions.

The development of agricultural exports from Comayagua has been a collaborative endeavor between government and industry.[1] Tomatoes used to be an important export from Comayagua. In 1974 the *Corporación Nacional de Inversiones* (CONADI) was formed as an industrial development fund to support new initiatives. CONADI financed a new operation producing and processing tomatoes for the export of tomato sauce and tomato paste throughout Central America. The project in Honduras, named *Agricola de Honduras*, was successful in

[1] The history of agro-exports in Comayagua in general, and Asian vegetables specifically, is retold here based on corroborating information gathered from in-depth interviews with Dr. Dennis Ramirez, Director of the FHIA in Comayagua and the three initial co-owners of the first exporting company of Asian vegetables, and conversations with agronomists and farmers in Comayagua during the authors fieldwork between Aug-Nov 2004.

Comayagua until 1988-89 when white fly decimated production. Starting in 1977, Chiquita also worked in Comayagua with the government on field trials of non-traditional exports like tomatoes, cucumbers, okra, zucchini, pole beans, cantaloupe, and honeydew melons. Dole eventually took over this project and continued to work with the Ministry of Natural Resources. In 1980 they decided on tomatoes and slicing cucumbers for export, but soon dropped tomatoes. Dole had also been pursuing the production of cucumbers in the Department of Yoro, to the north of Comayagua, but cut operations there. The government took over the project by hiring technicians and moved the operation to Comayagua.

While the cucumber industry was developing, *Fruta del Sol*, *la Cooperativa Regional de Honduras*, was forming (Macías Barrés, 1998). The *Fruta del Sol* cooperative worked in collaboration with Dole and the Honduran government for a few years and then took over production. In 1980 *Fruta del Sol* was growing 100 hectares of cucumbers. Production stayed at this level until 1985 when the cooperative tried to expand production. Since the seasonal market price for cucumbers follows a bell curve, peaking in the middle of the season, *Fruta del Sol* decided to double their production area, aiming for the high price of the season. This decision proved to be disastrous; in 1985 the price of cucumbers dropped and the cooperative went bankrupt. 1985 was also a bad year for the cucumber industry due to infestation of the cucumber mosaic virus. The industry seemed doomed. But in 1985 Chestnut Hill, a subsidiary of the international shipping company Seaboard Marine, came to Comayagua to develop production as a way to increase freight to fill their ships and add to their market share. Chestnut Hill bought out the infrastructure of the defunct *Fruta del Sol*. Also at this time, two varieties of cucumber resistant to the cucumber mosaic virus were identified. One of these varieties is still planted in Comayagua today. In the decades following, Chestnut Hill steadily increased the area planted to

Table 6.0: Profile of export agriculture in the Valley of Comayagua, 2004.

Company	Crop	Total Area (hectares)	Area farmed by company (hectares)	Area contracted to small farmers (hectares)
IACSA	slicing cucumber	750	750	---
	pickling cucumber	90	90	---
	winter squash	40	40	---
	American eggplant	70	70	---
Chestnut Hill	slicing cucumber	200	---	200
	jalapeño and tabasco peppers	200	---	200
Suazo	slicing cucumber	350	350	---
Monty Farm	slicing cucumber	170	170	---
	winter squash	30	30	---
Agroserve	slicing cucumber	170	---	170[†]
	winter squash	30	30	---
	seedless watermelon	30	30	---
Exportadora Atlantica	tomato and slicing cucumber	30	30[‡]	---
Exporter 1*	Asian vegetables	266	40	216
Exporter 2	Asian vegetables	280	---	280
Exporter 3	Asian vegetables	67	---	67

All estimates are based on the author's fieldwork from August - November 2004. At this time cucumbers were the largest export, with 3000-4000 shipping containers exported each season (approximately December - May).

* Names of the exporting firms of Asian vegetables have been changed to preserve anonymity. The vegetables that make up the category "Asian vegetables" are listed in Table 6.1.

[†] Agroserve has government support to finance small growers.

[‡] This area is under greenhouses, they were being built at the time of this field research. Plans were to have 60 hectares completed in 2005.

slicing cucumbers as well as pickling cucumbers (*pepinillos*), and to jalapeños. Today they continue to produce slicing cucumbers, jalapeños, as well as Tabasco peppers.

In 1986 the *Fundación Hondureña de Investigaciones Agricolas* (FHIA) came into existence. The U.S. Agency for International Development financed a joint project between the *Federación de Productores y Exportadores de Honduras* (FPX), to handle marketing, and the FHIA, to handle production. Like Dole before them, for two years the project ran field trials of cantaloupe, honeydew, tomatoes, slicing cucumbers, European cucumbers, okra, zucchini, butternut, acorn, and spaghetti squash. In 1988 the FHIA established an experiment station in Comayagua. Research on tomatoes (fresh and processing), onions, asparagus, sweet corn and other vegetables continued at the station

The years between 1987 and 1989 marked a turning point for Comayagua. In 1987 ripe tomatoes from Honduras were banned for import into the United States due to the Mediterranean fruit fly. Honduras was, however, allowed to export green, unripe tomatoes. The green tomatoes had to be gassed with ethylene to induce ripening when the fruit arrived in Miami. Neither the texture nor the flavor could compete with other imports, and by 1989 Honduras stopped exporting tomatoes.

The tomato collapse in Comayagua coincided with the collapse of the Asian vegetable industry in the Dominican Republic. The director of the tomato project, Toru Okada, came to play a central role in the introduction of Asian vegetable production to Comayagua. At this time the government of Honduras was also formulating a plan to "modernize" agriculture. In 1992, shortly after Asian vegetables were brought to Comayagua, *La Ley para la Modernización y el Desarrollo del Sector Agrícola* was adopted. The law established a general framework for future agrarian policy, mainly focusing on development through the production and commercialization

of basic grains, agro-exports, agro-processing, technology transfer, and credit. In order to meet a series of goals, the law deregulated the import of agricultural inputs, the import and subsidy of basic grains, the production of commercial seed, and eliminated taxes on agro-exports (Thorpe, 2002). The law has had many effects on the agricultural sector: deflation of basic grain prices, increase in number of export firms, increased access to agricultural inputs and credit, and increase in public/private programs for technology transfer. The law also facilitated the development of Asian vegetable exports from Comayagua.

The Introduction of Asian Vegetables, "*Vegetales Orientales*," to Comayagua

Production of *vegetales orientales*[2] came to Honduras because *vegetales orientales* in the Dominican Republic failed, and because of a social tie between two Japanese entrepreneurs. From 1979 to 1989 *vegetales orientales* were grown in the Dominican Republic and shipped by air to U.S. and Canadian markets. Flights were frequent and inexpensive between North America and the Dominican Republic, so air shipping was economical. During this time there were five companies that were shipping about 10,000 boxes per week to New York, Washington D.C., and Toronto.

Production in the Dominican Republic, however, was beset by problems of irresponsible use of pesticides. Government enforcement of application and residue standards was lax, both on the part of the Dominican Republic and of the United States, and many growers did not know how to apply pesticides properly. Farmers used pesticides prohibited by the EPA; they used too much pesticide. The natural enemies of thrips (*Palmae* sp.) were eliminated, causing a pest outbreak, which in turn prompted the use of still more pesticides. Eventually vegetables that

[2] The Spanish translation of Asian vegetables, *vegetales orientales,* will be used from this point on to refer to the specific group of Asian vegetables produced in Comayagua – see Table 6.1 for the composition of this category.

were shipped containing illegal pesticide residues caused the FDA to put an automatic detention on all imports from the Dominican Republic. The detention required that all vegetables imported from the Dominican Republic be sent to a private lab for testing upon arrival, an action which cost the exporter $500 in fees, and five days in shelf life. Exporters, however, continued shipping vegetables under these guidelines until thrips entered the United States in 1989 and all imports from the Dominican Republic were prohibited.

With the collapse of production in the Dominican Republic, Noburu Wataya, a Japanese-Dominican businessman who was financing the export of *vegetales orientales*, began looking for new production sites.[3] He consulted Toru Okada, an agronomist managing tomato production in Comayagua and a friend of Wataya, on the feasibility of moving production to Honduras. As noted above, 1989 was also the year of the collapse of the tomato industry in Comayagua, so agricultural land and labor were available for the production of new crops. Okada and Wataya invited a Honduran exporter, Alonso Lopéz, to join in their venture. Lopez was a former president of the *Camara de Comercio* (Chamber of Commerce) of Comayagua and was familiar with the politics of export from Honduras. Okada later recalled in an interview, "Between our combined experiences we had no problem getting permission from the USDA to export."

Honduran farmers had never grown Asian vegetables before, and although Okada was an agronomist, he had been working with tomatoes. Wataya brought one of his Dominican growers, Victor Reyes, to Comayagua to train Honduras farmers. The exporters needed to work directly with farmers to provide technical support, so the Honduran model of export developed differently what had been the pattern in the Dominican Republic. Exports from the Dominican

[3] Pseudonyms are used for those associated with the export of *vegetales orientales.* Noburu Wataya was interviewed on November 15, 2004; Toru Okada was interviewed on October 20, 2004, Alonso Lopéz on November 10, 2004 and Victor Reyes on September 20, 2004.

Republic relied on intermediaries both to buy from farmers and to sell to exporters; there was no room for intermediaries in Honduras.

Wataya and his partners began with two farmers growing Chinese okra, winter melon, Chinese eggplant, Thai eggplant, and bitter melon. They had trouble finding farmers at first because farmers were reluctant to work with the new exporters. Farmers were afraid of not getting paid; as had happened with export-oriented agriculture previously. But the marketing of Asian vegetables proved to be different; it was more stable. Tomatoes and onions, the most prominent commercial crops in Comayagua, were harvested once a season, a risky schedule for small farmers. Asian vegetables are continually harvested over a period of several months, depending on the crop. Also, the national market for tomatoes had fluctuated wildly. The U.S. market for *vegetales orientales* proved to be more consistent.[4]

Between 1989 and 1992 the export of *vegetales orientales* grew from 600 boxes to 3,000 boxes per week. A shift in transport from air to water helped this growth. A shipping container could be rented at Puerto Cortes on Honduras's north coast—a four-hour drive from Comayagua—and reach Miami 3.5 days after harvest. The shipping time was longer by water than by air, but the cost in freight was less than half. Compared to the cost of air freight at $0.15-0.25/lb, the cost by boat was $0.05–0.07/lb.

Shipping by water increased the growth potential of the industry. In 2005 there were thirteen crops that composed the category "vegetales orientales" (see Table 6.1 and Figures 6E-6L). The volume of *vegetales orientales* exported to the United States from Honduras has been rising. Between 1999 and 2005 Asian vegetable exports from Honduras increased from 10

[4] All observations made on the production and marketing of Asian vegetables discussed in this Chapter were made by the author over the course of four months of fieldwork in Honduras from September-November 2004 and July 2005 and four years of fieldwork from 2003-2006 in New York.

Table 6.1: Composition of the category Asian vegetables or “vegetales orientales” in Comayagua.

Botanical Name		**Spanish Name**	**English Name**
Solanaceae	*Solanum melongena*	Berenjena china	Chinese eggplant
	Solanum macrocarpon	Berenjena thai	Thai eggplant
	Solanum melongena	Berenjena indu	Indian eggplant
	Solanum melongena	Berenjena japonesa	Japanese eggplant
Cucurbitaceae	*Momordica charantia*	Cun de chino, cun de amor	Chinese bitter melon
	Momordica charantia	Cun de indu	Indian bitter melon
	Luffa acutangula	Okra china	Chinese okra, luffa
	Luffa aegyptiaca	Okra thai, paste chino	Thai okra, smooth okra
	Lagenaria siceraria	bangaña, behuco	Long squash
	Benincasa hispida var. chien-gua	Pepino peludo	Fuzzy squash
Liliaceae	*Allium tuberosum*	Chive, flor de chive	Chives, chive flowers
Musaceae	*Musa spp.*	Flor de banano	Banana flower
	Musa sp.	Banano thai	Thai banana, finger banana

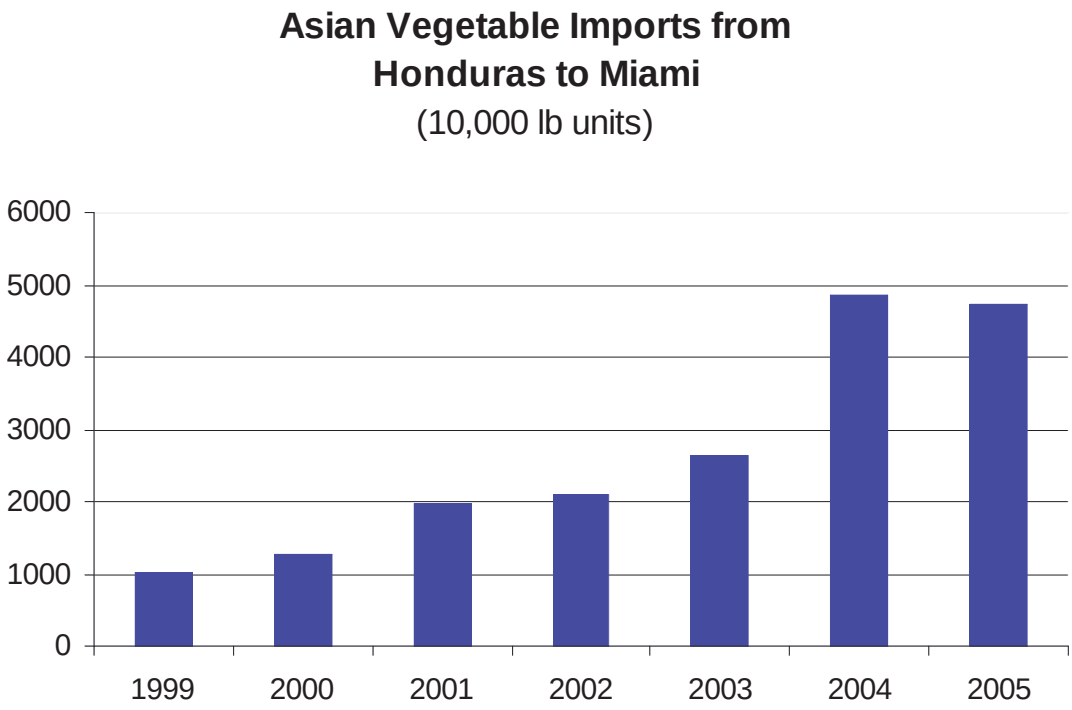


Figure 6D: Asian vegetable imports have risen from 10,020,000 lbs to 47,340,000 lbs between 1999-2005. Data from the USDA Agricultural Marketing Service, retrieved online at http://marketnews.usda.gov/portal/fv on February 10, 2006.

Figure 6E: *Ladenaria siceraria*, long squash

Figure 6F: *Luffa aegyptiaca*, Thai okra

Figure 6G: *Benincasa hispida*, fuzzy squash

Figure 6H: *Allium tuberosum*, chives

Figure 6I: *Solanum melongena*, Indian eggplant

Figure 6J: *Solanum macrocarpum*, Thai eggplant

Figure 6K: *Momordica charantia*, Indian bittermelon

Figure 6L: *Momordica charantia*, Chinese bittermelon

million pounds to just over 47 million pounds (see Figure 6D). With an average rate of $0.12/lb paid to farmers, the farm value of the production is $5.64 million. Half the area in planted by small farmers in Comayagua to export crops is now in *vegetales orientales.*

Farmers of *Vegetales Orientales*

The Comayagua Valley is the main area of Honduras for export vegetable production, but according to the *Compendio Estadistico Agropecuario de Honduras* (SAG, 1999), the majority of farmland at the end of the 1990s was still in basic grains. The Department of Comayagua had 51,723 hectares of land in food crops: 74% was in basic grains (maize, beans, rice and sorghum – mostly for grown for home consumption) and only 10%, or 5,309 hectares, planted in vegetables. Honduras is primarily an agrarian country of farmers who practice subsistence agriculture. The farmers in the valley do have more opportunities to enter market-oriented agriculture because of their access to transportation and irrigation infrastructure, but the opportunity is still limited to less than two percent of the population of the department.

The introduction of *vegetales orientales* has been significant for farmers in the Comayagua Valley. In 2004 there were nine export firms with whom a farmer could work (see Table 6.0). In the entire country of Honduras there are only fifteen agro-exporting firms.[5] Of the nine firms located in Comayagua, five contract land to small farmers; three of these export *vegetales orientales.* In total there are 1133 hectares contracted to small farmers in Comayagua, with 563 hectares planted in *vegetales orientales.* Combining the administration staff of the exporting firms, their employees at the packing plant, farmers, and hired day laborers, the export of *vegetales orientales* in Comayagua employs approximately 5,370 people.

[5] Personal communication from Andy Medlicott, Director of the *Centro de Desarrollo de Agronegocios* in Honduras, September 15, 2004.

The socio-economic profiles of the farmers of *vegetales orientales* is presented quantitatively in Appendix H.[6] The farmers who grow *orientales* come from differing agricultural backgrounds. Since tomatoes have been produced in the valley since the 1970s and other cash crops since the 1980s, the majority of the farmers are experienced in growing vegetables. Forty-seven percent of farmers growing *vegetales orientales* had previously grown other cash crops, but 32% had no previous experience growing commercial vegetables. Those with no past experience in commercial vegetables had produced only maize and beans for household consumption and intermittent sale, or had come from other professions. Export firms typically invite new farmers who were not previously involved with *orientales* to avoid friction with other firms. Even more commonly, farmers hear about *orientales* and ask a firm if they can grow them. Newcomers to *orientales* include farmers of basic grains, farm laborers, people from other professions, and university-educated agronomists.

Most farmers do not only grow *vegetales orientales.* Fifteen percent grow other vegetables and 47% continue to grow maize and beans, but for varying reasons. Some farmers retain their *milpa* (maize and bean rotational fields) because of a tradition of growing the basics of their diet for their families. The general consensus among farmers is that maize and beans are not profitable; some say that basic grains are actually cheaper to buy than to grow. Others justified growing maize as a good rotational crop, between crops of vegetables (see Figures 6V and 6T for images of maize and vegetable rotations).

The majority of farmers emphasize the importance of having *vegetales orientales* as an economic option. When asked why they chose to grow *orientales,* an overwhelming 71% of farmers said it is because they are more profitable than other crops. An additional 22% couldn't

[6] Approximately fifteen percent of the farmers of *vegetales orientales*, 68 farmers, were interviewed at their farms between the months of September and November 2004. The sample was stratified according to the export company

yet say if there were more profitable; they were trying *orientales* because tomatoes, onions, maize, and beans are simply not profitable. The remaining 7% said they grow them because of the financing provided by the firms. Farmers also had different reasons for perceiving *orientales* as more profitable and better to grow than other crops. Some farmers stated that the rising cost of agricultural inputs and gasoline, combined with the decline in prices of basic grains, make growing their traditional *milpa* crops only fit for home consumption, not for cash. The market and price of *orientales*, on the other hand, have proven to be stable. Most farmers appreciate that two export firms provide the option to continue to plant *orientales* during the low season (May-October), or that they can choose to grow maize and beans during the low season, which happens to corresponds to the traditional first planting (*primera*) in early May and second planting (*postrera*) in late August.[7] Other farmers like that most of the *orientales* can sustain harvest for up to 3-4 months, grafted Chinese eggplant can produce continual harvest for 6-8 months. This feature results in a much longer harvest season than is characteristic of tomatoes, and is also differs from the single harvest of basic grains. In general, farmers state that they feel more economically secure growing *vegetales orientales.* They can depend on a weekly paycheck for their continual harvests. Also, because there are thirteen cultivars to choose from, they can rotate crops and experiment with different cultivars.

One farmer described his previous experiences and present situation thus:

"I have a lot of experience with many crops, and the reality is that for me, *vegetales orientales* are the most profitable. The prices for tomatoes are very low, and the costs of production are very high. Also, there is a problem with the climate here. It is very hot, causing a lot of white fly... oof!. Tomatoes are not profitable. Now with *los orientales* each day I am a little more financially solvent. I still have a bill from the tomatoes!"

---

farmers were currently working with and the location of their farms.

[7] *Primera* and *postrera* plantings correspond to the rainy season which has a bimodal period of heavy rains, although many people say that the *postrera* has been dry in the last few years and the seasons are changing.

A veteran farmer of 18 years said:

"I have planted since 1976. I grew tomatoes from 1976-1982, and during this time I couldn't buy a shirt or a pair of pants. I was growing tomatoes! How terrible! And we weren't blind to needs of our children. We just couldn't raise ourselves up. *Vegetales orientales* are better. I am not going to say that they have considerably improved our lives, but at least they have helped our boys finish their studies. They are sustaining us."

Farmers of *vegetales orientales* tend to be people of very limited resources. On average they farm 1.4 hectares (2 manzanas);[8] 68% farm less than 2 hectares, a little lower that the national average. Over half of all Honduran farms (60%) are less than 3 hectares in size (SAG, *Compendio Estadístico Agropecuario*, 1999). Sixty-five percent of the farmers in my sample worked on land that they, their partner, or their parents own. The remaining 35% rented their farm land. Farm fields and residences are geographically separated in the valley. All villages in the Comayagua Valley have basic services, but the farms do not. People live in densely clustered villages in single-story adobe or cement homes (see Figure 6Z for an example of a typical home). The only farmers in this study that did not have basic services are the three who live not in a village, but on their farm.

In order to grow *orientales*, a farmer or his partner must have access to land and have a truck to bring their harvest to the packing plant. In addition to a truck, farmers need a backpack sprayer for pesticides, an *azadón* (hoe), a *chuzo* (a stick with a metal tip used to make holes for seed, transplants and fertilizer), and piping for irrigation. Some farmers have a motorized water pump for their irrigation systems, but most rely on gravity. Oxen or tractors can be hired for field preparation (see Figure 6U), and all other labor is done by hand.

Although they cultivate small areas, it is common for farmers to go into contract crops in partnership with others. Forty-eight percent have a partner with whom they split costs, labor and

[8] In Honduras the manzana, 0.7 of a hectare, is the common unit of land measurement.

profits. Although the exporting firms offer financing, they do not offer to cover 100% of the costs. Exporting firms cover about 45-60% of the start-up costs prior to harvest. Farmers reported that they need to invest between 30,000 and 40,000 lempiras before they can start to produce. The national average monthly income for farmers in Honduras is between 1,949 and 2033 lempiras (103-113 US$). At this income level, farmers would need at least 15 months of savings to invest into a crop. See Table 5.2 for a breakdown of the costs of production.[9]

Farmers who start producing *orientales* tend to stay with them. The retention rate has been good, 76% of interviewed farmers have been growing them for 2-10 years. Some young farmers just starting out as farmers have started with *orientales* (19% of the sample) and older farmers have also switched to growing *orientales*. Farmers say it easy to learn to grow *orientales*. Export firms provide technical assistance; 60% of farmers say that technicians have helped them learn. Twenty-six percent say that they just learned from watching others, or while producing; in other words, a quarter of producers are self-taught. Ten percent learned from friends, family or partners, and 3% of the sample had formal training in a university or technical school.

Vegetales orientales are very labor-intensive crops and although farmers are required to rotate between Solanaceae and Cucurbitaceae cultivars by the firms, they generally do not like to grow more that one cultivar at a time. Most farmers say that each cultivar has a specific management regime and they prefer to focus on one at a time. Some farmers did express that they like to have a variety of *orientales* in case one crop does not turn out well, or if the price is low, they would have another to fall back on. But because the majority of farmers see the market

[9] All pricing estimates are based on costs in 2004 and the conversion rate of 18 Honduran Lempiras to one U.S. Dollar.

for *orientales* as steady and stable, they don't avoid the economic risk that growing one cultivar at a time entails.

Farmers are almost exclusively male. I met one female farmer who is an independent farmer, meaning she does not need to take financing from exporting firms. She owns 15 hectares and works with multiple firms in multiple crops. She is a farmer by choice; she describes herself as "dedicated to the land." Other female farmers I met were part of an FAO project, *Proyecto de Acceso a la Tierra*, which helps farmers buy land in cooperatives.

Farming *orientales* is not a family enterprise. Instead of relying on non-wage workers like family members, farmers hire laborers to help them with farm tasks. The average number of laborers per manzana (0.7 ha) is four permanent workers, and eight during harvest. Including the contracted farmer(s), there tend to be an average of 6-10 people working on 0.7 hectare. Some farmers stated that their children help when they are off from school, or in other free periods. A few have sons who work permanently on the farm for wages. In some cases brothers or fathers and sons have become partners. Such complex family work relationships make up 48% of the sample, while 54% do not work with any family members. Women may help in harvest, sorting and packing on farm, but no farmers told me that their wives help them. Wives work in the home or hold other jobs. It is common for women to run a *pulperia*, or convenience store, from their home. Other jobs that farmer's wives hold are teaching, day care, and sewing. Forty-two percent of the sample does have income in addition to earnings from the farm. This income derives mostly from the wives' employment, or from working children who still live at home, and from remittances from family members abroad. Household size averages seven people. The average number of children is four, but most households have another relative, such as a grandchild, niece or nephew, as a dependent.

Figure 6M: Chinese eggplant being harvested. You can see that it is grown on vertical trellises and the bottom leaves are cleaned so they don't rub against the fruit.

Figure 6N: Nematodes and the root damage they cause to Chinese eggplant.

Figure 6O: Eggplant is not popular in Honduras, but one little boy likes to eat eggplants raw.

Figure 6P: Chinese eggplant being washed and packed in the field, a practice used in San Jeronimo.

Figure 6Q: A harvest being trucked out of the field to the packing house

Figure 6R: A drip irrigation system. A motorized pump takes river water, the water then enters filtration barrels before being pumped into the drip lines.

Figure 6S: Different farmers plant on adjoining parcels of land. Here you can see four parcels.

Figure 6T: One farmer's rotation system. Two maize fields surround a fallow.

Figure 6U: Oxen are used to cultivate between rows for soil aeration and weed elimination.

Figure 6V: Maize drying in foreground with new beans coming up and Chinese eggplant in the background.

Figure 6W: Chive seeds harvested and sold at the Taiwanese Mission.

Figure 6X: Bitter melon being grown for seed at the Taiwanese Mission.

Figure 6Y: A meeting held for farmers by Exporter 2 in front of the packing house of Exporter 3.

Figure 6Z: Father and son farmers at home with their families after a day of work.

Figure 6AA: The old packing area at Exporter 1 is still used to pack banana flowers.

Figure 6BB: The new packing house of Exporter 1 is technological up to date and much more sophisticated than their old packing house. CDA helped to finance this facility.

Figure 6CC: The packing house of Exporter 1 is located just outside the city of Comayagua were there is more space. The old facility was in the city center.

Figure 6DD: Farmers unload their harvested boxes into large containers to be sorted, washed and packed.

That the farming of *vegetales orientales* appears to be the best income option for many farmers in the Comayagua region, reflects on the general situation of farmers in Honduras. The opportunity to grow *orientales* has helped farmers improve their lives, but the earnings *orientales* offer are limited. Eighty-two percent of farmers say that their income has increased since they have been growing *orientales.* Those who report modest increases have only enough to cover food expenses and those farmers who are burdened with debts are still working them off. Some farmers, however, have earnings from to crops and have purchased trucks, improved their homes, reinvested in their farms (buying irrigation pumps, drip lines), paid for their children's education, and even saved money (see the discussion of Table 6.5 below for the costs and returns on growing one manzana of Chinese eggplant). One of the most ambitious farmers said:

> "My dream insto have a microenterprise. Two of my sons are agricultural technicians, and my son-in-law also works with me. I don't have much money, but I have bought many things that I have wanted. I have been buying equipment to reduce the manual labor needed to grow crops. I have a tractor, motorized water pump and pesticide-spraying backpack. I educated my sons purely on *orientales* and we eat well. Each year my production is a little bit better. But I worry because this valley lives off of these crops."

Indeed the *vegetales orientales* have been an important option for farmers in Comayagua, but hardly a sure way out of poverty, and the long-term prospect for these agro-exports remains uncertain.

Export Firms of *Vegetales Orientales* and the Contract System

There are three firms that export *vegetales orientales*: the first was formed in 1990, the second in 1994, and the third in 2002. In order to retain the anonymity of these entities, I am

going to refer to the export firms as Exporters 1, 2, and 3.[10] The existence of three export firms has given farmers an option to switch between companies if they are unhappy with one; the competition between firms generally appears to have benefited the farmers. Farmers retain some decision-making power regarding the marketing of their products because each firm offers slightly different advantages. The export firms market a similar selection of 10 to 13 cultivars, summarized in Table 6.1. Chinese eggplant is the most widely grown cultivar, representing 40% of the area cultivated in *vegetales orientales* and about 75% of the volume shipped. The second most commonly planted cultivar is Chinese bitter melon, with 13% of the total area, and the third most common is fuzzy squash, at 11% if the total area of *orientales*. The exact composition of crops is always changing as farmers come and go and firms adjust their contracts from season to season.

Both Exporters 1 and 2 use written contracts (see Figure 6EE); Exporter 3 uses a verbal contract. The irony of "contract" farming is that the contracts are a formality; contracts have more symbolic than material meaning. No one has ever used legal recourse to force compliance with a contract, and contracts are routinely breached. Contracts state that the firm will provide credit, technical assistance, a specified payday, and a market for farmers. Contracts also state that farmers must sell their entire harvest to the firm, not to a third party, and farmers' must repay all loans. These basic contractual agreements are often broken because of pervasive mistrust between farmers and firms. Firms believe that farmers sell parts of their harvest to another firm if offered a better price and farmers believe that firms reject harvested crops based on false claims that the fruit is of poor quality. There is no standardized system of grading fruit, the exporter has

[10] The data on the export firms presented in this section were gathered from interviews with fifteen percent of each firms cohort of farmers and interviews with the three owners of Exporter 1, the head technician for Exporter 2, and the manager and the owner of Exporter 3 between September and November 2004.

the ultimate decision of what fruit will be bought or thrown away. It was not possible to determine if farmers were selling to third party firms; they would not admit to such behavior. It was possible, however, to determine the rates of rejected harvest. Exporters 1 and 3 both said that the average amount of rejected fruit was 20%. Exporter 1 explicitly said they do not reject more than 50% of a farmer's harvest. The reports from farmers who produce for Exporters 1 and 3 confirm these estimates. However, forty percent of farmers who work with Exporter 2 report instances when over 50% of fruit were rejected, even up to 90% (see Figure 6FF). Farmers believe that the firms manipulate the levels of production according to the market, but firm managers deny this allegation. They pointed out that because farmers do not have scales in the fields, they often pack boxes with less than the specified weight, causing the counts of boxes they drop off to be higher than what they should be. Also, quality is still an issue. Chinatown markets have very particular quality standards. Eggplant has to be long and narrow, with no damage to the skin. Bitter melon must be large and cannot be yellow inside. Chive flowers cannot be open and Chinese okra must be straight. Fuzzy squash and long squash must be wrapped in paper before it is boxed to protect the sensitive skin. No fruit can have mechanical damage from handling and transport. In addition to aesthetic preferences, there can be no pest damage or pest infestation.

Exporters must adhere to rigid quality standards, which some farmers do not meet due to production challenges discussed in the following section. But firms do not keep clear records on the number of farmers and the area of each crop that they have contracted. My research in Florida and New York clearly indicated that the market for Asian vegetables is highly competitive and problems of overproduction frequently depress prices. It is not improbable that

Figure 6EE: Contracts used for growing and selling *vegetales orientales*

Contract of Exporter 1

The Farmer will…..

1. Plant, cultivate and harvest exclusively for Exp. 1 and sell when they meet export requirements. If this clause is broken, then the farmer will pay damages.
2. Authorize the firm to assign technicians to make supervisory visits and inspections, and will follow the advice of the technicians.
3. Follow the program of planting set forth by the firm, following advice, selling exclusively to the firm.
4. Authorize the firm to deduct the value of the chemicals, seeds, plants, or cash received from the value of the fruit brought to the packing house.

The Firm will…..

1. Sell the farmer seed of referred cultivar, provide technical assistance from seeding to harvest that includes cultivation techniques, pack, transport, use of chemicals that are approved by the FDA of the United States.
2. Purchase all of the exportable crop, at the rate of ____ - quality of export is judged by size, grade of ripeness, color, free if insects, leaves, fungus, of anything else unacceptable to international markets.
3. Pay the farmer 15 days after the fruit is brought to the packing house.
4. Charge the farmer for any damages associated with not using the recommended and FDA approved chemicals.

Contract of Exporter 2

Promises of the farmer

1. Plant and sell exclusively for Exp.2.
2. Use integrated pest management in accordance with an accompanying plan, respect quality controls, and the schedule of planting, soil preparation, irrigation, pesticides approved by the EPA, if you use chemicals not recommended by el comprador, then you will be responsible for any incurred expenses.
3. Follow the advise of the company's technicians.
4. Bring all of your product at your own expense with your own transportation, in plastic baskets, in a manner that assures the quality of the product will be exportable, to the packing house.
5. In return of guaranteeing your harvest to the buyer, you will receive partial financing, without interest, and free technical assistance.
6. If you cannot pay off the initial financing, you guarantee your land.
7. The farmer will promise to attend all the meetings related to affairs of production. If it is found that there are any negative affects on production as a result of not attending these meetings, then the farmer can be penalized up to 75% of their balance with el comprador.

Promises of the buyer

1. Will buy all of the harvest that meet export standards, and following the international market, at a rate within the range of $0.08/pound.
2. Will provide lps 8,000/per manzana, at the rate of lps 800/week for the first ten weeks, to cover inputs and equipment needed to plant.
3. If there is a natural disaster or another problem with the crop, the farmer has to repay their debt to the buyer.
4. Lend lps 700 for the elimination of crop residues from the fields.
5. Give plants of _____ at a rate of 0.40 lps each for a total of lps 1000.
6. Pay the farmer the balance in his favor for purchased fruit weekly, on Thursdays.
7. Receive product from August to January 2005.
8. The farmer must pay if he sells his fruit to a third party, within 7 days.
9. The buyer can proceed against the farmer on charges of theft if they sell to a third person.

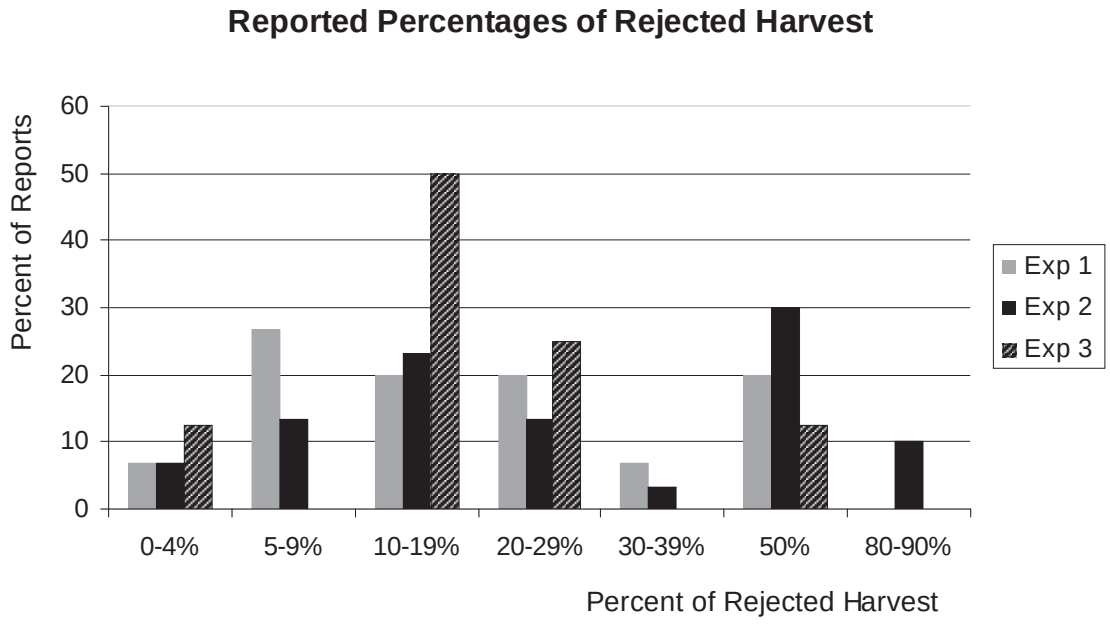


Figure 6FF: Percentage of rejected harvests reported by farmers for growing season November 2003 – April 2004 for each exporting firm.

Table 6.2: Comparison of Exporting Firms based on Interviews with Contracted Farmers.
Data collected by author between August and November 2004.

	ADVANTAGES	DISADVANTAGES
Exp. 1	▪ Fixed price in high and low season ▪ Good pack, average rejected fruit 20% ▪ Flexible credit for agro-inputs	▪ Technicians don't make regular visits ▪ Low price ▪ Selective cash advance to farmers
Exp. 2	▪ Technicians make weekly visits ▪ Standard cash advance to farmers ▪ Sell during high and low season	▪ Terrible pack, over 50% rejected fruit common ▪ Closed packing house ▪ Fixed credit for agro-inputs ▪ Instable price
Exp. 3	▪ Highest price ▪ Good pack ▪ Packing house in San Jeronimo ▪ Will pick up fruit on farm ▪ Flexible credit for agro-inputs	▪ Technicians don't make regular visits ▪ Selective cash advance to farmers ▪ Do not sell during the low season

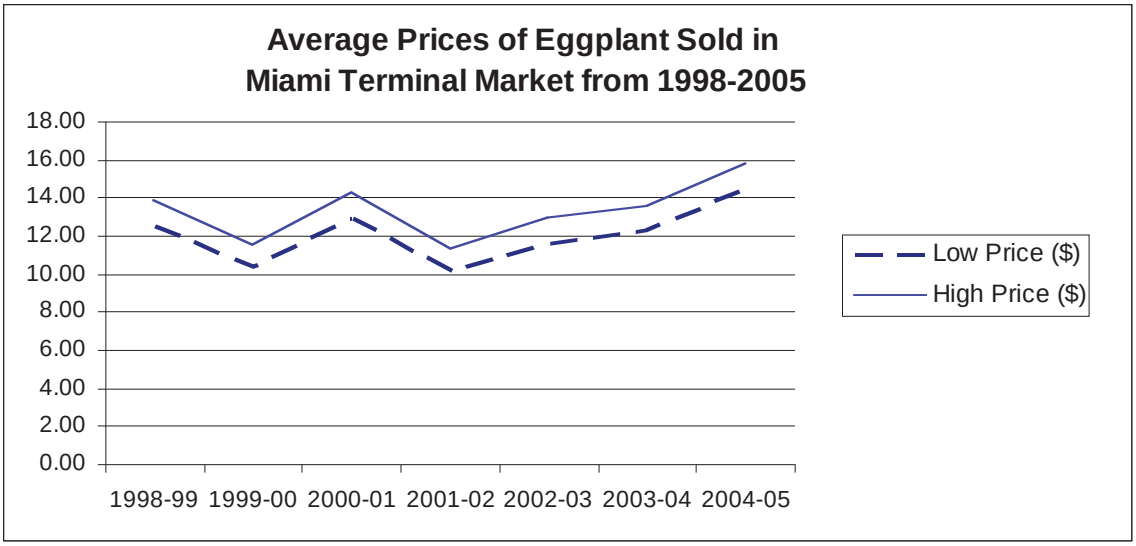


Figure 6GG: Wholesale prices of eggplant reported at Miami Terminal Market. Data provided by the USDA Agricultural Marketing Service, retrieved online at http://marketnews.usda.gov/portal/fv on February 4, 2006.

Table 6.3: **Prices per pound of Asian vegetables US$.** Prices reported by farmers and export firms administrators in interviews conducted by author between August and November 2004.

Cultivar	Exportera 1	Exportera 2	Exportera 3
Chinese eggplant	0.12	0.11	0.13
Chinese bittermelon	0.13	0.13	0.14
Long squash	0.09	0.08	0.12
Indian eggplant	0.12	0.08	--
Indian bittermelon	0.12	0.13	0.14
Fuzzy squash	0.09	0.08	0.10
Thai eggplant	0.12	0.11	0.13
Japanese eggplant	--	0.11	0.13
Thai okra	0.09	0.08	0.11
Chives	0.33	--	0.50
Chinese okra	0.09	0.08	0.11
Banana flower	3.25/box	--	--

Table 6.4: Example of Pricing Structure for a 35lb box of Chinese Eggplant along the Commodity Chain
Prices collected by author from fieldwork in New York City, Florida, and Honduras between 2003 and 2006.

Example 1 – Exporter 3	Example 2 – Exporter 1	Example 3 – Florida farmer
$4.47 – Honduran farmer	$4.37 – Honduran farmer	
$10-20 – Honduran Exporter	$7 – Honduran Exporter	
$11.20-22.40 – Miami importer	$5.00 - $20.00 – Miami importer	$10 – Florida farmer
$13.30-24.60 – Chinatown wholesaler	$5.55 - $23.00 – Chinatown wholesaler	$13.30 – 24.60 – Chinatown wholesaler
$28.00 - 42.00 – Retail vendor	$28.00 - 42.00 – Retail vendor	$28.00 - 42.00 – Retail vendor

Table 6.5: **Costs and Returns for growing one manzana (0.7 hectare) of Chinese eggplant**.
The Investment Plan below was provided to the author by the head technician of Exporter 2.
Farmer 1 and Farmer 2 reported costs to be much lower than the costs expected by the exporter.
Production is reported in harvested boxes from the field, not the final, purchased amount.
Gross income was calculated using the reported 80% pack rate and reported price, 80 lps per box.

Investment Plan prepared by Exporter 2 for 1 manzana of Eggplant		
	Lempiras (lps)	**US Dollars**
preparation of soil	1700	94
sorghum (barriers)	30	2
plants (non-grafted)	1750	97
plants (grafted)	10,000	556
fertilizers and pesticides	24,326	1351
stakes	3360	187
irrigation pipes	5310	295
labor	24,530	1363
gasoline	9792	544
Total Costs, non-grafted	**70,798**	**3933**
Total Costs, grafted	**79,048**	**4392**
Reported Earnings from Eggplant in 2003-2004 of two farmers of Exporter 2		
	Farmer 1	**Farmer 2**
Area cultivated	2 mz	2.5 mz
Cultivars	Chinese eggplant, non-grafted	Indian and Thai eggplant
Costs before production began (lps)	40,000	30,000
Production (boxes/cycle)	5959	5000
Gross income (lps)	380,000	320,000
Total Costs (lps)	120,000	80,000
Net Profit (lps, shared by two partners)	260,000	240,00
Net Profit per person ($)	**$7,222**	**$6,667**

firms manage their sales by increasing and decreasing the rates of rejected fruits according to market conditions.

Although the agreements between the three export firms and their farmers are similar, there are differences that prompt farmers to change firms. Exporter 1 is most consistent in the percent of harvest purchased, although the prices paid are not the best. Exporter 2 rejects the greatest percentage of fruit, but has the most consistent technical assistance. Finally, Exporter 3 has the best price, rejects little harvest, and picks up fruit at the farm (Table 6.3 and Figure 6FFF explicitly show the reported differences in price and rejected harvest by firm). Exporter 3, as the newest firm, is looking to win over farmers and is intentionally offering them more advantages do than the other firms, including higher prices, on -arm pick-up, and lower rejection rates. The practices of Exporter 3 are influencing Exporter 2 who has also started picking up fruit in the field and has raised prices paid. Exporter 1 is not changing practices because of a reluctance to expand and a belief that its practices are already fair. Although farmers feel comfortable working with Exporter 1, they wonder why the prices haven't changed in many years. Farmers are concerned that their costs are increasing but the selling price has stayed the same. Farmers erroneously believe that prices are going up in the marketplace and that the export firm is not passing along the increase to them. In reality the prices of vegetables have fluctuated since the late 1990's without much overall increase. (see Figure 6D). Exporter 1 has had a fixed selling price with its importer over the past several years; Exporter 1 has both a fixed selling and purchasing price .because it find less risk in this position. Its profit margin is guaranteed while the importer sometimes experiences gains and losses (see Table 6.4).

The existence of three exporting firms and competition among them has benefited the farmers. Farmers have been most loyal to Exporter 1. Seventy-three percent of farmers that

started with Exporter 1 have stayed, whereas only 57% of farmers that started with Exporter 2 have stayed; farmers are more content with Exporter 1. It is very hard, however, to quantify the differences in farmers' incomes, either comparing firms or over time. Although 82% of farmers reported increased earnings compared to previous income sources, most farmers have a very incomplete grasp of how much they spend and earn in a season. They can itemize costs per unit (cost of pesticides, cost of land rental, cost of labor), but they do not know total costs. The same is true for earnings. Farmers could tell me how many boxes they sold, but they don't tabulate a season's earnings. Two farmers of the 68 we interviewed were able to discuss last year's earnings (see Table 6.5). One farmer produced 5959 boxes last season and made 260,000 lps ($14,444) between him and his partner on two manzanas, a very impressive achievement. Another farmer reported having 80,000 lps in costs for 1.5 manzanas, and producing 250-300 boxes per week. This gave he and his partner a net income of $6,667 for the six month season. These are good earnings, especially considering that a professional agronomist in Comayagua earns about $700 per month.

CHALLENGES OF PRODUCTION

Contract farming is often criticized because it can lead to the deskilling of labor (Watts, 1994). Firms prescribe an agronomic management plan, and the farmer becomes a worker under the direction of the firms' agronomists. These agronomists support agro-industrial practices, such as intense fertilizer and pesticide use, which may come to replace the practices that farmers may have developed over time.

A lot has changed since the misuse of pesticides in the Dominican Republic in the 1980s. The development of production practices for *vegetales orientales* has taken into account the

biophysical attributes of the land under cultivation as well as socio-economic attributes of the farmers. The help of professional agronomists whose goals include not only profits but also economic, environmental, and even social improvement has been of great importance to the development of practices. Agronomists from the Mission to Agriculture of the Republic of China (Taiwanese Mission), the Center for the Development of Agribusiness (CDA), the Honduran Foundation of Agricultural Research (FHIA), the Phytosanitary Vigilance of Non-Traditional Agricultural Exports (VINIFEX) project, the Directorate of Agricultural Science and Technology (DICTA - Honduras) and the Center for Agricultural Development (CEDA – Japan) have all contributed to the improvement of production, packing, and shipping of *vegetales orientales.*

Integrated pest management has been a focal area. Honduran researchers have found that the imposition of American and European pesticide standards reduced the use of unregulated and more harmful chemicals in Honduras.[11] There are some well known examples of crop failures due to intense pest outbreaks in Comayagua, so management of pest populations is important. Although the use of illegal pesticides is not something that farmers readily admit, there was only one report in my sample of the purchase of an unapproved pesticide because it was cheaper. To minimize the use of pesticides farmers routinely employ three practices: crop rotations, barrier crops, and a Chinese eggplant cultivar grafted for nematode resistance. The grafted eggplant has been grown very successfully in soils with large nematode populations. Each firm is using the grafted plants[12] for the farmers that cultivate areas of the valley prone to outbreaks of soil-born

[11] Personal communication from Alfredo Rueda, Professor of Crop Protection at Zamorano, the Pan-American School of Agriculture in Honduras, September 2, 2004.

[12] The Chinese eggplant is grafted to the root stock of an indigenous "criollo" species, *Solanum torbon*. It takes about 75 days to complete the graft before the seedling is ready for transplant. Farmers have found that the grafted plants produce on average 30 percent more than non-grafted. Exporter 1 and 2 have greenhouses in which they produce their own seedlings. The Taiwanese Mission produces about 20% of Exporter1's and all of Exporter3's seedlings. The Mission charges 2 lps ($0.05) per plant, which is the same price the firms charge their farmers. Firms do not make money on the grafted plants.

nematodes; about 80% of the areas in Chinese eggplant production (see Figure 6N). All farmers practice crop rotation. They rotate their fields between Solanaceae and Cucurbitaceae crops, or break cropping cycles with maize, or if they own enough land, they fallow the fields (see Figures 6T and 6V). Another measure that reduces the spread of pest and disease populations is the use of barrier crops (wind breaks). Farmers plant sorghum, king grass, and sugar cane as barriers.

In spite of these efforts, the challenge of having an integrated pest management plan is the inability of firms or farmers to have a sense of the agricultural zones and pest control in the valley on a landscape level. Because the farms are so small (half a hectare to two hectares), but are located on contiguous fields (see Figure 6S), farm practices are interdependent but are not managed as such. An insightful farmer told me he is concerned about poor pest management in the valley. He said, "I am worried about the future because there are many people farming without experience and are poorly managing pesticides. If we don't manage correctly, we will be unable to export and we will be trapped. We need to think about preventative measures for pest outbreaks."[13] There was an attempt to map pest populations at the landscape level in the VINIFEX project in order to improve phytosanitary conditions on-farm. Aerial photos were digitized for the valley, but little was actually accomplished.

Export firms need to take more responsibility for monitoring the agricultural landscape. The exporters assess the biophysical characteristics of their farmers' fields before a farmer is contracted. A firm technician is sent to inspect the field for irrigation sources, soil type and quality. The farmer can suggest what he would like to grow, and depending on the needs of the firms and the biophysical capacity of the field, the crop is agreed upon. But the constant movement of farmers who rent land to new fields, and the movement of farmers between firms makes it hard for firms to have a deep understanding of the profile of their farmers' fields. This

limitation became apparent when I asked for lists of farmers with their location and cultivars. Lists were offered by Firms 2 and 3, but with the disclaimer that they may not be up to date. Firm 1 told me that it was impossible to keep track of such information due to its dynamic nature.

Farmers are heavily dependant on chemical fertilizers. Very few mentioned the use of organic soil amendments. In order to improve soil structure, they do practice crop rotation and they incorporate crop residues into the soil (in place of planting over crop residue or burning), but composting is not a common practice. FHIA has a composting project, but composting is not done by farmers. Too often rejected fruit is left in piles to rot and attract fungal pathogens and insects on roadsides and in fields when it could be used to create compost.

Another production challenge is the use of stakes, which both the eggplants and squashes require. Farmers use wild collected stakes. The valley and surrounding hillsides have long been deforested, but much secondary vegetation and scrubby regeneration exists. Firewood is predominately used as cooking fuel so collection of stakes for farming is in direct competition with household uses. FHIA has encouraged the growth of fast-growing tree species on-farm, but farmers have not adopted these practices because stakes are still very cheap to purchase (2 lps)

When farmers were asked what they do to ensure quality fruit production the most common answer—in addition to using fertilizer and pesticides—was '*estar pendiente del cultivo*'—to be on top of their crop. What farmers mean by *estar pendiente* is that they must keep up with the management regime of each crop. Chinese eggplant, 75% of the volume of *vegetales orientales* exported from Honduras, is an extremely labor-intensive crop. Leaves and flowers must be removed by hand to encourage large, straight and unblemished fruit to develop. Also,

[13] Interview conducted by author in Comayagua on October 28, 2004.

eggplant must be tied and staked so that the plants remain upright and do not become top heavy with fruit.

Eggplant is grown in Honduras because it is labor intensive, and the cost of labor in Honduras is much lower than it is in the United States. An agricultural worker in the U.S. earns about $6/hour compared to a Honduran worker who earns 55 lps/day, which is roughly equivalent to $0.51/hour. Honduras has not had to face much competition in the Asian vegetable commodity chain because it was developed in tandem with exporters in Honduras and importers in the U.S. who know the market well. Florida farmers who grow Asian vegetables do not bother with eggplant on a large scale. They cannot afford the necessary labor. Mexico has not started to produce eggplant in large quantities because it is not a high volume item in the market. Chinese leaf crops (bok choy, gai lon, nappa cabbage), on which Mexico is focusing production, are the staples of many Asian diets and are consumed in greater volume than are the vegetables grown in Honduras. Honduras would improve its standing in the Asian vegetable market, if the quality of the fruit were improved.

CONCLUSION

The story of *vegetales orientales* is in many ways a success story for contract agriculture. *Vegetales orientales* were introduced to Comayagua by private entrepreneurs, but the entrepreneurs have been able to leverage the support of public and private development agencies to improve production and processing, raising both the incomes of farmers and the number of farmers involved. The market has been steady, and the exporters have secure relationships with importers in Florida who understand the market well. The infrastructure for export is well established: there are packing houses that follow international phytosanitary guidelines and have

refrigerated loading docks, there is quick and easy transport to the port, and strong technical support provided by non-governmental and governmental institutions.

For the past 14 years, there have been no economic booms or busts, nor major pest outbreaks in *vegetales orientales*. They have been the most stable group of agro-exports that have been produced in the Comayagua Valley. I believe that *vegetales orientales* have been stable because of the biological diversity of the group of thirteen cultivars and because crops are planted in small areas on non-contiguous fields. The temporal and spatial rotation of the crops appears to be preventing severe pest outbreaks; although more data would be needed to confirm this assumption. Price fluctuations in crops, which are common in the Asian vegetable market, are also buffered by the diversity of crops produced.

A challenge for farmers and export firms alike is raising the quality of vegetables grown in Honduras. The quality of Honduran produce does not match that of the same crops grown in New Jersey for New York City during the summer. Instead of focusing on expanding the area of vegetable production, like two of the export firms are currently concentrated on in Honduras, firms might better focus on increasing the volume of exportable produce by raising the quality of the vegetables produced. Better quality of production would reduce the percentage of rejected harvest, increase famers' incomes and decrease the cost of cultivating larger areas. The reputation of Honduras-grown produce would also improve, benefitting everyone involved in the production of *vegetales orientales.*

Chapter 7

Conclusions:
Diversity and Dynamism in Global Markets

There are over two hundred fresh fruits and vegetables for sale in Manhattan's Chinatown year-round. Old and new Chinese immigrants, as well as Vietnamese, Thai, Malaysian, Cambodian, and Laotian immigrants make a living within Chinatown's food system. Countless other first, second, and multi-generation Americans patronize Chinatown's shops and street vendors. The cultural heterogeneity of the system is iconic of New York City. The abundance, freshness, and cost of produce in Chinatown are rarely rivaled in other parts of the city. Where else can you get a pound of baby bok choy or Chinese eggplant for $1.00?

Chinatown markets offer an outstanding variety of good-quality products for outrageously low prices. In order for a marketplace that comprises many small vendors and a great diversity of products to be steadily supplied throughout the year, a dynamic, flexible network of production and distribution must be in place. The marketing channels that deliver the variety and volume of products to Chinatown are constantly growing and changing. Entrepreneurs continually enter and leave the system, and look for new suppliers as well as new products. Because of this dynamism and competition, successful farmers as well as brokers are constantly experimenting with new products and new production sites. In this era when offshore sourcing of produce is the dominant trend, Chinatown brokers do not shy away from global trade. Instead they use their social networks to develop new trade relations. The globalization of Chinatown's food system has resulted from the actions of multiple individuals, in a bottom-up rather than top-down fashion.

Chinatown's food system exemplifies an alternative globalization that some scholars call globalization or transnationalism from below (Glick Schiller, 1999; Basch et al., 1994), globalization from the margins (Appadurai, 1996), or transnational urbanism (Smith, 2001). As a process it is not something extrinsic to daily life, or imposed by regulatory bodies, but rather it is

a result of new spatial arrangements made by individuals. Globalization, in this sense, is the means of conducting business over widening distances and stretched social relations (Flusty, 2004). As Smith (2001) points out:

> "…. specific collectivities – local households, kin networks, elite fractions, and other emergent local formations – actively pursue such strategies as transnational migration, transnational social movements or transnational economic or cultural entrepreneurship to sustain or transform resources, including cultural resources, in the face of the neoliberal storm." [Smith, 2001:167]

Chinese immigrant entrepreneurs have used cultural as well as economic resources to establish global networks of trade. What is extraordinary is that these networks mimic yet remains outside the dominant systems of food trade.

There is no single explanation for this phenomenon; rather, there are several factors that explain Chinatown's food system as it exists today. Entrepreneurship has been seen as a traditional path to success by overseas Chinese (Kwong, 1996). Chinese-Americans dominate the Chinese food sector in the City, from the supply of ingredients to preparation and service in restaurants. The ethnic character of the food products, as well as the community in which they are sold (Chinatown) differentiates the system from the dominant society. "Ethnicity" shields these businesses from takeover by American agribusiness and grocery corporations. Because Cantonese and Mandarin language skills and Chinese identity are needed to work within Chinatown to supply the retail end of this system, Chinese brokers control market access. Non-Chinese are involved at other points along the commodity chain, such as farming and exporting from Latin America, but they must have trustworthy relationships with Chinatown brokers to succeed over the long term as well.

The first hypothesis of this study stated: *Networks rooted in ethnicity and kinship drive the expansion of the Asian fruit and vegetable commodity chain.* It became clear from my

research findings that ethnicity and kinship were not the only social relations that were important in business, but that friendship, associations made through business, community, and religious organizations, and employment, were also means by which people found and retained business partners.

Extreme competition, particularly on the retail end, keeps companies within the system from getting too big. It also keeps quality high, but prices low. In Manhattan's Chinatown alone there are 90 produce vendors and twelve wholesalers. In a race to keep up with competition, wholesalers are constantly looking for ways to expand and make new contacts. Many "new" entrepreneurs have gotten their start by working for others in the system and have learned the business through an informal system of apprenticeship. Other entrepreneurs are family members who opened an independent branch of the family business at a different point in the commodity chain, or are children who inherited the family business. Other entrepreneurs look to friends and associates for potential business partners. As was discussed in Chapter Three, seventy-one percent of the actors in the network of trade between Honduras, Florida, and New York came into the network through a social contact, and sixty-one percent of the actors in the network trade with people with whom they have a social tie. Trust can be very elusive, however, it is not guaranteed through shared ethnicity or the other types of social relations we have seen. Successful farmers and distribution firms are constantly renegotiating their business relationships, extending and intertwining the social networks that unite those involved in Chinatown's food system.

The social networking aspect of Chinatown's food system does set it apart from other systems. Insiders make use of outsiders' perceptions of ethnicity and the barriers created by ethnic differences to keep control of their industry.

One result of seeking out new trade partners and keeping up with global economics is the inclusion of new production locations in the system. Disparate natural as well as political environments have become subject to the same economic fluctuations. Mixing of people in very different political-economic situations through global markets often perpetuates social inequities and creates winners and losers. In Chinatown's food system, because various production locales are managed by the same entrepreneurs, some complementary rather than antagonistic practices have been identified. The crops produced in Florida complement the seasonality of the New York area, and the crops produced in Honduras complement the Florida crops. Small farmers benefit from the marketing infrastructure that exists to service the needs of large-scale produce growers. The small, highly diverse farmers in Florida (the Southeast Asian home gardeners) do not survive in spite of large area growers and international growers, they survive *because* of them. One of the main reasons why small farms cannot survive as markets grow more distant is because they have to "get big or get out." But Chinatowns across the United States and Canada, the main markets of these farmers, are home to a diverse mix of Asian immigrants from cultures that typically eat many types of fruits and vegetables. The market itself is so varied, that there is room for all sorts of specialty growers.

The second hypothesis of this study states: *Asian fruit and vegetable production is characterized by cultivated plant diversity and a diversity of production techniques.* The research has shown that the vast diversity of products sold in Chinatown creates many opportunities for diversity to be used, from the sites of consumption to the sites of production. The scale at which crop diversity is used in the production of Asian vegetables varies from two-acre backyard gardens, to a 1700 acre farm, and to the landscape level of the Comayagua Valley. The market study in Chinatown indicated that over 200 fresh fruits and vegetables are sold in at varying

times and often in small quantities in the marketplace. Basically, consumers like a small volume of a great variety of products. In order to serve this market, distributors in Chinatown's food system deal in a varied assortment of fruits and vegetables, and they like to source their varied assortments from the same farmers. Both large and small growers in Florida have told me that their buyers want to be able to buy an entire inventory of products from one farm. The preference of buyers to do "one stop shopping" forces farmers to maintain diverse crop inventories.

While agricultural research today generally dismisses biodiverse agriculture (Brookfield et al., 2002) and the general trend in agriculture around the world has been crop specialization with increased commercialization (Pretty, 1995), the farmers in this study has shown that diversity can be used for economic gain. They prefer growing multiple crops because diversity gives them more economic stability. Maintaining a diverse inventory helps minimize fluctuation and overall loss.

The importance of the flexibility that comes with dealing in smaller volumes of many crops rather than larger volumes of fewer crops is also the reason why Honduran exporters contract small growers rather than turn to a company-managed plantation model of farming. One exporter told me that he works with small growers because, "the agronomic risks of farming are high, so it is better to manage smaller parcels of land so that if there is damage, the entire plantation is not damaged." In the Comayagua Valley booms and busts characterized export agriculture. But for the decade and a half that Asian vegetables have been produced there, production has been stable. The introduction of Asian vegetables to Comayagua has provided over 400 farmers with a reliable income, and has lead to better agronomic practices in the valley. The stability of Asian vegetables has become a project worthy of investment by national and international agencies. Hondurans are justly proud of what they have accomplished with the

production and export of Asian vegetables, and they have held international workshops to present their case as a development model for other Central American countries. There is still much work to be done to improve the production of Asian vegetables in Comayagua, but its successes cannot be overlooked.

The third and final hypothesis of this study states: *Spatial expansion of agricultural trade networks alone does not result in homogenization of practices and concentration of power along commodity chains.* While Chinatown's food system has become increasingly international in scope, there has been no consolidation or buy-out of enterprises at the level of production or distribution. Social ties are used to form trade alliances, but firms are individually owned and operated. Extreme competition causes firms to continually enter and leave the system, and it also drives innovation in the system. As the discussion above illustrates, there is room for many types of farmers as well varied approaches to producing Asian fruits and vegetables.

All the actors in the system insist that dependency on global markets has many pitfalls: they are unsure of what the future will bring. This sentiment is encapsulated in the words with which Steve, a farmer in South Florida, greeted me upon my second visit to his farm in Florida. He said, "Good thing you came to visit us this year. We might not be here next year." Anxiety about the future seems to be a constant in farming, but that anxiety is exacerbated by being involved in markets that are subject to large political and economic fluctuations. Being part of a global system of trade means that one's situation needs constant renegotiation and new challenges must be assessed and met every day. Astute monitoring of the system, using the tools at hand, and thinking innovatively are necessary skills for success in global markets. These are the skills that I have identified among the successful farmers and distributors that I interviewed for this study. The way they cope with change is by embracing it.

Chinatown's food system is largely dependant on immigration from East Asia to the United States. Few fruits and vegetables have mainstream appeal. Since the 1960's immigration rates have been steadily increasing so that Chinese immigrants are one of the fastest growing groups in New York City. But with China's rapid economic growth it is uncertain how immigration rates will change and how the production of Asian vegetables in the Americas will be affected.

The contested global agro-food systems are not the only global food systems in existence. In place of leading to simplification and loss of diversity, global trade can help preserve traditions as well as foster innovation. New forms of entrepreneurship can thrive without inevitable cooptation or appropriation by larger, more powerful global giants. Variety and diversity can exist in a food system at competitive prices and without the rhetoric of fashionable forms of alternative agriculture—including organic and fair-trade—in which many people cannot or do no participate or share.

Far from leading to consolidation of ownership and homogenization of practice, Chinatown's food system has shown us that global food systems are filled with diversity and dynamism. The very nature of what constitutes agriculture is so varied and complex that we cannot presume to know all of its manifestations. Alternatives may be present within existing markets and distribution networks, particularly in immigrant food systems that have not been explored in this context. Immigrants' contributions to the economy of their host countries as well as other regions should not be underestimated. The innovations they bring to globally complex systems, including food systems, create a future filled with opportunities.

APPENDIX A

RESEARCH METHODS

The Global Commodity Chain approach was used as an organizing concept to select field sites for this project. I chose the GCC approach for its original intent to understand the integration of processes over geographical areas (Hopkins and Wallerstein, 1986). Chinatown's fruit and vegetable markets in New York City are supplied by many places, many more than appropriate for the scope of a dissertation, so I conducted preliminary research to determine which sites could be combined most meaningfully. South Florida was selected because of its long-held importance as a source of winter fruits and vegetables for the United States, its climactic potential for tropical and subtropical crops, and its importance as a center of distribution for Latin American products. Honduras was selected for its novelty in the production of Asian vegetables and because entrepreneurs in Florida have been involved in organizing export from Honduras. Thus the ecological, economic, and social attributes of these locations, in addition to their involvement in the Asian fruit and vegetable commodity chain, were considered for site selection.

In order to answer the questions and test the set of hypotheses presented in this thesis, a multi-faceted, interdisciplinary approach was required. The methodology of this project combines anthropological with ecological techniques of data collection and analysis, and generated qualitative and quantitative data. It follows methodologies used in leading international *in situ* conservation projects (Jarvis et. al, 2000; Zarin et. al, 1999). The primary data is supplemented with quantitative marketing and pricing data drawn from government and industry sources.

Semi-structured interviews were used with market owners, packer/exporters, farmers, government and non-government agricultural workers in all sites. Farmer interviewees were selected through the help of agricultural extension agents and exporting firms in Honduras. All packers and distributors were contacted for interviews. Farmers' fields in Florida were mapped and sampled for cultivated plant species content and percent coverage. Observations from preliminary research in addition to the concept of agrodiversity (Brookfield et. al, 2002) were used to guide the development and analysis of structured interview questions. The research methods used in this study will be described for each field site: New York City, South Florida, and Central Honduras.

1. Market Research in Manhattan's Chinatown

Market research was designed following some methods described by Tony Cunningham (2001) in Applied Ethnobotany, People, Wild Plant Use and Conservation. My market methods are outlined in a table I made at the start of my research for organizational purposes. I include the table (A-1) below. Archival research was done to gather historical information on Chinatown's food system and market composition and Chinatown markets were visited over the course of four years between 2002 and 2006. First, complete market inventories were done to generate a list of fresh fruits and vegetables sold in Chinatown and a list of markets that sell fresh fruits and vegetables. Markets were typified according to their infrastructure (store, storefront, cart, table) and were mapped.

Table A-1: Summary of Chinatown Market Survey Methods

Method	Question	Information Obtained	Detailed Method
Archival	Since when have Chinese fruits and vegetables been sold in New York?	Historical data on the farming of Chinese vegetables – years, products, farmers, farming methods, acres of production	Journals (Econ.Bot.), Rutgers and Cornell Cooperative Extension
	How has the variety of fruits and vegetables changed in the past several decades?	Composition of products sold now and at available times in the past	United States Department of Agriculture
Market Inventories	How are markets distributed in Chinatown? Do they change over time?	Market number, location and typology	Complete market inventories
	What are retail product prices?	Price per pound, can interpret dynamics of supply and demand according to seasonal changes in price, competition between production locations, market competition	Monthly inventories based on stratified market sample according to market type and location
	What is the seasonality of products?	Product availability per month	Monthly inventories based on stratified market sample according to market type and location
	What products are sold in the largest quantities? Smallest?	Quantity determined by amount and availability	Monthly inventories based on stratified market sample according to market type and location
	What is the diversity of products sold between and within months?	Diversity of fresh fruits and vegetables available over time	Shannon Diversity Index, relative frequencies of products, and evenness were calculated for each month

In order to describe the species composition and seasonal variation of Chinatown markets, I conducted market inventories between 2004 and 2006. I developed a stratified sample of seventeen markets (about 20% of the total) to represent the proportion of market types in the sample. For example, there are street vendors that specialize in vegetables and others in fruits, some stores carry a full inventory, others just carry herbs. I conducted inventories on a monthly basis, supplemented by weekly visits during summer months to capture the impact of seasonal fruits on the market. I designed the data collection to enable the calculation of diversity measures commonly used to describe species diversity in ecological studies. I recorded the presence and absence of species and varieties of fruits and vegetables, new products seen and select prices.

The measures of diversity that I use provide a number of insights into monthly market inventories as well as a means of comparison between the monthly inventories. Richness is the total number of different fruits and vegetables present. Comparing richness by month will tell us the seasonality of certain fruits and vegetables, but it does not take into account the proportion and distribution of each fruit and vegetable in the market. The Shannon-Weaver Index (also called the Shannon or Shannon-Wiener Index) takes into account richness and proportion of each fruit and vegetables within the market. The index assumes that the proportion of individuals in an area indicate their importance in the market. Evenness is the ratio of observed diversity to maximum diversity. It indicates how similar the abundance of different fruits and vegetables are. When there are similar proportions of all species then evenness is one, but when the abundance are very dissimilar (some rare and some common) then the value increases.

Table A-2: Diversity Calculations						Shannon Index				Relative Frequency
Market	**1**	**2**	**3**	**4**	**5**	**ni**	**pi = ni/N**	**ln(pi)**	**pi(lnpi)**	**ni/5**
Asian pears, golden		1			1	2	0.09	-2.40	-0.22	0.4
Asian pears, brown	1	1			1	3	0.14	-1.99	-0.27	0.6
Asian pears, large green	1			1	1	3	0.14	-1.99	-0.27	0.6
pear				1	1	2	0.09	-2.40	-0.22	0.4
Atemoya							0.00			0
Banana		1			1	2	0.09	-2.40	-0.22	0.4
Banana, Thai			1		1	2	0.09	-2.40	-0.22	0.4
Black sapote							0.00			0
Cantolope		1		1		2	0.09	-2.40	-0.22	0.4
Carambola							0.00			0
Cherimoya							0.00			0
Coconut, immature	1	1			1	3	0.14	-1.99	-0.27	0.6
Coconut, mature							0.00			0
durian (frozen)	1	1			1	3	0.14	-1.99	-0.27	0.6
S = 15						**N = 22**			**H'=2.18**	

- The **Shannon Index** was calculated according the formula:

  $\mathbf{H^1 = -\sum (ni/N) \ln(ni/N)}$

  Where: ni = abundance of each fruit and vegetable, presence at the each market is equal to one.
  $N = \sum ni$

- **Relative Frequency** is calculated by dividing ni by the number of potential occurrences (the number of markets in the sample).

- **Evenness** is calculated according to the formula:

  Evenness = H^1/ Hmax = H^1/ lnS
  = 2.18/ ln15 (example in Table A-2)
  = 0.8

  Where: H^1 = Shannon Index
  S = total number of distinct fruits and vegetables

2. Distributor Interviews in Chinatown and South Florida

All distributors of Asian vegetables were contacted for interviews, some were contacted with referrals from others in the business; others were contacted without referrals. Interviews were conducted on marketing strategies, access to market information, use of networks and credit arrangements, forms, frequency and quality of communications between packers and farmers within and between sites. Information was collected on the initiation and development of their businesses, use of kin and personal connections, the regulatory trade environment, and their perceptions of risks and trends in produce marketing. I work with a few individuals throughout the project to understand the temporal variation and pressures in marketing, and how they affect business relations. Some interview questions were structured to collect numerical and other parametric data that can be statistically analyzed, other questions were used to gather ethnographic detail.

3. Farmer Interviews and Cultivated Plant Diversity Surveys in Florida

The ethnographic tools of interviews, life histories and direct observation where used to shape the connections between farmers and their production systems, as well as between their past experiences and present situation. Consistency was obtained by multiple visits to sites, follow-up interviews, interviews with additional household members, and by cross-referencing information through informal conversations with informants. I made four visits to Florida between 2003 and 2006 which totaled three months of fieldwork. I spent one of these months living at a tropical fruit grove in Homestead which provided with many occasions for informal conversations and observations. Throughout the visits I made it became clear that most farms included in this study were not only part of the same marketing channels and often did business

Figure A-A: Interview questions for distributors

Quantitative	**Qualitative**
How long have you been selling Asian vegetables?	What did you do before this business?
Do family members work in the business with you? If so, how many?	Why and how did you start this business?
How many employees do you have?	What is your ethnicity?
How many products do you sell?	Why do you deal in Asian fruits and vegetables?
What percent of your business comes from which products?	Is ethnicity, kinship or friendship important in building trust in your business relationships?
How many boxes do you sell per day?	If not, then how do you build trust?
What percent of your products come from which places?	What is the role of secure business relations in the success of your business?
How many farmers do you work with?	What gives your business a competitive advantage?
	How do you find farmers?
	How do you control quality?
	What changes have you seen in industry since you began?
	What is the future of produce marketing?

Figure A-B: Sample interview questions for farmers

Quantitative	**Qualitative**
How long have you been growing Asian vegetables?	Why and how did you start farming?
Do family members work on the farm with you? If so, how many?	How did you/do you learn new methods of farming?
How many employees do you have?	What did you do before farming?
How many products do you grow?	Why do you grow Asian fruits and vegetables?
What percent of your business comes from which products?	What is your ethnicity?
How many boxes do you sell per day?	Is ethnicity, kinship or friendship important in building trust in your relationship with distributors?
What percent of your products go to which places?	If not, then how do you build trust?
How long have you been selling to NYC?	What is the role of secure business relations in the success of your business?
How many distributors do you work with?	How do you find distributors?
How many acres/hectares do you farm?	Where do you get your seed? Do you experiment with new varieties?
How many do you own/lease?	What is the role of crop diversity on your farm?
	How do you irrigate, fertilize, control pests?
	What gives your farm a competitive advantage?
	How do you control quality?
	What changes have you seen in industry since you began?
	What is the future of farming?

together, but their families were part of a social community that in some cases were rooted in the past, but also united by professional and religious events.

In addition to farmers and their families, agricultural extension agents and researchers who work in the community were interviewed for background information on the historical and current agricultural situation. A list of Southeast Asian farmers was compiled through Miami-Dade Agricultural Extension and the Farmers' Service Association in Homestead. Chinese vegetable growers were identified for Palm Beach and Hendry Counties through the respective County Extension offices. Initial contact with farmers was made by phone, and interviews and farm visits were subsequently scheduled. Farmers were asked to recommend other farmers who grew similar crops and farmed in similar ways to increase the potential sample. Of 28 potential Southeast Asian farmers, all were contacted. Some refused to be interviewed, others could not be reached. Ten were successfully interviewed, most two times, and their farms were surveyed, and so comprise this study. All three Chinese vegetable farmers in Palm Beach and Hendry Counties were interviewed twice. Secondary data was gathered from USDA Agricultural Census, the Miami-Dade Land Retention Study, University of Florida's Institute for Food and Agricultural Sciences publications, and other research conducted in the area.

In order to quantify cultivated plant diversity, the technique of participatory mapping was used. Farmers or other household members would lead me around their farm identifying plants, plant uses and cropping zones while I recorded observations in a sketch map. Complete inventories were carried out to document plant diversity, abundance and location. Tree crop and woody shrub abundance were recorded as the total number of individuals; abundance of herbs was recorded as percent cover.

For the purposes of understanding farm level practices, their relation to market changes and their economic and ecological impacts, data was collected on three principle areas of agrodiversity (Brookfield et. el, 2002). (1) Biophysical diversity- soil type, rain, temperature, biodiversity; (2) Management diversity- site preparation, irrigation, planting material, cropping patterns, rotations, weeding, pests, harvest, processing, storage, soil fertility, fallows; (3) Organizational diversity – farmer/household census, education, experience, land tenure, land use history, land use interventions, catastrophic events, off-farm employment, equity, food security, labor, transport, marketing. Some interview questions were structured to collect numerical and other parametric data that can be statistically analyzed, other questions were used to gather ethnographic detail.

4. Farmer and Exporter Interviews in Comayagua, Honduras

I conducted fieldwork in Honduras between September and November of 2004. Introductions to the three exporting firms of Asian vegetables were facilitated by scientists from Zamorano, the Pan-American School for Agriculture, and FHIA, the Honduran Foundation for Agricultural Research, which is located in Comayagua. Technicians at each exporting firm escorted me to the farmers' fields for interviews. I worked with a research assistant to interview the farmers. We conducted interviews with 15 percent of each firms' farmers, which totaled about sixty interviews and the managerial staff of two of the three exporting firms (interview questions follow this section).

The same guiding principles were used to structure interview questions, but more specific questions were added to address the situation of contract farming in Honduras. These interviews were much more structured and formal than my interviews in New York and Florida. Farmers

rarely strayed from the questions posed, and because we were making the interviews on the technicians' schedules, there were time constraints that impeded informal conversation. If I were to continue conducting research with this group of farmers, I would select a smaller sample to make return interviews in the evenings when the farmers are at home, more relaxed, and with more time. The benefit of visiting farmers with the firm technicians is that I was able to repeatedly see the interactions of the farmers with the technicians to understand the type of assistance farmers receive from the firms. While in Honduras I lived in Lejamani, a farming village 20 km outside of the city of Comayagua. I was also given office space at the FHIA office, and so I had many opportunities to make causal observations and have informal conversations about agricultural and like in the area.

I also conducted interviews with many agricultural professionals from around Honduras, and around Central America. I was able to attend a four day workshop in Comayagua from October 5-8, 2004 on the export of Asian vegetables. The workshop was sponsored by the Secretary of Agricultural and Ranching, the Taiwanese Embassy, and the Central America Bank for Economic Integration. The workshop brought together professionals from all around Central America to showcase the Asian vegetables produced in Comayagua and discuss challenges and successes. The workshop even brought an importer from Homestead, FL that I had previously interviewed! This workshop, along with interviews with employees of the Center for the Development of Agribusiness (CDA), Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA), the International Center for Tropical Agriculture (CIAT), the Honduran Foundation of Agricultural Research (FHIA), Directorate of Agricultural Science and Technology (SAG-DICTA), the Mission to Agriculture of the Republic of China (MtCH), the

Center for Agricultural Development (CEDA), and Zamarano provided invaluable background information for this study.

APPENDIX B

INVENTORY OF PRODUCE MARKETS IN CHINATOWN

Retail Markets

#	MARKET TYPE	MARKET NAME °	ADDRESS	FRUIT/VEG/ BOTH/SEAH*
1	storefront	Choi Kun Heung Inc.	111 Chrystie St.	V
2	storefront	Subway	254 Grand St.	B
3	storefront	Tan My My Market Inc.	253-259 Grand St.	B
4	store	Sieu Thi Viet Nam	247 Grand St.	B; SEAH
5	storefront	United E Group	240 Grand St.	V
6	store	Grand Star Lotto	242 Grand St.	F
7	storefront	Hanging Longan	232 Grand St.	B
8	cart	Long Luffa	233 Grand St	V
9	cart	Washing Fuzzy Melon	231 Grand St	V
10	cart	Large Longan	223 Grand St	F
11	storefront	Wing Fat	221 Grand St.	B
12	cart	Afei	217 Grand St.	longan/litchi [a]
13	storefront	Yue Fung	206 Grand St.	B
14	storefront	Sweet Valley Fruit and Vegetable	207 Grand St	B
15	storefront	Sweet Valley Fruit and Vegetable	205 Grand St	V
16	storefront	GV Trading (was Sweet Valley)	146 Mott St	longan
17	table	GV Trading (S end)	144 Mott St	B
18	table	temp1	142 Mott St	B
19	table	temp2	140 Mott St	B
20	table	temp3	138 Mott St	V
21	table	temp4	136 Mott St	V
22	table	temp5	134 Mott St	V
23	cart	temp6	132 Mott St	B
24	storefront	temp7	130 Mott St	F
25	table	Optical	203 Grand St.	B
26	cart	temp8	149 Mott St	V
27	cart	temp9	147 Mott St	V
28	store	New Au Jang Market	141 Mott St.	B
29	store	Shing Hing Trading Co.	139 Mott St.	B
30	table	Tai Chong Meat Market	128 Mott St.	B
31	store	WK Vegetable Co.	124 Mott St	V
32	storefront	Won Chueng Fish Market	131 Mott St	V
33	storefront	Won Chueng Fish Market (S side)	131 Mott St	V
34	storefront	Tung Lay Meat Market	124 Mott St	V
35	table	Martha's Best	125 Mott St	mango, longan
36	storefront	Farmer's Market	121 Mott St	V
37	makeshift	pre-construction veggies	110 Mott St	V
38	makeshift	pre-construction fruit	108 Mott St	F
39	cart	Longan	90 Mott St	longan
40	cart	Abacus	89 Mott St	longan

Retail Markets

#	MARKET TYPE	MARKET NAME °	ADDRESS	FRUIT/VEG/ BOTH/SEAH*
41	cart	Vita Soy	185 Canal St	B
42	cart	Mou Cheng Optical	184 Canal St	longan, litchi
43	cart	Chase Cart	178 Canal	longan
44	cart	Hoho	71 Elizabeth	longan
45	store	Mee Li Fruit and Vegetable Co.	56 Elizabeth St.	B
46	cart	BEA Pitaya	94 Mulberry St	F
47	cart	BEA	92 Mulberry St)	F
48	cart	Taipan Bakery	200 Canal St.	F
49	cart	Taipan Bakery II	202 Canal St.	V
50	cart	Chinatrust I	93 Mulberry St	F
51	cart	Chinatrust II	91 Mulberry St	V
52	store	Thuan-Nguyen Trading	84 Mulberry St	SEAH
53	store	Asia Mart-Thai and Indonesian	71 1/2 Mulberry St.	V
54	storefront	Han May	73 Mulberry St.	B
55	store	Sung Hung Lee	79 Bayard	B
56	store	Bangkok Center Grocery	104 Mosco St.	SEAH
57	storefront	Lung Hing Fruit and Veg. Corp	120 Walker Street	B
58	cart	Four Season	226 Canal St.	F
59	cart	Non-Chinese	152 Centre St.	F
60	cart	Nice Lady	153 C Centre St	V
61	cart	Canal St. Station	153 D Centre St.	F
62	cart	Starbucks	241 Canal St.	F
63	cart	Chinese	250 Canal St.	longan/litchi
64	cart	HSBC	252 Canal St.	longan
65	cart	Longan	226 Canal St.	longan
66	cart	fish corner	224 Canal St.	longan/litchi
67	cart	M+F Fish	214 Canal St.	longan
68	cart	Music and Gifts	210 Canal St.	F
69	cart	Jackfruit and Horns	208 Canal St.	F
70	cart	ATM	200 Canal St.	B
71	cart	Peking	198 Canal St.	F
72	cart	Bamboo	196 Canal St.	B
73	storefront	Number One Long Hing Market Inc.	17 East Broadway	F
74	storefront	Number One Long Hing Market Inc.	17 East Broadway	F
75	storefront	Number One Long Hing Market Inc.	17 East Broadway	F
76	storefront	Sun Tung Wui Market Inc.	37 East Broadway	B
77	storefront	Sun Tung Wui Market Inc.	37 East Broadway	F
78	storefront	New Lung Hing Market	51 East Broadway	B
79	storefront	Lou Cheng Market Inc.	57 East Broadway	B
80	storefront	Hu Xin Vegetable and Grocery	107 East Broadway	B
81	store	Hong Kong Supermarket	109 East Broadway	B
82	storefront	HK Man Polo	291 Grand St	longan/litchi
83	storefront	AA Meat Market, Inc.	288 Grand St.	B

Retail Markets

#	MARKET TYPE	MARKET NAME	ADDRESS	BOROUGH
84	storefront	Evergrand Trading Inc.	272 Grand St.	B
85	storefront	G.S. Food Market Corp.	250 Grand St.	B
86	storefront	Tai Fortune Food Market Corp	162 Grand St.	B
87	storefront	Tin Tin	121 Bowery	B
88	supermarket	Dynasty Supermarket	78 Elizabeth St	B
89	indoor market	Deluxe Food Market	79 Elizabeth St	V
90	outdoor market	Confucious Plaza	25 Bowery	B

* SEAH = Southeast Asian herbs

a longan/litchi = markets that appeared during litchi and longan season but that may sell other seasonal items

o Market Names = Names that appear on front of the store where the market is located is listed. In some cases there are no names, so I gave the market a descriptive name

Wholesale Markets

#	MARKET TYPE	MARKET NAME	ADDRESS	BOROUGH
1	Wholesale	Double Green	141 Chrystie St.	Manhattan
2	Wholesale	Finast Produce	119 Chrystie St	Manhattan
3	Wholesale	New Son Yeng	69 Washington Ave	Brooklyn
4	Wholesale	World Farm	429 Broome St	Manhattan
5	Wholesale	Lau and Son Produce	252 Kent Ave	Brooklyn
6	Wholesale	Bally Wholesale	Brooklyn	Brooklyn
7	Wholesale	Dai Sing/ Tay Shing Corp.	1 Allen St and Division	Manhattan
8	Wholesale	Top Green Farm	14 Allen St	Manhattan
9	Wholesale	East Trading	130 Division St	Manhattan
10	Wholesale	Lau and Son	57 Kenmare St	Manhattan
11	Wholesale	Five Brothers	356 Broome St.	Manhattan
12	Wholesale	Jaya Produce	5 Roebling St	Brooklyn

APPENDIX C

FRESH FRUITS VEGETABLES AND HERBS SOLD IN CHINATOWN MARKETS

TYPE	FAMILY	BINOMIAL	ENGLISH
Fruit	Actinidiaceae	*Actinidia deliciosa*	kiwi
Root Vegetable	Alismataceae	*Sagittaria sp.*	Arrowhead
Leaf Vegetable	Amarathaceae	*Amaranthus tricolor*	red amaranth, Chinese spinach
Leaf Vegetable	Amarathaceae	*Amaranthus sp.*	green amaranth
Fruit	Anacardiaceae	*Spondias dulcis*	June Plum
Fruit	Anacardiaceae	*Mangifera indica*	mango, unripe
Fruit	Anacardiaceae	*Mangifera indica*	mango, Haitian, yellow kidney shaped
Fruit	Anacardiaceae	*Mangifera indica*	mango, Tommy Atkins, red and green
Fruit	Annonaceae	*Annona muricata*	Soursop
Fruit	Annonaceae	*Annona cherimola*	Cherimoya
Fruit	Annonaceae	*Annona cherimola x Annona squamosa*	Atemoya
Fruit	Annonaceae	*Annona squamosa*	sugar apple
Root Vegetable	Apiaceae	*Daucus carota*	carrot
Herb	Apiaceae	*Coriandrum sativum*	Cilantro
Herb	Apiaceae	*Eryngium foetidum*	Culantro
Root Vegetable	Araceae	*Colocasia esculenta*	Eddoes, Taro
Stem Vegetable	Araceae	*Colocasia gigantea*	tun, petiole eaten
Root Vegetable	Araceae	*Xanthosoma sagittifolium*	Malanga, dasheen
Fruit	Arecaceae	*Cocos nucifera*	Coconut, immature
Fruit	Arecaceae	*Cocos nucifera*	Coconut, mature
Leaf Vegetable	Asteraceae	*Lactuca sativa var. asparagina*	Celtuce
Leaf Vegetable	Asteraceae	*Chrysanthemum coronarium*	Chrysanthemum leaves
Leaf Vegetable	Asteraceae	*Lactuca sp.*	AA Choy
Leaf Vegetable	Asteraceae	*Lactuca sativa var. crispa*	lettuce, green leaf
Leaf Vegetable	Asteraceae	*Lactuca sp.*	lettuce, long pointed
Leaf Vegetable	Asteraceae	*Lactuca sativa var. capitata*	lettuce, iceberg
Root Vegetable	Asteraceae	*Arctium lappa*	Burdock
Leaf Vegetable	Basellaceae	*Basella alba*	Malabar or Ceylon spinach
Fruit	Bombacaceae	*Durio zibethinus*	Durian
Leaf Vegetable	Brassicaceae	*Brassica juncea*	Chinese mustard, heading
Leaf Vegetable	Brassicaceae	*Brassica integrifolia*	Chinese loose mustard leaves
Leaf Vegetable	Brassicaceae	*Brassica oleracea var. alboglabra*	Chinese broccoli
Leaf Vegetable	Brassicaceae	*Brassica oleracea*	Korean flat cabbage
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	Shanghai choy, baby
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	Shanghai choy, green stem and leaf
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	bok choy, white stem, dark green leaf
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	bok choy, baby
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	bok choy sum, flowering
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	bok choy tips
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. chinensis*	Taku choy, thin stemmed choy

TYPE	FAMILY	BINOMIAL	ENGLISH
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. parachinensis*	Oil Greens
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. parachinensis*	Yu Choy, yellow flower
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. parachinensis*	Yu choy tips
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. pekinensis*	long napa, chihili
Leaf Vegetable	Brassicaceae	*Brassica rapa*	Taiwan cabbage
Leaf Vegetable	Brassicaceae	*Brassica rapa subs. pekinensis*	Napa cabbage
Leaf Vegetable	Brassicaceae	*Nasturtium officinale*	Watercress
Stem Vegetable	Brassicaceae	*Brassica oleracea var. gongylodes*	kohlrabi
Root Vegetable	Brassicaceae	*Raphunus sativa longipinnatus*	Chinese radish (daikon)
Root Vegetable	Brassicaceae	*Rapahanus sativus var. longipinnatus*	Green Radish
Stem Vegetable	Brassicaceae	*Brassica oleracea (Italica group)*	broccoli
Stem Vegetable	Brassicaceae	*Brassica oleracea (Botrytis Group)*	cauliflower
Fruit	Bromeliaceae	*Ananas comosus*	pineapple
Fruit	Cactaceae	*Hylocereus undatus*	Pithaya
Fruit	Caesalpiniaceae	*Tamarindus indicus*	Tamarind
Fruit	Caricaceae	*Carica papaya*	Papaya, unripe
Fruit	Caricaceae	*Carica papaya*	papaya, small
Fruit	Caricaceae	*Carica papaya*	papaya, large
Leaf Vegetable	Chenopodiaceae	*Spinacia oleracea*	spinach
Leaf Vegetable	Convolvulaceae	*Ipomoea aquatica*	Water spinach
Leaf Vegetable	Convolvulaceae	*Ipomoea batatas*	sweet potato shoots
Root Vegetable	Convolvulaceae	*Ipomoea batatas*	sweet potato, orange skin
Root Vegetable	Convolvulaceae	*Ipomoea batatas*	sweet potato, white skin
Fruit Vegetable	Cucurbitaceae	*Momordica charantia*	white bitter melon
Fruit Vegetable	Cucurbitaceae	*Momordica charantia*	Bitter melon
Fruit Vegetable	Cucurbitaceae	*Sechium edule*	Chayote
Fruit Vegetable	Cucurbitaceae	*Cucumis sativus*	cucumber
Fruit Vegetable	Cucurbitaceae	*Luffa aegyptiaca*	Thai okra
Fruit Vegetable	Cucurbitaceae	*Luffa acutangula*	Chinese okra
Fruit Vegetable	Cucurbitaceae	*Benincasa hispida var. chien-gua*	Fuzzy squash
Fruit Vegetable	Cucurbitaceae	*Cucurbita maxima*	Japanese pumpkin
Fruit Vegetable	Cucurbitaceae	*Legenaria siceraria*	Long squash
Fruit Vegetable	Cucurbitaceae	*Benincasa hispida*	Winter melon
Fruit Vegetable	Cucurbitaceae	*Lagenaria siceraria*	bird house gourd
Fruit Vegetable	Cucurbitaceae	*Cucurbita pepo*	zuccini
Fruit Vegetable	Cucurbitaceae	*Cucurbita moschata*	green striped melon
Fruit Vegetable	Cucurbitaceae	*Cucurbita moschata*	butternut squash
Fruit Vegetable	Cucurbitaceae	*Cucurbita maxima*	large light tan squash, orange inside
Fruit	Cucurbitaceae	*Cucumuis melo var. cantaloupensis*	cantaloupe
Fruit	Cucurbitaceae	*Cucumis melo (Inodorus Group)*	honeydew
Fruit	Curcurbitaceae	*Citrullus lanatus*	watermelon
Root Vegetable	Cyperaceae	*Eleocharis dulcis*	Water chestnut
Fruit	Ebenaceae	*Diospyros kaki*	persimmon, flat
Fruit	Ebenaceae	*Diospyros kaki*	persimmon, conical
Fruit	Ebenaceae	*Diospyros dignya*	Black Sapote
Fruit	Ericaceae	*Vaccinium spp.*	blueberry
Root Vegetable	Euphorbiaceae	*Manihot esculenta*	Cassava

TYPE	FAMILY	BINOMIAL	ENGLISH
Leaf Vegetable	Fabaceae	*Pisum sativum var. macrocarpum*	Snow pea tips
Root Vegetable	Fabaceae	*Pachyrhizus erosus*	Jicama
Root Vegetable	Fabaceae	*Pueraria lobata*	Kudzu
Fruit Vegetable	Fabaceae	*Vigna unguiculata sesquipedalis*	Long beans, light grees
Fruit Vegetable	Fabaceae	*Vigna unguiculata sesquipedalis*	Long beans, dark green
Fruit Vegetable	Fabaceae	*Pisum sativum var. macrocarpon*	Snow peas
Fruit Vegetable	Fabaceae	*Pisum sativum var. macrocarpon*	Snap peas
Fruit Vegetable	Fabaceae	*Glycine max*	Soybean
Fruit Vegetable	Fabaceae	*Psophocarpus tetragonolobus*	Winged bean
Bean Sprout	Fabaceae	*Vigna radiata*	mung bean sprouts
Fruit Vegetable	Fabaceae	*Phaseolus vulgaris*	string beans
Fruit Vegetable	Fabaceae	*Lablab purpureus*	bean, hyacinth Lablab purpureus
Fruit Vegetable	Fabaceae	*Lablab purpureus*	bean, larger green lablab
Herb	Fabaceae	*Acacia gamblei*	Cha ohm
Fruit	Fabaceae	*Arachis hypogaea*	peanut
Fruit Vegetable	Fagaceae	*Castanea sativa*	chestnuts
Herb	Lamiaceae	*Ocimum basilicum*	Thai Basil
Herb	Lamiaceae	*Ocimum tenuiflorum*	Holy Basil
Herb	Lamiaceae	*Mentha spicata*	Spearmint
Herb	Lamiaceae	*Ocinum americanum*	Hoary Basil
Herb	Lamiaceae	*Perilla frutescens*	Perilla, Tia To
Herb	Lamiaceae	*Elsholtzia ciliate*	Rainbow plant
Fruit	Lauraceae	*Persea americana*	avocado
Leaf Vegetable	Liliaceae	*Allium tuberosum*	chive leaves
Leaf Vegetable	Liliaceae	*Allium tuberosum*	chive flowers
Leaf Vegetable	Liliaceae	*Allium tuberosum*	yellow chives
Stem Vegetable	Liliaceae	*Allium sp.*	lily bulb
Stem Vegetable	Liliaceae	*Allium porrum*	leek
Stem Vegetable	Liliaceae	*Asparagus officinalis*	asparagus
Stem Vegetable	Liliaceae	*Allium cepa*	scallion
Stem Vegetable	Liliaceae	*Allium cepa*	onion, white
Stem Vegetable	Liliaceae	*Allium cepa*	onion, red
Stem Vegetable	Liliaceae	*Allium cepa*	shallot
Stem Vegetable	Liliaceae	*Allium sativum*	garlic
Herb	Liliaceae	*Allium cepa*	shallot
Herb	Liliaceae	*Allium sativum*	garlic
Fruit Vegetable	Malvaceae	*Abelmoschus esculentus*	okra
Fruit	Moraceae	*Artocarpus heterophyllus*	Jackfruit
Fruit	Moraceae	*Ficus carica*	figs
Herb	Moringaceae	*Moringa oleifera*	Horseradish tree, drumstick
Flower Vegetable	Musaceae	*Musa spp*	Banana flower
Fruit	Musaceae	*Musa spp.*	Banana, thai
Fruit	Musaceae	*Musa spp.*	Banana
Fruit	Myrtaceae	*Psidium guajava*	Thai Guava
Fruit	Myrtaceae	*Myrciaria cauliflora*	jaboticaba
Root Vegetable	Nymphaceae	*Nelumbo nucifera*	Lotus root

TYPE	FAMILY	BINOMIAL	ENGLISH
Fruit	Oxalidaceae	*Averrhoa carambola*	Carambola, star fruit
Herb	Piperaceae	*Piper lolot*	Chi' pluh
Herb	Piperaceae	*Piper betel*	Pan leaves
Stem Vegetable	Poaceae	*Phyllostachys spp.*	Bamboo shoots
Fruit Vegetable	Poaceae	*Zea mays*	sweet corn
Herb	Poaceae	*Cymbopogan citratus*	Lemon Grass
Fruit	Poaceae	*Saccharum officinarum*	sugarcane
Herb	Polygonaceae	*Polygonum odoratum*	Vietnamese Coriander
Fruit	Punicaceae	*Punica granatum*	pomegranate
Fruit	Rhamnaceae	*Ziziphus jujuba*	Jujube
Fruit	Rosaceae	*Eriobotrya japonica*	Loquat
Fruit	Rosaceae	*Syzyguim samarangense*	Wax Jambu
Fruit	Rosaceae	*Pyrus serotina*	Asian Pear, brown
Fruit	Rosaceae	*Pyrus serotina*	Asian pears, golden
Fruit	Rosaceae	*Pyrus serotina*	Asian pears, large green
Fruit	Rosaceae	*Pyrus communis*	pear
Fruit	Rosaceae	*Malus domestica*	apple, gala
Fruit	Rosaceae	*Malus domestica*	apple, macintosh
Fruit	Rosaceae	*Malus domestica*	apple, red delicious
Fruit	Rosaceae	*Malus domestica*	apple, lady
Fruit	Rosaceae	*Fragaria ananassa*	strawberry
Fruit	Rosaceae	*Prunus salicina*	plums, oval purple
Fruit	Rosaceae	*Prunus salicina*	plums, round purple
Fruit	Rosaceae	*Prunus salicina*	plums, yellow
Fruit	Rosaceae	*Prunus persica*	peach
Fruit	Rosaceae	*Prunus persica*	nectarine
Fruit	Rosaceae	*Prunus avium*	cherries
Fruit	Rosaceae	*Malus domestica*	granny smith apples
Fruit	Rosaceae	*Rubus spp.*	blackberry
Herb	Rutaceae	*Citrus hystrix*	Kaffir lime
Herb	Rutaceae	*Citrus hystrix*	Kaffir lime leaves
Herb	Rutaceae	*Murraya keonigii*	Curryleaf
Fruit	Rutaceae	*Citrus aurantifolia*	Lime
Fruit	Rutaceae	*Citrus aurantifolia*	lime
Fruit	Rutaceae	*Citrus grandis*	Pummelo
Fruit	Rutaceae	*Citrus limon*	lemon
Fruit	Rutaceae	*Citrus paradisi*	grapefruit
Fruit	Rutaceae	*Citrus reticulata*	tangerine
Fruit	Rutaceae	*Citrus reticulata*	clementine
Fruit	Rutaceae	*Citrus sinensis*	orange
Fruit	Rutaceae	*Citurs sinensis*	blood orange
Fruit	Rutaceae	*Fortunella spp.*	Kumquat
Fruit	Sapindaceae	*Dimocarpus chinesis*	Longan, Dragon's eye
Fruit	Sapindaceae	*Litchi chenisis*	Litchi
Fruit	Sapindaceae	*Nephelium lappaceum*	Rambutan
Fruit	Sapotaceae	*Chrysophyllum cainito*	Star Apple
Herb	Sauraceae	*Houttuynia cordata*	Giap Ca

TYPE	FAMILY	BINOMIAL	ENGLISH
Herb	Scrophulariaceae	*Limnophila aromatica*	Mah Ohm
Leaf Vegetable	Solanaceae	*Lycium chinense*	Chinese boxthorn
Fruit Vegetable	Solanaceae	*Solanum melongena*	Cambodian eggplant
Fruit Vegetable	Solanaceae	*Solanum melongena*	Chinese eggplant
Fruit Vegetable	Solanaceae	*Solanum melongena var. depressum*	Thai eggplant
Fruit Vegetable	Solanaceae	*Lycopersicon esculentum*	tomato
Fruit Vegetable	Solanaceae	*Solanum tuberosum*	potato
Fruit Vegetable	Solanaceae	*Capsicum annuum var. grossum*	pepper, red bell
Fruit Vegetable	Solanaceae	*Capsicum annuum var. grossum*	pepper, green bell
Fruit Vegetable	Solanaceae	*Capsicum annuum var. annuum*	pepper, long hot
Herb	Solanaceae	*Capsicum annuum*	Thai chili peppers
Fruit Vegetable	Trapaceae	*Trapa bicornis*	caltrops
Root Vegetable	Umbelliferae	*Arracacia xanthorrhiza*	Apio, white carrot
Stem Vegetable	Umbelliferae	*Apium graveolens*	Celery
Stem Vegetable	Umbelliferae	*Apium leptophyllum*	Chinese celery
Fruit	Vitaceae	*Vitis sp.*	grape, red
Fruit	Vitaceae	*Vitis sp.*	grape, purple
Fruit	Vitaceae	*Vitis sp.*	grape, white
Fruit	Vitaceae	*Vitis sp.*	grape, small concord
Herb	Zingerberaceae	*Alpinia galanga*	Galangal
Herb	Zingerberaceae	*Zingiber officinale*	Ginger

APPENDIX E

CHINESE VEGETABLES GROWN IN PALM BEACH AND HENDRY COUNTIES, FLORIDA

Image		Scientific Name	Cantonese and Mandarin Pronunciation	English Name
1		*Allium tuberosum*	C gau choy fa M jiu tsai hua	chive flowers or chive leaves
2		*Amaranthus tricolor*	C yeen choy M shian tsai	Amaranth, Chinese spinach
3		*Apium graveolens*	C kun coi M chin tsai	Chinese celery
4		*Benincasa hispida*	C tung kwa M dong gua	winter melon

5		*Brassica juncea*	C gai choy M jie tsai	Chinese mustard
6		*Brassica oleracea*	C go lai choy	Korean (flat) cabbage
7		*Brassica oleracea* var. *alboglabra*	C gai lan M jie lan	Chinese broccoli
8		*Brassica oleracea* var. *gongylodes*	C coi gua M da tou hau	kohlrabi
9		*Brassica rapa* subs. *chinensis*	C sheng hoy choy	Shanghai choy

10		*Brassica rapa* subs. *chinensis*	C sheng hoy choy	baby Shanghai choy
11		*Brassica rapa* subs. *chinensis*	C bok choy M bai tsai	bok choy
12		*Brassica rapa* subs. *chinensis*	C siu bok choy	Baby bok choy
13		*Brassica rapa* subs. *chinensis*	C choy sum M you tsai	choy sum (flowering bok choy)
14		*Lactuca sp.*	C au jiu choy M rr choy	AA choy

15		*Brassica rapa* subs. *chinensis*	C miu bok choy	Thin stemmed boy choy tips
16		*Brassica rapa* subs. *parachinensis*	C yu choy M you chai	yu choy - yellow flower, green stems
17		*Brassica rapa* subs. *pekinensis*	C siu choy M da bai chai	napa cabbage
18		*Brassica rapa* subs. *pekinensis*	C cheurng choy M chang chai	long napa, chihili
19		*Chrysanthemum cononarium*	C tung ho M tong hau	Chrysanthemum leaves

20		*Coriandrum sativum*	C eem sai, heung choi M yian shui	Chinese parsley, cilantro
21		*Raphanus sativus* var. *longipinnatus*	C lo bak M luo bo bai	Chinese turnip, daikon
22		*Raphanus sativus*	C sheng hoy lo bok	Shanghai turnip, green turnip
23		*Spinacia oleracea*	C M bau tsai	spinach

APPENDIX F
Plants found in Southeast Asian homegardens in Homestead, Florida

Use	Latin Name	Khmer	Vietnamese	Thai	Lao	English
HERB	*Acacia pennata*	cha om	Keo	cha om		acacia
VEG	*Allium tuberosum*	slak katjhai	he		pak pen	flowering chives
HERB	*Alpinia galangal*	mt daeng	rieng	khaa	khaa	galangal
HERB	*Anethum graveolens*		Thia la	pak chi lao	pak si	dill
FRUIT	*Annona cherimola x Annona squamosa*		Na			atemoya
FRUIT	*Annona muricata*	tiep banla	Mang cau xiem	ma thurian	mak khiap	soursop, guanabana
FRUIT	*Annona squamosa*		Na	noina	khieb	sugar apple, annona
VEG	*Apium graveolens*		can tay	khuen chai	pak si sang	chinese celery
FRUIT	*Artocarpus heterophyllus*	khnao	Qua mit	ka noon	mak mi	jackfruit
FRUIT	*Averrhoa carambola*	pla-ay spoeu	Qua khe	ma fung	mak feuang	carambola, star fruit
HERB	*Azadirachta indica*	sa dao	Sau dau	sa dao	sa dao	neem leaves
HERB	*Barringtonia acutangula*		Loc vung	chik	ka don	cut nut, wild almond
VEG	*Basella alba var rubra*		Mong toi	pak ptang	pak pang	ceylon or Malabar spinach
VEG	*Benincasa hispida*		Bi dao			fuzzy melon
VEG	*Brassica integrifolia*		Cai ngot	pakkat khieo plee		mustard leaf
OTHER	*Canaga odorata*		Ngoc lan tay			ylang ylang
VEG	*Capsicum fruitescences*	mate hel	Ot	prik	piik thai	chile pepper
FRUIT	*Carica papaya*	pla-ay lehuang	trai du du	ma lakaw	mak huong	papaya
HERB	*Cassia siamea*		Muong xiem or muong den		key lek	glutinous soup herb
HERB	*Centella asiatica*	trachiek kranh	rau ma	bua bok; pak nok		pennywort
OTHER	*Cestrum nocturnum*		da ly huong			night jasmine
FRUIT	*Chrysophyllum cainito*		vu sua			star apple, caimito
FRUIT	*Citrus aurantifolia*		chanh ta	ma nao	mark nao kiao	lime

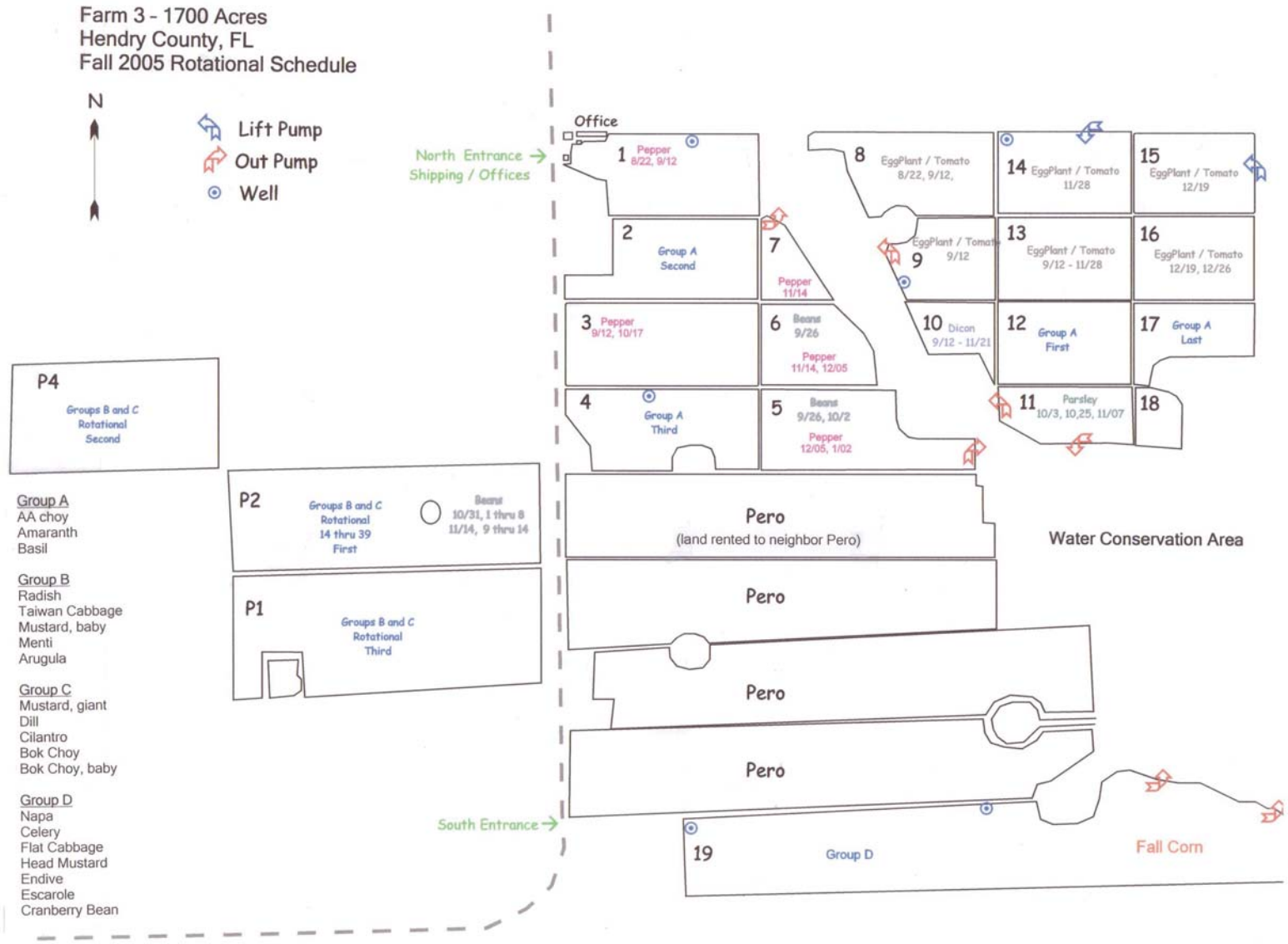
Use	Latin Name	Khmer	Vietnamese	Thai	Lao	English
FRUIT	*Citrus grandis*		buoi	som o	mak kiang ny ai	pummelo
HERB	*Citrus hystrix*	kraunch soeut	chanh sac, truc	bai makrut	kok mak khi hout	kaffir lime
VEG	*Coccinia grandis*		bat	tamlueng	thum nin	tindora
FRUIT	*Cocos nucifera*	dong	dua	ma phrao	mark phao	coconut
VEG	*Colocasia esculenta*		Cu khoai so	bak ha maruni	thoune	taro stem
VEG	*Cyamopsis tetragonoloba*		Dau			guar, cluster bean
HERB	*Cymbopogon citratus*	culs la kray	xa	ta krai	si khai	lemongrass
FRUIT	*Dimocarpus longan*	pla-ay min	nhan	lamyai	mak lam nyai	longan
FRUIT	*Diospyros dignya*		Thi			black sapote
FRUIT	*Diospyros kaki*		Hong	lhok phub; phlap chin	mak phueang	persimmon
HERB	*Elsholtzia ciliata*		Rau kinh gio'i			rainbow plant, vietnamese mint
FRUIT	*Eriobotrya japonica*		Nhot tay			loquat
HERB	*Eryngium foetidum*	vann sui	Ngo tay; mui tau	pak chi	pak hom pom	Cilantro; cilantro, corander leaf
HERB	*Erynglum fetidum*	chi bonla	Check latin name	pak chi farang	hom pen	culantro, saw tooth herb
HERB	*Glinus oppositifolius*		rau dang			glinus
HERB	*Houttuynia cordata*	diep ca	rau giap ca	kau tong	pa kau tong	chinese lizard tail, fishwort, heartleaf
FRUIT	*Hylocereus undatus*		Thanh long; Tuong lien			dragon fruit, pithaya
VEG	*Ipomoea aquatica*		rau muong	pak boong	pak bong	water spinach
VEG	*Ipomoea batatas*	damlo ng chvie	rau lang	man thet	man kew	boniato or potato leaf
VEG	*Lablab purpureus*		Dau van; bach bien	thua paep	mak thua paep	hyacinth, indian bean
VEG	*Lagenaria siceraria*	khlook	Bau	naam tao	namz taux	long squash
HERB	*Limnophila aromatica*	ma om	rau om, ngo om	cha yang		rice paddy herb
FRUIT	*Litchi chinensis*	pla-ay koo lain	Vai	linchi	mak lin chi	litchi, lychee
VEG	*Luffa acutangula*	ronoong chrung	muop khia	buap	mak noi/loi	chinese okra

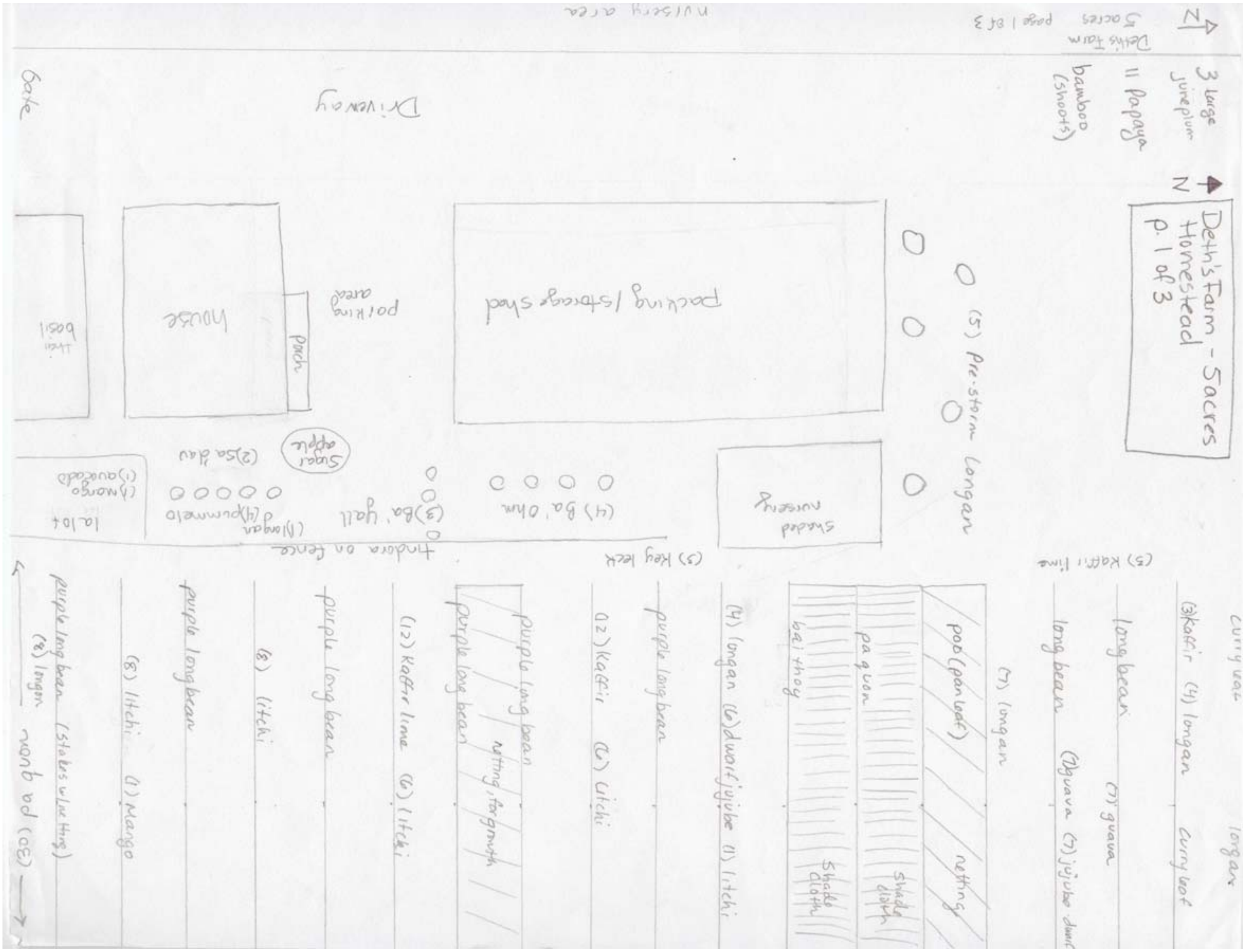
Use	Latin Name	Khmer	Vietnamese	Thai	Lao	English
VEG	*Luffa cylindrica*	ronoong muul	muop huong	buap hom	mak bouap	thai okra, smooth luffa
HERB	*Marsilea crenata*		Rau Deu rang		pak van	water clover
FRUIT	*Mangifera indica*	pla-ay mukhot	Xoai	mamuang	mark muang	mango
VEG	*Manihot esculenta*		la mi, khoai mi	mansampalang	bay man ton	yuca leaf
FRUIT	*Manilkara zapota*	pla-ay kom ping riedj	hong xiem	lamut farang	lamud	sapodilla
HERB	*Mentha piperita*	ci poho	Bac Ha	bai saranai	pak hom	peppermint
HERB	*Mentha spicata*		Cay bac ha luc			spearmint
VEG	*Momordica charantia*	mreah	kho qua; muop dang	mara khinok	mak khao	bittermelon
OTHER	*Morinda citrifolia*			yo baan	ba yall	noni, awl tree
HERB	*Moringa oleifera*	daem mrom	Cay cai ngua	ma rum		horseradish tree, drumstick
HERB	*Murraya keonigii*		Cari; nguyet quoi	bai karee	khi be	curryleaf
FRUIT	*Musa spp.*	cheek namva	chuoi	kiew hom	mak kuay	banana
HERB	*Ocimum americanum*	thjee		mang lak	pak etu	hoary or white basil
HERB	*Ocimum basilicum*	ju liang vong	hung que	bai horapa	pak etu	Thai basil
HERB	*Ocimum tenuiflorum*	mareh preuw	E tia: E do; hoang nhu tia	bai gaprow	pak etu holy	holy basil
HERB	*Pandanus odorus*	taey	dua thom, la dua	bai toey	bai toey	pandan leaf, sweet leaf, fragrant screw pine
VEG	*Parkia speciosa*		N/A	ga teen; sator		cabi bean
HERB	*Perilla frutescens*		tia to	nag mon	nga chien chin	perilla, balm mint
FRUIT	*Persea americana*	avokaa	trai bo	awokhado	mak avocado	avocado
VEG	*Phyllostachys sp.*		mang			bamboo shoot
HERB	*Piper betle*		trau khong	phulu	pu	pan leaf
HERB	*Piper lolot*	chi' pluh	la lot	cha plu	la lot, pak ileut	pepper leaves
HERB	*Polygonum odoratum*	chi krassang tomhom	rau ram	pak chi wietnam	pak payo	Vietnamese coriander
FRUIT	*Pouteria campechiana*		Qua trung ga			egg fruit, canistel
FRUIT	*Psidium guajava*	trapaek sruk	oi	farang	mak si da	Thai guava
VEG	*Psophocarpus tetragonolobus*	prapiey	dau rong	thua phuu	mak thua phou	wing bean, asparagas bean

Use	Latin Name	Khmer	Vietnamese	Thai	Lao	English
HERB	*Sauropus androgynus*		rau ngot	pak wan	pak wan	sweet leaf bush
VEG	*Sesbania grandiflora*	angkiedei	So dua	dok khae, khae ban	dok khae	white flower
VEG	*Solanum melongena*	traap veing	ca tim	mak heva muang	mak kheau	Chinese eggplant
VEG	*Solanum undatum*		ca phao	mak heva	khun	thai eggplant
VEG	*Solanum torvum*		ca hoang; ca nong	mak hua puang	puang	Cambodian, cherry of pea eggplant, turkeyberry
FRUIT	*Spondias dulcis*	mokak	Qua coc	makok	kook hvaan	june plum
FRUIT	*Syzyguim samarangense*	man	Roi, man	chom phuu		wax jambu
FRUIT	*Tamarindus indicus*	am peuhl	me chua	mak kham	mak kham	tamarind
VEG	*Vicia faba*					valor or Indian broad bean
VEG	*Vigna sesquipedelis*	sang dek khoua	dau dua	tua fak yao	mak thoua frang	long bean
FRUIT	*Ziziphus jujuba*	pla-ay poo tree e	tao ta	phutsa cheen	mak ka than	jujube

APPENDIX G

Examples of two sketch maps from Florida Farms


Farm 3 - 1700 Acres
Hendry County, FL
Fall 2005 Rotational Schedule
N
Lift Pump
Out Pump
Well
Office
North Entrance
Shipping / Offices
1 Pepper 8/22, 9/12
2 Group A Second
3 Pepper 9/12, 10/17
4 Group A Third
5 Beans 9/26, 10/2 Pepper 12/05, 1/02
6 Beans 9/26 Pepper 11/14, 12/05
7 Pepper 11/14
8 EggPlant / Tomato 8/22, 9/12,
9 EggPlant / Tomato 9/12
10 Dicon 9/12 - 11/21
11 Parsley 10/3, 10,25, 11/07
12 Group A First
13 EggPlant / Tomato 9/12 - 11/28
14 EggPlant / Tomato 11/28
15 EggPlant / Tomato 12/19
16 EggPlant / Tomato 12/19, 12/26
17 Group A Last
18
P4 Groups B and C Rotational Second
P2 Groups B and C Rotational 14 thru 39 First
Beans 10/31, 1 thru 8 11/14, 9 thru 14
P1 Groups B and C Rotational Third
Pero (land rented to neighbor Pero)
Pero
Pero
Pero
Water Conservation Area
South Entrance
19 Group D
Fall Corn
Group A
AA choy
Amaranth
Basil
Group B
Radish
Taiwan Cabbage
Mustard, baby
Menti
Arugula
Group C
Mustard, giant
Dill
Cilantro
Bok Choy
Bok Choy, baby
Group D
Napa
Celery
Flat Cabbage
Head Mustard
Endive
Escarole
Cranberry Bean



Deth's Farm - 5acres
Homestead
p. 1 of 3
N
3 large jureplum
11 Papaya
bamboo (shoots)
Driveway
packing/storage shed
house
porch
parking area
(5) Pre-storm longan
shaded nursery
Gate
(5) Kaffir lime
(5) Key leek
purple long bean
long bean
shade cloth
netting

APPENDIX H

Socio-economic Profile of Honduras Farmers of *vegetales orientales*

Farmers are grouped according to the export firm they worked with at the time of interviews, Sept-Nov 2004.
Independent farmers are those who do not need to accept financing from export firms and have contracts with multiple firms.

Variable	Exportador 1		Exportador 2		Exportador 3		Independent Farmers		TOTAL	
	# responses	% total	# responses	% total	# responses	% total	# responses	% total	**# responses**	**% total**
AREA										
0 > 1 mz	7	27%	13	50%	3	30%	0	0%	**23**	**34%**
1 > 3 mz	16	62%	10	38%	5	50%	2	33%	**33**	**49%**
3 > 5 mz	3	12%	2	8%	1	10%	3	50%	**9**	**13%**
5 > 10mz	0	0%	1	4%	0	0%	1	17%	**2**	**3%**
>10 mz	0	0%	0	0%	1	10%	0	0%	**1**	**1%**
YEARS FARMING ORIENTALES										
First year	4	15%	5	19%	3	30%	1	17%	**13**	**19%**
2-5 yrs	16	62%	14	54%	2	20%	3	50%	**35**	**51%**
6-10 yrs	6	23%	6	23%	4	40%	1	17%	**17**	**25%**
>10 yrs	0	0%	1	4%	1	10%	1	17%	**3**	**4%**
BEFORE ORIENTALES										
Maize and beans	5	19%	12	48%	4	40%	0	0	**21**	**32%**
Other cash crops	17	69%	8	32%	1	10%	5	83%	**31**	**47%**
Farm workers	1	4%	2	8%	4	40%	0	0	**7**	**11%**
Other profession	2	8%	3	12%	1	10%	1	17%	**7**	**11%**
CROPS GROWN										
Only orientales	10	38%	10	39%	3	30%	3	50%	**26**	**38%**
Orientales and maize and beans	10	38%	15	57%	5	50%	2	33%	**32**	**47%**
Orientales and other vegetables	6	24%	1	4%	2	20%	1	17%	**10**	**15%**

Variable	Exportador 1		Exportador 2		Exportador 3		Independent Farmers		TOTAL	
	# responses	% total	# responses	% total	# responses	% total	# responses	% total	**# responses**	**% total**
AVG # ORIENTALES GROWN		1.92		1.96		2.30		2.5		**2.04**
WHY GROW ORIENTALES										
More profitable	20	77%	17	65%	5	71%	na		**42**	**71%**
To try, tomato and basic grains are not profitable	6	23%	6	23%	1	14.5%	na		**13**	**22%**
The opportunity for credit	0	0	3	12%	1	14.5	na		**4**	**7%**
LAND TENURE										
Own	11	44%	9	35%	3	30%	6	100%	**29**	**43%**
Owned by another	1	4%	5	20%	5	50%	0	0	**11**	**16%**
Own and rent	0	0	4	15%	0	0	0	0	**4**	**6%**
Rent	14	52%	8	30%	2	20%	0	0	**24**	**35%**
WORK										
Partner	11	43%	9	35%	7	70%	3	50%	**30**	**48%**
Alone	15	57%	17	65%	3	30%	3	50%	**34**	**52%**
FAMILY WORK ON-FARM										
Permanent help	9	35%	10	38%	0	0	0	0	**19**	**28%**
Temporary help	6	23%	2	8%	3	30%	1	17%	**12**	**18%**
No family	11	42%	14	54%	7	70%	5	83%	**37**	**54%**
HOUSEHOLD	AVG		AVG		AVG		AVG			**AVG**
Children	3.6		4.3		4.4		2.6			**3.9**
Dependants	4.4		5		7.2		4.3			**5.0**
OTHER INCOME										
YES	6	42%	9	47%	2	20%	4	66%	**21**	**42%**
NO	9	58%	10	53%	8	80%	2	34%	**29**	**58%**

Variable	Exportador 1		Exportador 2		Exportador 3		Independent Farmers		TOTAL	
	# responses	% total	# responses	% total	# responses	% total	# responses	% total	**# responses**	**% total**
LEARNED TO GROW ORIENTALES										
Technicians	14	78	11	44%	6	67%	4	67%	**35**	**60%**
Family/partners	1	6	5	20%	0	0	0	0	**6**	**10%**
School	0	0	1	4%	0	0	1	16.50%	**2**	**3%**
Self taught	3	17	8	32%	3	33%	1	16.50%	**15**	**26%**
HAS GROWING ORIENTALES INCREASED YOUR INCOME?										
YES	14	78%	17	81%	6	86%	3	100%	**40**	**82%**
NO	4	22%	4	19%	1	14%	0	0	**9**	**18%**
WHAT HAVE YOU DONE WITH EXTRA INCOME?										
Invested in farm	4	22%	10	26%	0	0	3	33%	**17**	**25%**
Invested in house	2	11%	13	34%	1	25%	1	11%	**17**	**25%**
Saving	3	17%	4	11%	0	0	0	0	**7**	**10%**
Education	3	17%	5	13%	0	0	1	11%	**9**	**13%**
Car	2	11%	2	5%	1	25%	2	22%	**7**	**10%**
Food	2	11%	4	11%	1	25%	1	11%	**8**	**12%**
Debts	2	11%	0	0%	1	25%	1	11%	**4**	**6%**
WHAT DO YOU WANT FOR YOUR CHILDREN?										
Farm	8	32%	8	33%	0	0	3	50%	**19**	**32%**
Other Profession	18	68%	16	67%	3	100%	3	50%	**40**	**68%**

BIBLIOGRAPHY

Adams, Jane (ed.). 2003. *Fighting for the Farm: Rural America Transformed*. Philadelphia: University of Pennsylvania Press.

Agelet, A., Angels, B. M. and J. Valles. 2000. Homegardens and their Role as a Main Source of Medicinal Plants in Mountain Regions of Catalonia (Iberian peninsula)." *Economic Botany* 54: 295-309.

Allen, Patricia. 1993. *Food for the Future*: *Conditions and Contradictions of Sustainability*. New York: John Wiley and Sons, Inc.

Allen, P., FitzSimmons, M., Goodman, M. and K. Warner. 2003. Shifting Plates in the Agrifood Landscape: The Tectonics of Alternative Agrifood Initiatives in California. *Journal of Rural Studies* 19: 61-75.

Altieri, M.A. 1989. Agroecology: A New Research and Development Paradigm for World Agriculture. *Agriculture Ecosystems Environment* 27: 37-46.

Altieri, M. A. and C. Nicholls. 2005. *Agroecology and the Search for a Truly Sustainable Agriculture*. Mexico: United Nations Environment Programme. Accessed on July 10, 2006 at http://www.agroeco.org/doc/agroecology-engl-PNUMA.pdf.

Angel-Peréz, A. N. and M. A. Mendoza. 2004. Totonac Homegardens and Natural Resources in Veracruz, Mexico. *Agriculture and Human Values* 21: 329-346.

Appadurai, A. 1996. *Modernity at Large: The Cultural Dimensions of Globalization.* Minneapolis: University of Minnesota Press.

Barndt, Deborah. 2002. *Tangled Routes: Women, Work, and Globalization on the Tomato Trail*. Boulder CO: Westview Press.

Basch, Linda, Shiller, Nina Glick and Cristina Szanton-Blanc. 1994. *Nationals UnBound: Transnational Projects and the Deterritorialized Nation-State.* New York: Gordon and Breach.

Bernard, H. R. 1994. *Research Methods in Anthropology, Qualitative and Quantitative Approaches*, Second Edition. London: Sage Publications.

Bonnano, A., Busch, L., Friedland, W., Gouvia, L., and Mingione, E. 1994. *From Columbus to Con-Agra, the Globalization of Agriculture and Food.* Kansas: University of Kansas Press.

Bradshaw, B. 2004. "Plus C'est la Meme Chose? Questioning Crop Diversification as a Response to Agricultural Deregulation in Saskatchewan, Cananda." *Journal of Rural Studies* 20: 35-48.

Brookfield, H. and C. Padoch. 1994. Appreciating Agrodiversity: A look at the Dynamism and Diversity of Indigenous Farming Practices. *Environment* 36(5): 271-289.

Brookfield, H., Padoch, P., Parsons, H. and M. Stocking. 2002. *Cultivating Biodiversity, Understanding, Analysing and Using Agricultural Diversity*. London: ITDG Publishing.

Brush, Stephen (ed.). 1999. *Genes in the Field: On Farm Conservation of Crop Diversity*. Boca Raton, Florida: Lewis Publishers.

Buttel, Fred. 1992. Environmentalization: Origins, Processes, and Implications for Rural Social Change. *Rural Sociology* 57(1): 1-27.

de Certeau, Michel. 1984. *The Practice of Everyday Life*. Berkeley: University of California Press.

Calvin, Linda and Veronica Barrios. 1998. Marketing Winter Vegetables from Mexico. *Vegetables and Specialties* 274, ERS, USDA, retrieved at http//:usda.mannlib.cornell.edu/ ERS page on May 2, 2002.

Conway, Gordon. 1997. *The Doubly Green Revolution: Food for all the Twenty-first Century*. London: Penguin Books.

Cook, Ian. 1994. New Fruits and Vanity: Symbolic Production in the Global Food Economy. In A. Bonnano, L. Busch, W. Friedland, L. Gouvia and E. Mingione (eds.) *From Columbus to Con-Agra, the Globalization of Agriculture and Food.* Kansas: University of Kansas Press.

Corselius, K. L., Simmons, S. R. and C. B. Flora. 2003. Farmer perspectives on cropping systems diversification in northwestern Minnesota. *Agriculture and Human Values* 20: 371-383.

Crane, J., Campbell, R. and C. Balerdi. 1993. The Effect of Hurricane Andrew on Tropical Fruit Trees. *Proceedings of Florida State Horticultural Society* 106: 139-144.

Cunningham, A. 2001. *Applied Ethnobotany, People, Wild Plant Use and Conservation.* Sterling, VA: Earthscan Publications Ltd.

Degner, R. L., Stevens, T. and K. L. Morgan (eds.). 2002. *Miami-Dade County Agricultural Land Retention Study*. Gainesville: Florida Agricultural Market Research Center, Institute of Food and Agricultural Sciences, University of Florida.

Degner, R. L., Moss, S. D. and W. D. Mulkey. 1997. *Economic Impact of Agriculture and Agribusiness in Dade County, Florida*. Gainesville: Florida Agricultural Market Research Center, Institute of Food and Agricultural Sciences, University of Florida.

Dolan, C., Humphrey, J. and C. Harris-Pascal. 1999. *Horticulture and Commodity Chains: The Impact of the UK Market on the African Fresh Vegetable Industry*. Mimeo, Institute of Development Studies: University of Sussex.

DuPuis, M. E. 2002. *Nature's Perfect Food: How Milk Became America's Favorite Drink*. New York: New York Univeristy.

Evans, N., Morris, C. and M. Winter. 2002. Conceptualizing Agriculture: A Critique of Post-Productivism as the New Orthodoxy. *Progress in Human Geography* 26(3): 313-332.

Fine, Ben. 1995. From Political Economy to Consumption, in Daniel Miller (ed.) *Acknowledging Consumption*. NY: Routledge.

FitzGerald, E. 1991. Introduction: The Central American Agro-Export Economy – Issues and Debates. In W. Pelupessy (ed.). *Perspectives on the Agro-Export Economy in Central America.* London: Macmillon.

Flusty, Steven. 2004. *De-Coca-Colonization: Making the Globe Inside Out.* New York: Routledge.

Friedland, William H. 1994. The New Globalization: The Case of Fresh Produce. In A. Bonnano, L. Busch, W. Friedland, L. Gouvia and E. Mingione (eds.) *From Columbus to Con-Agra, the Globalization of Agriculture and Food.* Kansas: University of Kansas Press.

Friedland, William H. 2001. Reprise on Commodity Systems Methodology. *International Journal of Sociology of Agriculture and Food* 9: 82-103.

Friedland, William H. 2004. Agrifood Globalisation and Commodity Systems. *International Journal of Sociology of Agriculture and Food* 12: 5-16.

Friedmann, H. 1993. The Political Economy of Food: A Global Crisis. *New Left Review* 197: 29-57.

Gereffi, G., Korzeniewicz, M., Korzeniewicz, R. (eds). 1994. *Commodity Chains and Global Capitalism*. Westport: Greenwood Press.

Glick Schiller, Nina, Basch, L. and Christina Blanc-Szanton. 1992. Towards a Definition of Transnationalism: Introductory Remarks and Research Questions. *Annals of the New York Academy of Science* 645: ix-xiv.

Glick Schiller, Nina. 1999. Who are these guys? A Transnational Reading of the U.S. Immigrant Experience. In L. Goldin (ed.) *Identities on the Move, Transnational Processes in North America and the Caribbean Basin,* New York: Institute for Mesoamerican Studies.

Gliessman, S. R. 1997. *Agroecology: Ecological Processes in Sustainable Agriculture*. Chelsea, Michigan: Ann Arbor Press.

Goodman, D. 2003. The Quality "Turn" and Alternative Food Practices: Reflections and Agenda. *Journal of Rural Studies* 19: 1-7.

Goodman, David and Michael Watts (eds.). 1997. *Globalizing Food, Agrarian Questions and Global Restructuring.* NY: Routledge.

Gottwald, T. R., Graham, J. H. and T. S. Schubert. 2002. Citrus Canker: The Pathogen and its Impact. Online. *Plant Health Progress.* Retrieved June 1, 2005 from http://www.apsnet.org/online/feature/citruscanker/ .

Guest, Kenneth J. 2003. *God in Chinatown: Religion and Survival in New York's Evolving Immigrant Community*. New York: New York University Press.

Gupta, Ahkil and James Ferguson. 1992. Beyond "Culture": Space, Identity and the Politics of Difference. *Cultural Anthropology* 7(1): 6-24.

Guptill, A. and J. Wilkins. 2002. Buying into the Food System: Trends in food retailing in the US and implications for local foods. *Agriculture and Human Values* 19: 3-51.

Guthman, Julie Harriet. 2000. *Agrarian Dreams? The Paradox of Organic Farming.* PhD Dissertation. Department of Geography, University of California, Berkeley.

Guthman, J. 2002. Commodified Meanings, Meaningful Commodities: Re-thinking Production-Consumption Links through the Organic System of Provision. *Sociologia Ruralis* 42: 295-311.

Grossman, L. 1997. *The Political Ecology of Bananas: Contract Farming, Peasants, and Agrarian Change in the Eastern Caribbean.* Chapel Hill: University of North Carolina Press.

Harvey, David. 1989. *The Condition of Postmodernity.* London: Basil Blackwell.

Harvey, David. 2001. *Spaces of Capital: Towards a Critical Geography*. New York: Routledge.

Heffernan, William and Douglas Constance. 1994. Transnational Corporations and the Globalization of the Food System. In A. Bonnano, L. Busch, W. Friedland, L. Gouvia and E. Mingione (eds.) *From Columbus to Con-Agra, the Globalization of Agriculture and Food.* Kansas: University of Kansas Press.

Hendrickson, J. 1994. Community Supported Agriculture. *Direct Marketing* 41, Madison, WI: Univeristy of Wisconsin-Extension.

Hendrickson , M., William, H., Howard, P. and J. Heffernan. 2001. *Consolidation in Food Retailing and Dairy: Implications for Farmers and Consumers in a Global Food System*. Presented at National Farmer's Union, Denver, Colorado

Hinrichs, C. 2000. Embeddedness and Local Food Systems: Notes on Two Types of Direct Agricultural Markets. *Journal of Rural Studies* 16(3): 295-303.

Ilbery, B. and M. Kneafsey. 1997. Regional Images and the Promotion of Quality Products and Services in the Lagging Regions of the European Union. Paper presented to the Third Anglo-French Rural Geography Symposium, Université de Nantes, 11–14 September.

Ilbery, B. and I. Bowler. 1998. From agricultural productivism to post-productivism, in B. Ilbery (ed.) *The geography of rural change*. London: Longman.

Imbruce, V. and C. Padoch. 2002. *Demand for Diverisity: Production and Consumption of Agrobiodiversity in New York City*, a paper presented to the 43rd Annual Meeting of the Society of Economic Botany at the New York Botanical Garden.

Imbruce, V. 2006. From the Bottom-Up: The Global Expansion of Chinese Vegetable Trade for New York City Markets. In R. Wilk (ed.) *Fast Food/Slow Food: The Economic Anthropology of the Global Food System,* Berkeley, CA: AltaMira.

Instituto Nacional Estadístico. 2000. Anuario Estadístico. Secretaría del Despacho Presidencial, República de Honduras.

International Noni Communication Council. Retrieved June 15, 2005 from http://www.incc.org/index.php.

Jarvis, D., Sthapit, B. and L. Sears (eds). 2000. *Conserving Agricultural Biodiversity* In Situ: *A Scientific Basis for Sustainable Agriculture.* IPGRI, Rome, Italy.

Kirby, D. 1998. "Temporary" Stalls Look Too Permanent, City Says, in *The New York Times*, p. 8. New York, NY.

Kloppenburg, J., Hendrickson, J. and G. W. Stevenson. 1996. Coming into the Foodshed. *Agriculture and Human Values* 13: 33-42.

Kuo, C. 1977. *Social and Political Change in New York's Chinatown, the Role of Voluntary Associations*. New York: Praeger Publishers.

Kwong, P. 1996. *The New Chinatown, Revised Edition*. New York: Hill and Wang.

Kwong, P. 1997. *Forbidden Workers, Illegal Chinese Immigrants and American Labor*. New York: The New Press.

Kwong, P. and D. Miscevic. 2005. *Chinese America, The Untold Story of America's Oldest New Community*. New York: The New Press.

Kumar, B. M. and P. K. R. Nair. 2004. The Enigma of Tropical Homegardens. *Agroforestry Systems* 61: 135-152.

Lamberts, M. L. 2005. Specialty Asian Vegetable Production in South Florida. In S. M. Olson and E. Simonne (eds.), *Vegetable Production Handbook for Florida 2004-2005*. Gainesville: University of Florida IFAS Extension.

Lin, J. 1998. *Reconstructing Chinatown: Ethnic Enclave, Global Change*. Minneapolis: University of Minnesota Press

Lyson, Thomas A. and Judy Green. 1999. The Agricultural Marketscape: A Framework for Sustaining Agriculture and Communities in the Northeast. *Journal of Sustainable Agriculture* 15: 133-150.

Lyson, Thomas A. and Annalisa Lewis Raymer. 2000. Stalking the Wily Mulitnational: Power and Control in the U.S. Food System. *Agriculture and Human Values* 17: 199-208.

Machum, S. 2005. The Persistence of Family Farming in the Wake of Agribusiness: A New Brunswick, Canada Case Study. *Journal of Comparative Family Studies* 36(3): 377-390.

Macías Barrés, A.A. 1998. *An assessment and evaluation of the* "Fruta del Sol" *Ltda. agricultural credit system.* Zamarano, Departamento de Economía Aplicada y Agronegocios, Honduras.

Marsden, T., Banks, J. and G. Bristow. 2000. Food Supply Chain Approaches: Exploring their Role in Rural Development. *Sociologia Ruralis* 40(4): 424-438.

Marsden, Terry and Neil Wrigley. 1995. Regulation, Retailing and Consumption. *Environment and Planning A* 27: 1899-1912.

Masakure, O. and S. Henson. 2005. Why do Small-Scale Producers Choose to Produce under Contract? Lessons from Nontraditional Vegetable Exports from Zimbabwe. *World Development* 33(10):1721-1733

McMichael, Philip (ed.). 1994. *The Global Restructuring of Agro-Food Systems*. Ithaca: Cornell University Press.

McMichael, Philip (ed.). 1995. *Food and Agrarian World Orders in the World-Economy*. Wesport, Connecticut: Greenwood Press.

Méndez, V. E., Lok, R. and E. Somarriba. 2001. Interdisciplinary Analysis of Homegardens in Nicaragua: Micro-zonation, Plant Use and Socioeconomic Importance. *Agroforestry Systems* 51: 85-96.

Mingione, E. and E. Pugliese. 1994. Rural Subsistence, Migration, Urbanization, and the New Global Food Regime. In A. Bonnano, L. Busch, W. Friedland, L. Gouvia and E. Mingione (eds.) *From Columbus to Con-Agra, the Globalization of Agriculture and Food.* Kansas: University of Kansas Press.

Mintz, S. 1985. *Sweetness and Power.* NY: Viking Press.

Murdoch, J., Marsden, T. and J. Banks. 2000. Quality, Nature, and Embeddedness: Some Theoretical Considerations in the Context of the Food Sector. *Economic Geography* 76(2): 107-125.

Murray, D. and L. Raynolds. 2000. Alternative Trade in Bananas: Obstacles and Opportunities for Progressive Social Change in the Global Economy. *Agriculture and Human Values* 17: 65-74.

New York City Department of City Planning. 2000. Demographic Profile of New York 1990-2000.

Ong A. 1997. "A Momentary Glow of Fraternity": Narratives of Chinese Nationalism and Capitalism. *Identities* 3: 331-66.

Padoch, C. and W. de Jong. 1991. The House Gardens of Santa Rosa: Diversity and Variability in an Amazonian Agricultural System. *Economic Botany* 45(2): 166-175.

Ploeg, J. D. van der and G. van Dijk. 1995. Beyond Modernization: The Impact of Endogenous Rural Development. Assen, The Netherlands: Van Gorcum.

Ploeg, J. D. van der. 1994. Styles of Farming: An Introductory Note on Concepts and Methodology. In J.D. van der Ploeg and A. Long. Assen (eds.) *Born From Within, Practice and Perspectives of Endogenous Rural Development,* The Netherlands: Van Gorcum.

Porterfield, W. M. 1937. Chinese Vegetable Foods in New York. *Journal of the New York Botanical Garden* 38: 254-257.

Porterfield, W. M. 1951. The Principle Chinese Vegetable Foods and Food Plants of Chinatown Markets. *Economic Botany* 1(5): 3-37.

Portes A. 1980. Immigrant Earnings: Cuban and Mexican Immigrants in the United States. *International Migration Review* 14: 315-41.

Portes, Alejandro. 1997. Immigration Theory for a New Century: Some Problems and Opportunities. *International Migration Review* 31(4): 799-826.

Portes, A. 1999. The Study of Transnationalism: Pitfalls and Promise of an Emergent Research Field. *Ethnic and Racial Studies* 22: 217-237.

Pretty, J. 1995. *Regenertating Agriculture: Policies and Practice for Sustainability and Self-Reliance*. London: Earthscan.

Qualset, C. O., McGuire, P. E. and M. L. Warburton. 1995. "Agrobiodiversity": Key to Agricultural Productivity. *California Agriculture* 49(6): 45-59.

Rafie, R. and C. F. Balerdi. 2002. International Marketing of Lychee and What is the Future for Florida Growers. *Proceedings of the Florida State Horticultural Society* 115: 88-90.

Rich, L. 2005. Shopper Alert: Grocery Stores Have a Future, in *New York Times*. New York, NY.

Sachs, Carolyn. 1996. *Gendered Fields: Rural Women, Agriculture, and Environment*. Boulder, Colorado: Westview Press.

Sassen, Saskia. 1991. *The Global City: New York, London, Tokyo*. Princeton: Princeton University Press.

Sassen, S. 1998. *Globalization and its Discontents.* New York: The New Press.

Saxe, D. 1997. SoHo Produce Wholesaler is Enjoined From Certain Interference on Street; SoHo Alliance v. World Farm Inc., Supreme Court, IA Part 18. *New York Law Journal*: 25.

Secretaría de Agricultura y Ganadería, Departamento de Información Agrícola. 1999. Compendio Estadístico Agropecuario, Honduras, C.A.

Smale, M. and M. R. Bellon. 1999. A Conceptual Framework for Valuing On-Farm Genetic Resources. In D. Wood and J. Lenné (eds.), *Agrobiodiversity: Characterization, Utilization, and Management*. Wallingford: CAB International.

Smith, Michael. 2001. *Transnational Urbanism, Location Globalization*. Malden, MA: Blackwell Publishers.

Sonnino, R. and T. Marsden. 2006. Beyond the Divide: Rethinking Relationships Between Alternative and Conventional Food Networks in Europe. *Journal of Economic Geography* 6: 181–199.

Stoller, Paul. 1996. Spaces, Places and Fields: The Politics of West African Trading in New York City's Informal Economy. *American Anthropologist* 98(4): 776-789.

Stoller, Paul. 2002. *Money Has No Smell: The Africanization of New York City*. *Chicago*: Univeristy of Chicago Press.

Stonich, S. 1993. *I am Destroying the Land! The Political Ecology of Poverty and Environmental Destruction in Honduras.* San Francisco: Westview Press.

Technoserve. 2000. The US Market for Selected Asian Vegetables. Centro Desarrollo de Agronegocios Market Information Series Survey #12. San Pedro Sula, Honduras.

Thorpe, A. 2002. *Agrarian Modernisation in Honduras*. Lewiston, NY: Edwin Mellon Press.

Thrupp, Lori Ann. 1995. *Bittersweet Harvests for Global Supermarkets: Challenges in Latin America's Agricultural Export Boom.* Washington D.C.: World Resources Institute.

Tickell, A. and J. Peck. 1995. Social Regulation *after* Fordism: Regulation Theory, Neo-liberalism and the Global-Local Nexus. *Economy and Society* 24(3):357-386.

Tourquiebiau, E. 1992. Are Tropical Agroforestry Home Gardens Sustainable? *Agriculture, Ecosystems and Environment* 41: 189-207.

Toy, Vivian. 2003. East End's Lost Link to Agriculture. *New York Times*. August 31: Long Island Weekly Desk, New York, NY.

Trinh, L. N., Watson, J. W., Hue, N. H., De, N. N., Minh, N. V., Chu, P., Sthapit, B. R. and P. B. Eyzaguirre. 2003. Agrobiodiversity Conservation and Development in Vietnamese Home Gardens. *Agriculture, Ecosystems and Environment* 97: 317-344.

Tsing, A. 2000. The Global Situation. *Cultural Anthropology* 15: 327-360.

United States Census of Agriculture. 1987, 1992, 1997, 2002. Retrieved March 22, 2005 from http://agcensus.mannlib.cornell.edu.

United States Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division. 1981. *Fresh Fruit and Vegetable Unloads in Eastern Cities*. USDA, Washington D.C.

United States Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Programs. 1998. *Fresh Fruit and Vegetable Arrivals in Eastern Cities*. USDA, Washington D.C.

Vietmeyer, N. 1985. Exotic Edibles are Altering America's Diet and Agriculture. *Smithsonian Magazine* 16(9): 34-43.

Watts, D. C. H., Ilbery, B. and D. Maye. 2005. Making Reconnections in Agro-Food Geography: Alternative Systems of Food Provision. *Progress in Human Geography* 29: 22-40.

Watts, M. 1994. Living Under Contract: Contract Farming, Agrarian Restructuring, and Flexible Accumulation. In Peter Little and Michael Watts (eds.) *Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa*. Madison: University of Wisconsin Press.

Wells, Miriam. 1996. *Strawberry Fields: Politics, Class, and work in California Agriculture.* Ithaca, NY: Cornell University Press.

Werbner, P. 2001. Metaphors of Spatiality and Networks in the Plural City: A Critique of the Ethnic Enclave Economy Debate. *Sociology* 35: 671-93

Whatmore, Sarah and Lorraine Thorne. 1997. Nourishing Networks: Alternate Geographies of Food. In Goodman, David and Michael Watts (eds.) *Globalizing Food, Agrarian Questions and Global Restructuring.* NY: Routledge.

Williams, R. 1986. *Export Agriculture and the Crisis in Central America.* Chapel Hill: University of North Carolina Press.

Williams, M. 2001. Produce Company Loses Latest Round of a Pitched Battle, in *New York Times*, p. 7. New York, NY.

Wood, D. and J. Lenné (eds.). 1999. Agrobiodiverisity: Characterization, Utilization and Management. Oxford: CAB International.

Wong, B. 1988. *Patronage, Brokerage, Entrepreneurship and the Chinese Community of New York*. New York: AMS Press.

Wong, B. 1998. *Ethnicity and Entrepreneurship, the New Chinese Immigrants in the San Francisco Bay Area*. Boston: Allyn and Bacon.

Yeung, H. 2000. Economic Globalization, Crisis and the Emergence of Chinese Business Communities in Southeast Asia. *International Sociology* 15: 266-87.

Zarin, D., Guo, H. and L. Enu-Kwesi. 1999. Methods for the Assessment of Plant Species Diversity in Complex Agricultural Landscapes: Guidelines for Data Collection and Analysis from the PLEC Biodiversity Advisory Group. *PLEC News and Views* 13.

Zhou, M. 1992. *Chinatown, the Socioeconomic Potential of an Urban Enclave*. Philadelphia: Temple University Press.

Zimmerer, K. 1994. Human Geography and the New Ecology. *Annals of the Association of American Geographers* 84:108-25.

Zimmerer, K. 1996. *Changing Fortunes, Biodiversity and Peasant Livelihood in the Peruvian Andes*. Berkeley and Los Angeles: University of California Press.