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### **DEVELOPMENT REPORT Nº 12**

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#### **CULTIVATING HAVANA: Urban Agriculture and Food Security in the Years of Crisis**

by Catherine Murphy

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# Executive Summary

The break up of the Soviet Bloc in 1989 plunged Cuba into the worst economic crisis of its history. Cuba lost 85 percent of its trade, including both food and agricultural inputs. The conventional system of agriculture was highly dependent on imported pesticides, fertilizers, and farming equipment, and without these inputs, domestic production fell. This decline in food production, coupled with a drastic reduction in food imports, led to a 50 percent reduction in caloric intake in the early 1990s. Cuba was faced with a dual challenge of doubling food production with half the previous inputs.

Cuba responded to the crisis with a national call to increase food production by restructuring agriculture. This transformation was based on a conversion from a conventional, large scale, high input, mono-crop agricultural system to a smaller scale, organic and semi-organic farming system. It focused on utilizing local low cost and environmentally safe inputs, and relocating production closer to consumers in order to cut down on transportation costs.

Urban agriculture has been a key part of this effort. By 1994 a spontaneous decentralized movement of urban residents joined a planned government strategy to create over 8,000 city farms in Havana alone. The success of these gardens has significantly contributed to the easing of Cuba's food crisis. In 1998 an estimated 541,000 tons of food were produced in Havana for local consumption. Food quality has also improved as citizens now have access to a greater variety of fresh fruits and vegetables. Although the program still faces many challenges, urban gardens continue to grow, and some neighborhoods are producing as much as 30 percent of their own subsistence needs.

The growth of urban agriculture is largely due to the Cuban state's commitment to making unused urban and suburban land and resources available to aspiring urban farmers. The issuing of land grants of vacant space in the city has converted hundreds of vacant lots into food producing plots. New planning laws place the highest land use priority on food production.

The opening of farmer's markets and the legalization of direct sales from farmers to consumers dramatically increased production incentives for urbanites. Deregulation of prices combined with high demand for fresh produce in the cities has allowed urban farmers to make two to three times as much as professionals.

The government also encourages gardeners through an extensive support system including extension agents and horticultural groups that offer assistance and advice. Many gardeners were inexperienced in the type of small-scale, organic cultivation necessary for urban production. The extension services helped to educate gardeners and spread the word about new biologically based pesticides and fertilizers and agroecological techniques. Seed houses throughout the city sell seeds, gardening tools, compost, and distribute bio-fertilizers and other biological control agents to small farmers at very reasonable rates.

New biological products and organic gardening techniques are developed and produced by Cuba's agricultural research sector, which had already begun exploring organic alternatives to chemical controls. This emphasis on alternative methods of pest and disease control has enabled Cuba's urban farms to become completely organic. In fact, a new ordinance prohibits the use of any pesticides for agricultural purposes anywhere within city limits.

Cuba now has one of the most successful urban agriculture programs in the world and continues expanding urban production with the goal of putting 100 percent of arable land under cultivation, increasing irrigation potential with new wells and water tanks, and maintaining high standards of quality in all aspects of production. While many believed that when the economy recovered urban farming would disappear, quite the opposite has occurred. In spite of increased food availability and increasing economic recovery, the urban agriculture movement is stronger than ever and growing rapidly. Both the public and private sectors

are investing resources in urban agriculture, a sign that it will continue to be part of the urban landscape for years to come.

# I. Why is it Important?

## The Benefits of Urban Agriculture

The importance of urban agriculture as a social movement has gained increasing recognition in recent years. But in fact, city farming is an ancient practice. It was only with the development of modern industrial agriculture that rural areas became the sole providers of foodstuffs. When cities began to specialize in the production of industrial goods and services, all food began to be imported from the countryside (Smit, 1997). Many fertile agricultural areas on the borders of cities were paved over, and agriculture was marginalized both geographically and in the modern consciousness (Rees, 1997).

Beginning in the 1970s, this trend began to reverse. Urban food gardening spread throughout the world and today an estimated 14 percent of the world's food is produced in urban areas (Smit, 1998). Today there are over 1,000 gardens in New York City and over 30,000 gardens in Berlin (Smit, 1998). In some cities of the developing world, a third to a fifth of families are engaged in agriculture, and some have no other source of sustenance or income. In Kathmandu, Nepal, 37 percent of food producers meet all their household vegetable needs and 11 percent of animal product needs through their own labor (Rees, 1997). In Dar es Salaam, Tanzania, over 67 percent of families are engaged in agriculture, and Cairo reports 80,000 head of livestock located within the city (UNDP, 1996). In densely populated Hong Kong, 45 percent of local vegetable needs are met through intensive cultivation on only six per cent of the land area (Garnett, 1996).

Urban agriculture has many benefits:

- increasing community food security
- providing local jobs
- greening and beautifying cities
- recycling nutrients
- treating waste
- empowering urban people
- localizing food production
- bringing the products closer to the market
- improving freshness and variety of produce
- involving city residents in the cultivation of their own foodstuffs.

(Nugent, 1997)

The return of farms and gardens to the cities also cuts down on the expense of transporting food over long distances, with the additional benefits of lowering the final cost of many goods and reducing transport related pollution.

Local production also helps to close the nutrient cycles associated with human food production and consumption. Urban agriculture can play an important role in municipal waste management (Nelson, 1996). Instead of putting wastes into landfills, much organic

waste can be turned into compost and returned to nearby gardens and farms. This produces numerous ecological and economic savings.

Urban agriculture also enhances biological diversity. It encourages the continued production of rare varieties of fruits and vegetables, which are adapted to local soils and climate. Small-scale gardeners tend to grow a wider variety of fruits and vegetables than large-scale growers, conserving unique cultivars that might otherwise die out (Garnett, 1996). This increased diversity of urban crops in turn attracts a variety of bird and animal life that would otherwise not survive the urban landscape.

Urban agriculture significantly affects the city economy and supports new industries and opportunities for employment. These include farming and gardening, supply of seeds, tools and other needed inputs, compost making and supply, marketing, and distribution—including farmer’s markets and sale of prepared foods. Urban farms and gardens also support farmer-consumer cooperatives, exchange and barter systems, and encourage community participation and increased local control over food production (Rees, 1997).

## Urbanization and Agriculture

These social and environmental benefits are desperately needed by cities as the world faces an unprecedented process of urbanization—the largest migration in human history. By the year 2025, 80 percent of the world’s people will live in cities (UNDP, 1996).

TABLE I: Percentage of residents that are urbanized, by region and year.

Country	1970	1995	2025 (estimated)
<u>Less Developed</u>			
Africa	25.1	37.0	57.0
Asia (except Japan)	21.0	34.6	54.0
Latin America	57.4	73.7	84.7
Oceania (except Australia)	18.0	24.0	40.0
<u>More Developed</u>			
Australia-N Zealand	84.4	84.9	89.1

Europe	64.4	73.3	83.2
Japan	71.2	77.5	84.9
North America	73.8	76.1	84.8

Source: UN, World Urbanization Prospects, 1994

An increasing number of poor families move to cities, and many of those not poor upon arrival become poor after moving (UNDP, 1996). Can there be an integrated strategy to combat the social and environmental problems created by this rapid urbanization, one that provides a healthy living environment for current and future urban residents?

A pressing issue is how to provide the increasingly urban planet with enough to eat. In developing countries, urban populations are growing much faster than agricultural production, distribution, and marketing networks (UNDP, 1996). At the same time neo-liberal globalization processes are widening the gap between rich and poor at unprecedented rates and pushing countries to focus on export agriculture at the expense of increasing national food security (Lappe et al., 1998; Bello 1994). To begin to solve these problems more food must be produced in the urban centers where it is consumed.

Today urban producers around the world have different primary reasons for growing food. In developed countries, home and community gardens are most common among middle income people and are seen as an enjoyable hobby—produce valued for its freshness rather than as a source of basic nutrition. At the same time, there is a growing appreciation of the ability of urban gardening to promote a sense of community and bring neighbors together. Urban gardening is also a tool for community empowerment, especially in low income and high crime neighborhoods. In some cases, urban gardens have provided jobs to marginalized youth. One Latino gardener in Los Angeles asserted that by gardening “kids are learning important lessons and skills. They play safely and we do not have to worry about gangs. We also have a good time” (quoted in Fisher, 1996b).

However, in developing countries, gardening addresses immediate food needs. Most urban gardeners in developing nations are low income. They may also face crushing economic policies, civil war, drought, and extreme poverty. In addition to increasing family food security, city farmers work toward increased incomes and greater economic security from the sale of foodstuffs (Nugent, 1997).

The United Nations Development Program undertook a systematic investigation of urban agriculture worldwide, culminating in publication of the book *Urban Agriculture: Food, Jobs, and Sustainable Cities* (1996), and the founding of The Urban Agriculture Network (TUAN). The book affirms that urban agriculture has previously been unacknowledged and underreported. In spite of its growing importance, urban agriculture has survived with little or no official support. “Where governments are involved, it is most often to limit,” TUAN proclaims. Urban farming and gardening often offends the “modernist” ideal of a cosmopolitan center. In some cities, such as Dar es Salaam and Nairobi, this

same prejudice has actually led city governments to fine gardeners or tear down gardens in urban areas (UNDP, 1996).

One of the greatest limitations gardeners face is lack of land ownership. Most gardeners do not own the land they farm. Land access poses the largest constraint to producers around the world. Few countries have any formalized urban agriculture programs or funding for urban food production programs. During research for this report, only Peru and Argentina had urban agriculture departments (UNDP, 1996).

In spite of the lack of recognition and support for urban gardens and farmers, they have still made enormous strides in recent decades. One of the most important contributions of urban agriculture to developing nations is food security.

## Urban Agriculture and Food Security

The notion of food security as defined by the Community Food Security Network is that, “all people should have access to a nutritious diet from ecologically sound, local, non-emergency sources “ (Fisher, 1996a). Distinct from a traditional focus on hunger prevention, food security includes ideas of long term self-sufficiency through a nutritionally adequate and culturally appropriate regular food source (Fisher, 1996a). One of the strengths of a food security analysis is the conceptual unification of many programs and ideas that have traditionally been separate, such as: community gardens, farmers’ markets, community supported agriculture, urban supermarket development, food policy councils, and micro-enterprise promotion.

Urban agriculture has much to contribute to local food security. In a study of household gardening and food security, Robin Marsh found the following food security benefits:

1. Production of fresh, diverse foods—seasonally or year-round.
2. Production of nutrient rich foods otherwise not consumed, or consumed in smaller quantities.
3. Income earned from garden sales and/or savings on purchased foods increase cash available for buying staple foods for family.
4. Garden production may become the dominant food source in times of failed harvest or off-farm employment.
5. Gardening provides an opportunity for hands-on nutritional education. Since gardening is typically a woman’s activity, it enhances women’s control over food production and sales, increasing the likelihood that household nutrition will improve.

Marsh also provides guidelines for designing gardens to meet food security goals:

1. Build on traditional gardening practices and varieties.
2. Work in areas with adequate access to water and family labor.
3. Begin with community organizing and nutrition education.



4. Involve and train local people to be promoters .
5. Flexibility with respect to choice of species and cropping patterns, encourage diversity and cultivation of indigenous varieties.
6. Encourage self-reliance on local materials for soil and pest management as well as household/community seed production. (Marsh, 1997)

The Food and Agriculture Organization of the United Nations (FAO) also agrees that decentralized production and strong local distribution and marketing networks—as well as other factors—are vital to food security. According to FAO:

Nutritional well-being requires access to enough nutritious and safe food to meet the dietary needs of all members of the household throughout the year. Attaining better food supplies and nutritional well-being is more than just producing enough food locally. It also requires sufficient resources (such as land and labor), tools skills, and knowledge. Roads and transport to markets are necessary so that goods such as food and other essentials can be traded and so that household members can find employment as well as having access to other commercial and government services (FAO, 1995).

In 1980, nearly 50 percent of all foods consumed by people in the cities of the developing world were imported from other countries. In the Caribbean, food insecurity is a direct result to centuries of colonialism that prioritized the production of sugar and other cash crops for export, neglecting food crops for domestic consumption. This historical obstacle has proven insurmountable for most Caribbean countries which remain net food importers today (Cox, 1998).

In the context of the Caribbean, Cuba is a unique and fascinating case study. The Cuban revolution, which came to power in 1959, established food as a basic human right. Much work was done to develop the national agricultural sector to increase Cuba's self-reliance in foodstuffs. However, in the mid 1980s over 50 percent of the total foodstuffs consumed in Cuba were still being imported. When the Soviet bloc disintegrated, Cuba lost direct food imports and agricultural inputs, in which it greatly depended on. In spite of the national position that everyone should eat well, Cuba was thrown into a severe food crisis that shook the entire island. No where were food shortages more deeply it than in Havana.

Havana is the largest city in the Caribbean and the home to 2.2 million people—500,000 to 600,000 families and roughly 20 percent of Cuba's population. This city provides one of the best models to date of a comprehensive, highly successful urban food production strategy. It includes land reform, technical assistance, and research and development, demonstrating both strong government and country support. The focus of this report is the many vital lessons to learn from the Havana experience.

## II. Agricultural History of Cuba

Columbus first landed in Cuba in 1492 and claimed the island for Spain. The Arawak people who lived in Cuba had a complex agricultural system of cultivated crops known as *conuco* agriculture, combined with household gardens (Chaplowe, 1995). The genocide of the indigenous people meant an end to this agricultural system and other rich cultural traditions. African slaves were then brought into the island to compensate for absence of manual laborers. Cuban agriculture was heavily influenced by African cultural traditions. In subsequent centuries, Cuba became the headquarters for the Spanish crown in the Americas. As with the other Spanish colonies, the riches of Cuba were primarily of benefit to Spain, and the island was used only as a source of raw materials and a market for Spanish goods. Spain milled large amounts of sugar in Cuba, which throughout the 1800s was grown by small farmers who also raised food crops for local consumption (Garcia Trujillo, 1996).

In 1898, the United States claimed victory over Spain by interceding in Cuba's War of Independence (known by North Americans as the Spanish American War). Spain then signed Cuba over to the U.S., along with Puerto Rico, the Philippines, and Guam in the Treaty of Paris (Franklin, 1992). In the following three decades, U.S. sugar giants bought up much of Cuba's land. The new mill owners stopped buying cane from small farmers as the Spanish-owned mills had done, and began large-scale sugar cane production on their recently acquired property. Labor was increasingly done by sharecroppers or by immigrant workers from Haiti and Jamaica who received very low wages. As the mills continued to produce their own cane, they offered progressively lower prices to the local farmers. Small farmers could not sustain production under these conditions, and they were cut out of the market. Almost half of Cuba's small farmers lost their land in the first thirty years of this century (Garcia Trujillo, 1996).

**TABLE II: Reduction of small and medium size farms in Cuba, 1899 - 1934**

<u>YEAR</u>	<u>Number of Small Farms</u>
1899	60,711
1934	38, 180

Source: Garcia Trujillo, 1996

As bankrupt *campesinos* lost their land, sugar companies bought it up, extending cultivation through an exploitative system of hired labor or sharecroppers. By the 1930s, Cuba was the largest single sugar producer in the world, providing half of the sugar cane sold on the international market (Benjamin et al, 1984). Sugar cane became the primary basis of the economy. Cuba held Favored Trade Nation status with the United States, who purchased Cuba's sugar at preferential prices. Cuba sold six million tons of sugar to the U.S. annually, an exported product of half of all cultivated land (Valdes, 1990). Many rural men worked as cane cutters, extremely hard labor that offered low salaries and only provided employment four months out of the year. The entire Cuban economy, including

wages and interest rates, became tied to the international price of sugar (Benjamin et al, 1984).

By 1959, corporations and U.S. citizens owned 75 percent of arable land in Cuba (Franklin, 1997). Agricultural land was divided roughly in half between sugar cane plantations and pasture for dairy and beef production. However, sugar cane was an intensive crop, , cattle raising was quite inefficient and underutilized the land. Many rural farmers were landless while large extensions of private land went uncultivated. An agricultural census taken in 1946 showed that 1.5 percent of all farms occupied 47 percent of the agricultural land in Cuba. Five U.S. sugar companies owned or controlled over two million hectares in Cuba a nation with only 6.8 million hectares of agricultural land (Valdes, 1990). The Cuban Atlantic Sugar and United Fruit Companies alone held 248,404 hectares and 109,480 hectares, respectively (Rodriguez et al, 1985).

In 1959, Cubans successfully realized a popular national revolution committed to building an independent nation, diversifying the economy, and creating a more just social system. This diversification was to include agriculture, with the goal of becoming self sufficient in food production and improving the lives of farmers and rural people. The first step was the far reaching Agrarian Reform Law in May of 1959, passed only three months after the new government gained power (Rodriguez et al, 1990). The reform law put limits on landholdings and redistributed land to squatters, sharecroppers, and landless farmers. Fifty percent of the land in Cuba was nationalized, and more than 100,000 landless peasants became landowners overnight (Diaz et al, 1995). A second agrarian reform in 1960 further limited landholdings and most expropriated land was converted into state farms.

In the eyes of the United States, the new revolutionary government never had a chance; the United States was committed to abolishing what saw as a communist threat in the American continent. The United States reacted in July of 1960 by refusing to purchase the remaining 700,000 tons of that year's sugar quota, and canceling future sugar contracts (Franklin, 1992). The Soviet Union immediately offered to buy all of Cuba's sugar harvest at a higher price, and with five-year contracts—in place of annual contracts with the U.S.. This began a trade relationship that would last for the next three decades, and eventually almost all of Cuba's trade would be with Soviet Bloc countries.

Cuba began importing agricultural inputs from the Soviet Bloc, developing a highly mechanized and chemically intensive agricultural sector. By the 1980s, Cuba had 21 tractors per 1,000 hectares, the highest ratio in Latin America. In the final years of the 1980s, Cuba imported more than 1,300,000 tons of chemical fertilizers, 17,000 tons of herbicides, and 10,000 tons of other pesticides (Rosset and Benjamin, 1994). Almost all machinery, agrochemicals, fuel, and spare parts were imported. The agricultural system that Cuba developed was heavily dependent on key basic inputs from the Soviet Bloc.

Large investments in agriculture did not pay off and modernization actually impeded anticipated increases in food security. Cuba was not able to produce enough food to meet the needs of its people. In the 1980s, 57 percent of the calories consumed by the Cuban

people were still imported, including a full 80 percent of proteins and fats (Deere, 1993). Furthermore, the diversification of agriculture that the revolution had intended was frustrated by the continued dependence on sugar as a source of foreign exchange (Enriquez, 1994).

Conscious of this continued dependence, Cuba initiated the National Food Program in the late 1980s. The Food Program aimed to take 20,100 hectares of land, mostly around Havana City where food needs were largest, out of sugar cane production and plant them with vegetables, requiring increased irrigation, which was also provided for in the plan. Self-provisioning areas, called *autoconsumos*, would be promoted at schools and workplaces, with the goal of increasing local self-reliance in foodstuffs (*Asamblea Nacional de Poder Popular*, 1991).

In the meetings that led up to the announcement of the National Food Program, the modernist model of agriculture and especially of the high level of specialization and compartmentalization of agricultural institutions was severely criticized. The delegates of *Poder Popular* (literally, "Peoples Power," the governmental body of Cuba) pushed decentralization and integration of agricultural institutions and production plans. Locally produced organic fertilizers and biological controls were also initiated, precursors to the "new agricultural model" that would flower in the years of crisis (Rosset and Benjamin, 1994).

## Economic Crisis

Before the National Food Program could achieve any major results, Cuba's economy was faced with the largest crisis of its history. Cuba's favorable rates of trade with the Council of Mutual Economic Assistance (CMEA), the international socialist marketplace, were abruptly terminated in 1989. In 1991, a year marked by the fall of the Berlin Wall, a rapid transition period began that culminated in the total disintegration of the Soviet Union and CMEA in 1991.

This dissolution meant the loss of almost all of Cuba's import sources and markets, devastating its import-based economy. Cuba depended on CMEA for 85 percent of its trade (Lage, 1993); a far-reaching economic crisis was imminent. There ensued the "Special Period in Peacetime," commonly referred to as the Special Period, in which measures normally limited to wartime would be taken. The government instituted drastic measures such as planned blackouts, the use of bicycles for mass transportation, and the use of animals in the place of tractors to mitigate the effects of the crisis and help the island survive the oncoming shortages.

Along with all other imports, Cuba lost access to its main sources of imported foodstuffs. Food imports had supplied over half of the calories eaten in Cuba. Extensive food rationing was instituted to ensure equitable distribution in the difficult years to come (Carranza, 1994). Where 19 items were rationed in the 1980s, by the early 1990s virtually all food items became scarce enough to warrant controlled distribution. Some imported goods that had been readily available before the crisis became unavailable. Overall

caloric intake fell, and intake of fats and lipids fell even more dramatically (Frank, 1998). The decrease in caloric and nutrient intake was accompanied by a rise in energy-consuming activities such as walking and bicycle riding. Along with other factors, this sudden drop in vitamins and minerals caused several health problems, the worst of which was an eye disorder causing temporary blindness.

Accompanying the loss of food imports was the loss of agricultural inputs such as pesticides, fertilizers, and spare parts. Annual petroleum imports fell from 13 million tons to under seven million tons in only three years, vastly inadequate to run industry and meet the high requirements of tractors, plows, and other agricultural equipment (Lage, 1992). There was not enough fuel to run irrigation pumps and harvest combines. Domestic food production plummeted. Other services crucial to food supply, such as storage, refrigeration, and distribution networks, also dependent on petroleum, nearly ground to a halt. Without enough fuel to ship food into the cities where it was most needed, some of the remaining harvest spoiled before it could reach consumers. The food crisis was felt across the island, and cities were the most affected, especially the capital city of Havana.

At this moment of crisis, the United States passed the Torricelli Bill (1992), tightening the already existing economic blockade against Cuba, and further damaging the Cuban economy. The Torricelli Bill banned all foreign subsidiaries of U.S. companies from trading with Cuba. Seventy percent of this trade had been in food and medicines (Murray, 1993). This bill also banned all sea vessels that had been to Cuba from docking in the US within six months, punishable by confiscation. The U.S. placed several conditions on Russia and the newly independent states as they scrambled for U.S. aid, one of which was to end all trade with Cuba (Cotayo, 1992). These inhumane policies further exasperated an already critical food crisis.

## In Search of Solutions

At the onset of the Special Period, Cuba began a graduated process of integrating itself into the “free market” capitalist economy, looking for new trade partners and foreign investment. Joint ventures were started in manufacturing, telecommunications, and most importantly, tourism. The income from these new investments and the new tourism sector helped fuel Cuba’s economic recovery and has helped finance social programs like education, health care, and housing. The reforms engendered in this state-sponsored capitalism have reverberated through all of the economy’s sectors. Agriculture, like most sectors, was forced to go through severe budgetary cuts and increased demands were placed on it to feed the population.

Food production became the most important task for the nation. President Fidel Castro and other leaders proclaimed that no piece of land should be left uncultivated. The government began to decentralize production and link it directly to transportation and consumption patterns. Work places with open space began to produce their own food for their lunchrooms. Many farms began to deliver directly to ration stores, hospitals, and other consumption sites.

These changes focused on implementing a whole new agricultural model, embarking on the largest conversion from conventional agriculture to organic and semi-organic farming that the world has ever known (Rosset and Benjamin, 1994). Food production was rapidly decentralized and options for direct marketing were increased. Ministries and other state institutions became directly involved in producing food crops for local consumption. The Ministry of Agriculture (MINAG) tore up the front lawn at their modern headquarters in Havana, and planted lettuce, bananas, and beans. Many employees that regularly worked behind desks began watering and weeding to ensure a steady food supply for the Ministry's lunchroom.

Even the Cuban military participated. At the closing speech to the army congress held in 1995, the Minister of the Armed Forces affirmed that "food production is our principal task" (*Granma*, 1995). The military would no longer take any food from civilian sources, but rather contribute, producing beyond their own food needs. Alternatives to the mandatory military services were proposed: youth were given the option of doing one year military service in the *Ejercito Juvenil de Trabajo* (EJT, or youth work troops), or service in one of the EJT's 93 farms across the country, producing food and sugar for national consumption and for export (Lage, 1995).

The *autoconsumo* plan of "self-provisioning" areas for local food production was expanded. Large and small workplaces were made responsible for growing a portion of their own food on site. *Autoconsumo* areas were started at state farms, sugar mills, and other large workplaces that were often in rural areas. This program increased localized food self-sufficiency, thereby reducing the need for transportation, refrigeration, and other scarce resources.

In September of 1993, in a bold and unprecedented move, the Cuban government implemented a new agrarian reform by breaking up the majority of the large state farms into smaller worker-owned collectives. These new farms called "Basic Units of Cooperative Production" (UBPCs), are owned, managed, and operated by the workers. Previously, the State managed 82 percent of the agricultural land in Cuba, and these massive enterprises were farmed in large monocrop extensions, with a high level of agriculture inputs (Diaz, 1997). They were fully industrialized, but remained much less efficient than the other two echelons of Cuban agriculture: the private farm sector with 8 percent of the land, and the Cooperatives for Agricultural Production (CPAs) with 10 percent of the land (*Consejo de Iglesias*, 1997a).

Sixty percent of State farms were turned into UBPC workers' collectives. While the State continues to own the land, the workers hold it in free and indefinite usufruct. Everything above the ground—buildings, machinery, and all other means of production—now belongs to the workers as collective property. This is one of the most important steps taken toward self-management and self-financing in Cuba in recent years (Diaz, 1997). The accord published by the Ministry of Agriculture in 1993 to announce the creation of the UBPCs stated:

As part of the work that has been realized during the Special Period to make...agriculture more efficient, and with the intention of applying formulas that motivate people to achieve larger levels of production with the smallest possible use of material resources, we have agreed to the following principles: 1) To connect the workers to the land, increasing a concrete feeling of responsibility; 2) To make the collective of workers and their families self-sufficient, and to progressively improve housing conditions and other needs; 3) To directly connect income with degree of productivity; 4) To increase autonomy of governance. Each unit will administrate its own resources and its plan for self-sufficiency (Ministry of Agriculture, 1993).

On October 1, 1994, one year after the creation of the UBPCs, 121 farmers markets opened around the island. All food producers were allowed to sell their produce directly to consumers rather than through the state redistribution chain. There are no price controls, nor any state interference in setting price limits. Prices are set by supply and demand. Any growers that have state contracts must first fulfill those contracts that supply the national ration system and other subsidized food distribution such as to hospitals and day care centers. Only the excess produce after complying with these contracts may be sold at the farmers' markets. Growers earn much higher prices at the farmers' markets, an economic benefit that has stimulated increases in production. Market sales provide very good incomes, and are subject to a ten percent sales tax all over the country. In Havana and Santiago de Cuba, the two largest cities in Cuba, sales tax is kept at five percent. This gives economic incentives to growers to sell where the country's food needs are greatest (Henriquez, 1994).

When farmers' markets opened, they immediately undermined the black market for many food items. One week before the farmers markets opened, rice was being sold on the black market for 50 pesos per pound. On the first day of the markets, rice opened at 12 pesos per pound, and the black market in rice immediately disappeared (Murphy, 1995). Prices in the farmers market soon began to drop, and by January of 1995, rice was sold from 7 to 10 pesos per pound (Deere, 1995).

With the increased need for local food brought on by the crisis and the various new sales options that began to open, popular food production increased all over the country. In 1997, small scale rice production on individual plots reached 140,000 tons, nearing the total state production of 150,000 tons (Pages, 1998). Many rural homes now raise their own staples, such as beans and *viandas* (the root and tuber crops that are a staple in the traditional Cuban diet). Widespread small animal raising—pigs, goats, sheep, chickens, and rabbits—has also spread dramatically, especially in rural areas.

One of the most important strategies for increasing food security through localized production was to support the booming urban gardening movement. To do this, the Ministry of Agriculture made another unprecedented move and created the world's first coordinated urban agriculture program that integrated: 1) access to land, 2) extension services, 3) research, and development, 4) new supply stores for small farmers, and 5)

organized points of sale for growers and new marketing schemes, all with a focus on urban needs.

### III. The Beginning of an Urban Agricultural Food System

Urban agriculture was almost non-existent in Havana before 1989. Under the revolutionary government, state distribution channels provided adequate food for all citizens for thirty years. Even the poorest residents had no need to grow their own food before the economic crisis because the state distribution system guaranteed all basic staples. From 1959 into the 1980s, there was literally no hunger in Cuba (Benjamin et al, 1984). While a variety of basic items, such as rice, beans, and cooking oil were distributed through the ration system at highly subsidized prices, the “parallel market” provided unlimited amounts of many additional goods at slightly higher, but still very affordable prices.

In Cuba, as in many underdeveloped countries, gardening was never seen as a form of leisure. Prior to the Special Period, urban gardening was popularly associated with poverty and underdevelopment. Havana even had city laws prohibiting the cultivation of agricultural crops in the front yards of city homes. Only ornamentals were permitted in front yards, and all food crops were relegated to the back or side yards, kept out of sight (Benjamin et al, 1984).

With the onset of the crisis, urban gardens sprang up all over Havana, a massive popular response by the residents themselves to the food shortages. At first, most people planted in and around their own home: on balconies, patios, and rooftops. Families with adjacent vacant lots began to plant in these previously unused areas. Pre-existing community organizations, such as the Cuban Women’s Federation and block committees, facilitated neighborhood production.

In spite of tremendous enthusiasm, there was little popular knowledge about agriculture. Many of the new gardeners were just beginning. The growers with previous agricultural experience had mainly worked in large-scale rural agriculture, using field-scale plant spacing, large monocropped extensions of land and mechanization. Very few of Havana’s gardeners were familiar with the small scale, highly diverse, agroecological techniques that urban gardening requires (Murphy, 1995).

Nevertheless, these new urban growers were full of determination, planting any seeds they could find with whatever tools were available, on any open land in sight. In the abrupt absence of food previously guaranteed by the government at very low prices, thousands of urban dwellers began to cultivate it for themselves. New gardeners planted food crops to satisfy immediate family food needs, and the newly relaxed laws governing sale of garden items allowed them to sell any excess, improving the family economy. Although sale was rarely the primary purpose for cultivation, it provided an important



income supplement for many families (Moskow, 1995). The Ministry of Agriculture and Havana's city government responded to the enthusiasm of Havana's residents by providing needed services and facilitating the expansion of the movement. This greatly accelerated the popular movement already underway.

## Creation of an Urban Agriculture Department

Urban agriculture has since become a major element of the Havana cityscape. It owes its success to the structural changes implemented through the Ministry of Agriculture in coordination with local and municipal governments, the efforts of research centers, national and international non-governmental organizations (NGOs), collaborative projects, and the determination of individual farmers. This model is now being replicated throughout the country in provincial capitals and other urban centers, and provides a model for countries around the world attempting to prevent hunger within their cities.

The first boost given to urban agriculture by the government was the creation of the Agricultural Department for Havana City in April, 1994 (Cabada, 1995). Havana's Agriculture Office, together with the provincial office of *Poder Popular*, then created a specific Urban Agriculture Department with the goal of putting all of the city's open land into production. They set out to provide support services and material resources for the urban gardeners of the capital. This department, jointly created by both MINAG and the local municipal government, was the first office of the Urban Agriculture Department and was located in Havana's provincial government building. After a year, this office was moved into the Agriculture Ministry building; municipal agriculture extension offices are currently located in the government buildings of each of Havana's 15 municipalities.

The first priority of the Urban Agriculture Department was to secure land use rights for urban gardeners. Tremendous emphasis was placed on provision of land to all who wanted to grow food in the city. The Department worked with *Poder Popular* to change city laws so gardeners would have legal priority all for unused space. Citizens who wanted to set up gardens in their neighborhood solicited the local government, usually requesting a specific plot. Land use rights were then distributed through the municipality or the *Consejos Populares* (popular councils). The most localized level of government, *Consejos Populares*, were established in 1991 to create a more grassroots level of government that would serve as a bridge between the neighborhoods and the municipalities, and create more local autonomy (Almaguer, 1996).

This decentralized strategy allowed for land transfer to happen in a timely manner, with little red tape. Even privately owned land in the city, if not in use, was turned over to those who wished to cultivate it. In these cases, the local agriculture delegates would notify the legal owner of the intention to turn use rights over to a local gardener for food production. If the owners objected, they would be allowed six months to put the land into production themselves. If the owners never cultivated the lot, use rights would then go to the soliciting gardener. This gardener would then be obliged to grow food on the lot; if it were to lie fallow for six months all rights would be returned to the legal owner.

With this political support, thousands of gardens sprang up in Havana. Hundreds of vacant lots were transformed into farms, gardens, and other food production sites. The outlying municipal districts have more open space than the downtown districts, which has allowed them even more gardens.

Most of Havana's gardens are located in the eight outlying municipalities of Boyeros, Cotorro, Arroyo Naranjo, Guanabacoa, Habana del Este, La Lisa, Marianao, and San Miguel de Padron. The high percentage of open land in these areas gives gardeners more space and site options. Gardeners from these regions usually find good-sized plots within walking distance of their homes. Often the garden is on an adjacent lot next to the gardener's house. One gardener complained he had the longest walking distance of all the producers in his area—four blocks!

The two most heavily urbanized municipalities of Havana City are Centro Habana and Habana Vieja. These neighborhoods were built when city planning allowed for little open space, thus leaving little room for cultivation. Few vacant lots exist, and most of them have paved surfaces. Roofs and balconies offer open spaces available to gardeners, but gardens in these areas are uncommon due to safety concerns. Residents are aware that the very old buildings might break down under the additional stress of containers, soil, and watering. Torrential rains threaten the old rooftops of beautiful buildings in Habana Vieja and few people want to further burden their ancient roofs with the extra weight of gardens. Gardens in the densest areas are also limited by poor soil quality, and by the scarcity of irrigation water.

Nevertheless, residents from Centro Habana and Habana Vieja have expressed the desire to garden as well. Since the local government has made a commitment to provide use rights to all urban residents who will put city land into cultivation, sites are found for downtown gardeners. Most of them are given garden plots in the neighboring municipalities of East Havana or Regla which still have unused agricultural space. These two municipalities are five to ten kilometers from Habana Vieja, a close commute on public transport divided only by Havana Bay.

Following Centro Habana and Habana Vieja, the municipalities of Cerro and Diez de Octubre are the most densely populated. They are both very old municipalities, residential and fairly industrial, have few services, and a weaker local economic base than other municipalities. Diez de Octubre has 250,000 inhabitants in only 12.20 square km, making it the most populous municipality in Havana. Both Diez de Octubre and Cerro, however, have some open space and a good number of gardens. Production in these areas is particularly important because of the high local demand for food.

Beyond the foods that are rationed and distributed through an extensive network of small markets every two blocks throughout the city, residents from these municipalities often have to leave their neighborhoods to find simple food items. In the absence of other local options for purchasing food, any increase in community food production is especially welcome, and can improve the variety and quality of the local diet.

The municipality of Regla is highly industrial, home to the Havana oil refinery and several large factories. Large industry has left open space around it where many gardens are now being cultivated, under power lines or on unused factory lands. There are quite a few gardens in Regla. Most of the produce grown in this district goes directly to family consumption and very little is sold.

Plaza and Playa municipalities have a relatively large tourist sector, and office headquarters for joint ventures and the emerging private sector. Residents in these neighborhoods tend to have more access to services and income than other municipalities. The largest and most diverse farmers' markets are in these municipalities (Vedado Farmer's Market and 42nd Street in Playa). Gardens are still needed by those who cannot afford farmers' market pricing, or who choose to produce some of their own food.

The peripheral municipalities of Boyeros, Cotorro, Arroyo Naranjo, Guanabacoa, Habana del Este, La Lisa, Marianao, and San Miguel de Padron have large amounts of open space, far more than the central districts already mentioned. These outlying municipalities are also home to the majority of Havana's small farms run by over 2,000 *campesinos* (Paez, 1998). They also boast a high number of gardens, and are growing most of the food that is produced in the city of Havana.

By 1998, there were over 8,000 officially recognized production units cultivated by over 30,000 people. With roughly 30 percent of Havana's available land under cultivation, these city farms and gardens are informally organized into five main categories:

- I. ***Huertos Populares (popular gardens)***: Cultivated privately by urban residents in small parcels all over Havana.
- II. ***Organopónicos and Huertos Intensivos (intensive gardens)***: Gardens in raised container beds with a high ratio of compost to soil as a growing medium. They can be run either through a state institution or by private individuals.
- III. ***Autoconsumos***: Self-provisioning gardens that belong to and produce for the workers. These usually supply the cafeterias of a particular workplace, an institution often on-site at hospitals, factories, and schools.
- IV. ***Campesinos Particulares***: Individual small farmers, some of whom have been farming in Havana for years, while others work newly available lands. The farms are largely in Havana's greenbelt.
- V. ***Empresas Estatales (state enterprises)***: Businesses owned and run by the state, many of which are now being run as a "New Type of Enterprise," with increasing decentralization, autonomy, and varying degrees of direct profit sharing with workers.

(Source: *Grupo Provincial Agropecuario*, 1998).

These five main urban agriculture categories are neither comprehensive nor mutually exclusive, but rather overlapping and complementary. This is particularly true for *organopónicos*, a term which really refers to a specific agricultural production strategy, not to an organizational category.

## **I. *Huertos Populares***

*Huertos Populares* are the gardens spontaneously created in yards, on balconies, patios, and rooftops as the result of the massive popular response of Havana residents to the food shortages brought on by the Special Period. These gardens assume many forms, including “vertical gardens”: planting seeds and seedlings in upright PVC pipe or cement tubing with holes drilled in the sides. Many gardens are on nearby vacant lots, obtained by petitioning the local government as previously described. By the end of 1997 there were over 26,000 popular gardens farming covering 2,000 hectares of land in the city (Fuster, 1997b).

Most popular gardeners were initially motivated by the sole purpose of providing food for their own household. During the first years of the crisis, almost all of the food harvested in Havana's Popular Gardens went directly to the families, close friends, and neighbors of the urban producers. The Cuban notion of family includes aunts, uncles, cousins, grandparents, nieces, nephews, and in-laws—and often close neighbors and friends as well. Interviewing forty-two gardeners in 1995, researcher Angela Moskow found that an average of ten people regularly ate out of each garden (Moskow, 1995).

The primary benefit of these gardens is increased food production in the local communities and neighborhoods, and the significant improvement of the availability of fresh produce. Popular and community gardeners, however, also are given unrestricted access to local markets, and many now sell their surplus production. Although they are allowed to sell at the farmers' markets too, most prefer to sell on site at their gardens, as it saves them the intensive work of a market harvest, risk of unsold produce, and time away from the field.

In the municipality of Diez de Octubre, *Poder Popular* arranged for some popular gardeners to sell at the site of a state *Agro*, the local ration produce market. *Agros* sell produce at very low, highly subsidized prices to the local neighborhoods. Depending on available quantities, produce may be sold in limited or unlimited quantities, but there is rarely much variety. Bringing popular gardeners to sell at the *Agro* has made produce shopping easier for local consumers. Local residents shop for produce and staples at one location. They can go to the *Agro*, see what is available that day at state prices, and buy a variety of other needed goods at the higher, unsubsidized price.

The relaxation of laws governing the sale of urban produce has stimulated production and allowed growers to benefit economically through sales. Urban farmers can sell all of their harvest, making a significant profit, but in spite of the potential for large earnings from the sale of food crops, gardeners donate a significant proportion of their produce. In 1995, 80 percent of Havana's gardeners donated a regular amount of their produce, with some giving as much as 200 pounds monthly (Moskow, 1995). Most of these donations

are made to primary schools, day care centers, and retirement homes in the neighborhood where the garden is located. Many gardeners give to elderly and low-income neighbors (Moskow, 1995). This commitment to share the food harvest is a powerful testament to the spirit of collectivity and solidarity of the Cuban people, and has allowed them to survive the worst moments of the economic crisis.

Some neighborhoods now directly request that new gardeners make donations to local institutions. A neighborhood extensionist in Arroyo Naranjo, while handing over a plot of land for a new garden site, asked the new gardener to consider making regular donations once he had the land in production. The extensionist suggested two recipients: a special education school and a daycare center, each within ten blocks of the garden. Donations are voluntary, but since the community gives away land with no charge, he said, it is only right that local gardeners should give back some produce to the community.

Many of Havana's popular gardeners are retired men in their fifty's and sixty's, although the participation of women in urban agriculture is much greater than the role women have traditionally played in rural agriculture (Moskow, 1995). Unlike most countries where women grow the bulk of all food, in the Cuban countryside agricultural labor is considered a man's job. This view is changing in the cities with the development of urban agriculture. The largest *organopónico* in the country, called "*Las Marianas*," is organized by the Federation of Cuban Women and employs 140 women. Many women have full time salaried jobs in urban gardens, and many retired women tend gardens in their spare time.

Gardening is an activity that is well suited for retired people, because they can dedicate the time that is needed for good results. Gardening can also be a source of joy and self-esteem for elders and retired people who may feel that they are no longer needed. Gardens can also increase income to a retired person's fixed pensions. Retired Havana gardener Santana, cultivates a garden on his rooftop in Centro Habana. He first decided to plant a grapevine arbor to provide shade for his top story home. He harvested so many grapes that he decided to register with MINAG to make and sell wine. Santana now supports his family with the income he earns. When the Special Period hit, he decided to expand his home garden production, and started bringing home old tires found on the side of the road. He cut the tires in half, filled them with soil, lay them out in four long rows on his roof, and planted vegetables, condiments, medicinal herbs, and flowers.

All around the world, garden success improves with social organization and collaboration (UNDP, 1996). In Cuba, organization has greatly benefited urban growers. Many gardeners in Cuba are organized into *de Horticultores* (Horticultural), which are voluntary organizations made up of gardeners working in the same neighborhood. Most have between ten and 20 members, and by December of 1997, 18,628 people had organized 926 clubs in Havana (Fuster, 1997b), a figure that is slowly and steadily continuing to grow. Clubs help organize information sharing among gardeners in the city, and also distribute seeds, tools, and other garden inputs. Extension workers from the Urban Agriculture Division hold educational workshops with local *Grupos*, and share printed informational materials and other resources with them.

Extension workers prioritize working with the clubs, since they are able to reach many more gardeners at one time. There are far too many gardeners in Havana for the extensionists to reach one by one. Through the clubs, a great deal of organic gardening information has been passed to the urban farmers of Havana helping to strengthen and fulfill the city's commitment to organic production, and knowledge of new techniques such as locally produced biological controls.

Participation in the clubs is voluntary, but there are incentives for joining. Instrumental incentives include access to the educational workshops and material resources provided by MINAG, networking with other gardeners, and increased access to markets and foreign donations. Social incentives include companionship, camaraderie, and the collective celebrations. Groups also come together on large workdays to help with particularly difficult jobs on members' individual plots.

## II. *Autoconsumos*

*Autoconsumos* are self-provisioning parcels where food is grown for a specific school, factory, hospital, research station, or workplace. Most of these gardens are located on-site or within close walking distance of the institution. In Havana there are 376 *autoconsumos* with a total of 6,365 hectares of land (*Grupo Provincial Agropecuario*, 1998). *Autoconsumos* generally dedicate most of their harvest to the *comedor*, or workplace lunchroom of the hosting institution. Secondly, they sell their produce directly to the workers at "state prices," much lower than those at the farmers' markets, or even at the state *organopónicos*. "State prices" are equal to the prices of the ration system. *Autoconsumos* may also supplement the produce available at the ration *agros*, which have been short of goods since the onset of the Special Period. Thirdly, *autoconsumos* sell to the public, usually from an on-site stand, thereby contributing to the community food supply.

Each workplace autonomously decides how to structure responsibilities for garden work and food distribution. Some choose a regular group of employees to work in the *autoconsumo* garden, while others divide the work between all employees. Some organize it on a voluntary sign-up basis. One Havana *autoconsumo* requires all employees to spend two hours each week in the garden, so that the work is shared by all.

Increasingly, new employees are hired to tend the garden full-time. Many centers have reassigned workers who had previously been responsible for other duties, such as maintenance or landscaping. One benefit to having a stable group that regularly works in the garden is that it allows for a closer relationship between the garden and those who work it. Workers that specialize in tending the gardens develop a more intimate knowledge of the soil and plants, learning about the specific care that they need. Produce yield, gardening techniques, and produce quality improve with this knowledge.

One *autoconsumo* in Boyeros Municipality, run by a large state biotechnology center, sells a large percentage of its produce to the public. The garden is located across the street from a bus stop where many commuters congregate each morning and evening. The garden workers take produce out to the bus stop in crates and sell directly to the commuters. This is a very important service since many people work during the hours most markets are open, and have a difficult time getting fresh produce. This *autoconsumo* also supplies fresh produce to eight workplace lunchrooms and provides several hundred produce rations daily to children in nearby schools. All of this comes out of 5,000 square meters of garden space, from which they harvested 36,000 kilograms of produce between January 1 and October 31, 1997 (Paez, 1998).

The garden is run by eight people, each paid a basic monthly salary of 225 pesos. Every month, after calculating all expenses and salary deductions, half of the net earnings go to the workplace and half gets divided among the workers. The workers choose among themselves which three of them have worked the hardest that month, and those three people get an elevated percentage of the excess earnings. In December 1997, the high-end earners took home 800 pesos, double the average professional salary.

### ***III. Organopónicos and Huertos Intensivos***

In 1987 the state began to promote *organopónicos* as a strategy aimed at increasing food supply, especially fresh vegetables, to city residents across the island. The term “*organopónico*” applies to a production technique that uses raised container beds with a high ratio of compost to soil, and intensive planting of fresh vegetable crops (Companiononi et al, 1997). These container beds are called “*canteros*,” and are placed fully above the ground, and filled with a soil mix that is mostly compost or manure. They are perfect for vacant lots that have been paved over with concrete, or where the soil is extremely poor or hard to plough. Most of the raised beds are of concrete blocks, but some from stone, asbestos, wood, or metal scraps.

Most *organopónicos* do not make their own compost, but bring it from the countryside. Most often they use composted manure or sugar cane filtercake, a byproduct of the sugar refining process. Some *organopónicos* have been built on top of rich soils that could have been directly planted, reflecting the occasional adoption of *organopónico* methodology when it is not appropriate technology.

*Organopónicos* can be organized as workplace *autoconsumos*, workers cooperatives, or private production sites. Of the 451 *organopónicos* in Havana, almost half are *autoconsumos*, which are state-owned and run (see Table III). State *organopónicos* are managed through a variety of enterprises and ministries, such as the Ministry of Agriculture, the Ministry of Armed Forces, *La Empresa Hortícola Metropolitana* (Metropolitan Horticulture Enterprise), and a wide range of workplaces.

Twenty-one *organopónicos* are deemed “high yield,” producing an average of 16 kilograms per square meter (Companiononi et al, 1997). They dedicate garden beds to

intensive planting of the fresh vegetables that are in highest demand among Havana households. These vegetables, along with herbs and spices, are sold directly to the public through on-site vending stands.

TABLE III – *Organopónicos* in Havana

Type	Number
Workplace	266
Private/individual	153
High yield	20
UBPC	12
TOTAL	451

Source: Paez, 1996; *Grupo Provincial Agropecuario*, 1998,

Many of the high yield *organopónicos* now serve as educational and information sites, displaying posters about the nutritional value and cooking methods of the different vegetables they sell. *Organopónicos* produce lettuce (about 50 percent), and smaller percentages of spinach, basil, green onions, chard, and other delicate produce in high demand (Fuster, 1997a). Recently, many state-run *organopónicos* now also sell produce that is grown off-site to offer a wider variety of goods to the local consumers. *Plaza Organopónico* brings in produce from rural growers, and sells it at prices 20 percent below farmers' market prices. The produce brought in to the *organopónicos* may come from rural UBPCs, EJT farms or the campesinos within Havana City. By selling products at lower prices than the farmers' markets, *organopónico* gardens provide an important option for lower income families (Cabada, 1998), and pressure farmer's markets to lower their prices.

Twelve *organopónicos* are organized as UBPC cooperatives. These cooperatives must pay 30 centavos per square meter of area under cultivation as a tax. One UBPC *organopónico* in the Municipality of Havana del Este was started by a young couple who had both been teachers, but began farming in response to the call made at the beginning of the Special Period to plant food in all available areas of the city. They now run a large garden at the Villa Panamericana, organized as a UBPC with their extended family. Every one in the family has specific responsibilities, including the elderly grandmother, who is in charge of providing lunch, snacks, and coffee for the coop members and hired workers. This UBPC regularly donates food to the school where the founding couple used to work, as well as to several other schools. They also host children from various schools in their area for educational garden workdays.



*Organopónico* methodology is increasingly being displaced by direct planting schemes called *huertos intensivos* or “intensive gardens,” where the soil is appropriate. These gardens use intensive gardening methods similar to those promoted by John Jeavons (biodynamic farming method) and Alan Chadwick (French intensive gardening Method), which promote plant spacing for maximum yield per area, incorporating organic matter directly into the soil with a raised bed design that does not require retaining walls.

One *huerto intensivo* in Havana, run as an UBPC, is in the East Havana neighborhood of Alamar. The president of the cooperative is Miguel Salcines, a former administrator of a forestry research institute. He and a group of forestry employees requested early retirement from their regular work duties and a piece of land to develop a UBPC garden. Salcines insists that it is due to the incredible biodiversity of their garden that they have few pest problems. “We are reaching biological equilibrium,” he said, “The pest populations are now kept under control by the constant presence of predators in the ecosystem. I have little need for application of any control substance.”

The success of the *organopónicos* and *huertos intensivos* has spawned even more enthusiasm. On December 10, 1997, the seventh national gathering of *organopónicos* was held in Havana. The Minister of Agriculture, Alfredo Jordan, made a special appearance at the opening. He announced the following 11-point *organopónico* program to be implemented over the next three years.

1. Strengthen the production of vegetables in *huertos intensivos* (raised bed gardens, not walled containers).
2. Dedicate ten square meters per city inhabitant to *organopónico/ huerto intensivo* garden space by the year 2002. This should grow incrementally, from three square meters in 1998, six square meters in 1999, eight square meters in 2000, and finally, to ten square meters per inhabitant by the end of 2002.
3. Appoint one person in each municipality to be in charge of all *organopónicos*, including their construction and maintenance.
4. Include more fruits and flowers in planting schemes.
5. Continue turning over land in usufruct to UBPCs and individual *fincas* (farms). Increase the organization of the plots and the growers.
6. Increase crop diversity, in accordance with each site.
  - a. Reach full potential in leafy vegetables and condiments.
  - b. Increase production of tomato and green beans.
  - c. Increase production of onions, garlic, and chives.
7. Build direct relationships with all municipal organizations.

8. Address irrigation problems and provide more irrigation equipment.
9. Improve soil fertility through the use of compost and biofertilizers (“This is very important!” he emphasized). The Soils Institute will coordinate as head of research on soil protection and management.
10. Expand biological plant protection and address the individual needs of each site.
11. Expand the seed houses into “*Casas de Atención Intensivo*,” (Houses for Intensive Outreach) where growers can acquire seeds, tools, hoses, and irrigation equipment, biological control products, and technical assistance/extension advice. These goods whenever possible should be manufactured in the municipality where they will be deployed.

This program indicates precisely the weakest points of current production. To the degree that Minister Jordan's 11 points can be fulfilled, Havana's *organopónicos* will be more agriculturally sound, more genetically diverse, and better able to meet the food demands of the city.

#### **IV. *Campesinos Particulares***

Havana has a significant urban farm sector, with 3,485 hectares of arable land within city limits (*Grupo Agropecuario*, 1997). The majority of these farms are in the greenbelt surrounding the metropolitan center of Havana, but close enough to easily bring produce in for sale. Much of this farmland is held in usufruct, and the typical farm size is approximately one *caballería*, or 13.4 hectares of land. Much of the milk and cut flowers that are sold in the capital are produced by Havana's small farmers. Milk is not sold in farmers' markets or through direct sale, but is distributed through the state ration system which guarantees children seven years and under one liter of milk per day. Many small farmers sell other products directly from their farms in order to avoid being away from the farm or losing a needed family member to sell produce at the market. To facilitate sales by small farmers, the government does not charge any taxes on produce that is sold on-site. This allows farmers to sell at lower prices, making food more affordable to nearby consumers.

A former MINAG employee, who was previously a tractor driver, runs one of the small farms located in the municipality of Boyeros. The Urban Agriculture Department together with *Boyeros Poder Popular* helped him get use rights to an adjacent area that had been fallow. Now he farms his property together with his own private lot, growing vegetables, fruit, and *viandas*, the root and tuber crops that are a main staple of the Cuban diet. The three most common *viandas* in Cuba are *yuca* (cassava), *boniato* (a white sweet potato), and *malanga* (a Caribbean taro). These crops are sold on-site from a small kiosk on the road in front of his farm.

This farmer has also been working closely together with Havana's urban reforestation program, *Mi Programa Verde* (My Green Program), and has planted over 20 guava and

avocado trees. The trees were planted in wide rows with room between them for his regular annual crops. Not only will the trees provide him with extra income and produce, but they also provide shade for vegetable crops that cannot survive in the tropical sun during the summer months, thereby extending the growing season. This is a beautiful illustration of the relation between private and public services that has made these gardens prosper.

## State Enterprises

There are three state run agricultural enterprises in Havana: the *Empresa de Cultivos Varios* (Mixed Crop Enterprise), the *Empresa Horticola Metropolitana* (Metropolitan Vegetable Enterprise) and the *Empresa Pecuaria* (Animal Husbandry Enterprise). All three existed before the Special Period, but have gone through major transitions to improve their organization and services in response to the crisis—largely through decentralizing and privatizing urban production.

### ***Empresa de Cultivos Varios* (Mixed Crop Enterprise)**

For many years, the *Empresa de Cultivos Varios* was a centrally organized state enterprise that bought, sold, and distributed fruits and vegetables for national consumption and export. The *Empresa* also produced some of their own fruit, mostly in large scale mango orchards on the outskirts of Havana. The orchards had low yields, and suffered significant losses to *marabu*, a spiny, woody leguminous, and extremely pernicious weed. In 1994, the *Empresa* began a transformation toward what are now called the *Empresas de Nuevo Tipo* (New Type of Enterprises).

The former centralized *Empresa* was decentralized into 21 municipal farms. These farms continue to produce for the State Enterprise and its corresponding distribution chain, but each is run as an individual business with its own management. These are further broken down into small scale units given to individual workers. These farmers take on a more active role in management of their unit, and in addition to their monthly salary they share the profits of the farm production. Each farm, management together workers, define its own structures and goals.

For example, one of the *Cultivos Varios* Farms of a New Type was established by giving away land. Participating families were required to clear their areas of *Marabu*, and care for the existing mango trees that would still belong to *Cultivos Varios*. In return, each family may build a house on the site, raise a limited number of livestock, and grow any additional crops they wished for their own consumption and for sale. There are now 360 of these small farms on *Cultivos Varios* land in Havana City. These new farmers operate their own bank account and make all of the production decisions on their land, except for the mango trees and harvest that belong to *Cultivos Varios*.

*Cultivos Varios* has not only secured land for growers, but has taken on a protagonist role on behalf of growers in several other key legal issues. *Cultivos Varios* recently secured the right for the farms to operate accounts in U.S. dollars legalizing the growers to sell directly to tourism or other dollar industry businesses. This allows them the potential for

greater earnings. They also legalized the use of part time contracted labor to be hired during peak labor demands.

Before this transformation began in 1994, *Cultivos Varios* was producing 73,000 *quintales*, or 3,650 tons of produce annually, resulting in a net loss of 10 million pesos per year. By the end of 1997—three years into the new system—production had reached 203, 000 *quintales* and generated net earnings 56,000 pesos. The total sales of 1997 included 36.3 tons of medicinal plant material sold to the Ministry of Public Health (Fuster, 1997b). This does not include the food and animals consumed on site.

### ***Empresa Horticola Metropolitana (Metropolitan Vegetable Enterprise)***

The *Empresa Horticola Metropolitana* manages the 21 high yield *organopónicos* in Havana City, and coordinates sale and distribution of the produce from 2,200 small farmers. Each high yield *organopónico* has an on-site manager, and works directly for the enterprise. There are also small independent farmers, who supply the *Empresa* with produce based on negotiated contracts. The *Empresa Horticola* negotiates directly with each of the small farmers, resulting in agreements about the purchase of farm inputs, the products the farmer will sell, and the quantity and price of the products the farmer will sell. Much of the produce that the *Empresa* buys from the small farms is sold at the high yield *organopónico* produce stands.

### ***Empresa Pecuaria (Animal Husbandry Enterprise)***

The *Empresa Pecuaria* has 11,913 hectares within the city of Havana, organized in various smaller enterprises (*Grupo Provincial Agropecuario*, 1997). Three are dairy enterprises, with several farms in Bacuranao, and in the municipalities of Boyeros, Cotorro, and Arroyo Naranja. In all, the farms have more than 15,000 head of cattle. Decentralization and other strategies aimed at improving efficiency are being implemented and have boosted production in 1997.

This *Empresa* also oversees the rearing of small animals: chickens, rabbits, goats, sheep, and pigs. Several of the specific animal husbandry enterprises have established joint projects with urban producers to promote and improve animal raising in the city. In these “joint ventures,” the *Empresa* provides the start up materials such as the cages, feed, and breeding stock that the grower will need. An agreement is made from the outset; the grower will give the institute a certain number of live animals, and the institute will supply the grower with supplemental feeds and veterinary services.

With rabbit raising, the *Empresa* asks for twenty percent of the rabbits raised per year in exchange for monthly feed supply. Beyond that set percentage of rabbits, the grower may keep the remaining 80 percent to eat, or sell the rest. One grower in Santa Fe had already surpassed his yearly quota by July. The remaining production for the year was his to eat or sell in the private marketplace, but he planned to donate a significant number of these rabbits to community organizations in his area.

## IV. Production

Together, the popular gardens, *autoconsumos*, *organopónicos*, and small farms produced over two million *quintales*, or 160,000 tons of food, in 1997. This includes over 1,914,500 kilos of mixed vegetable, fruit, and tuber crops, 6,403,100 liters of milk, and 3,148,800 flowers (Fuster, 1997b). Each sector of urban agriculture made significant contributions to this total.

**Table IV: Total production, by farm type, in 1997.**

Sector	Production in <i>quintales</i> (100 lbs.)
<i>Huertos Populares</i>	358,000
<i>Organopónicos</i>	295,000
<i>Autoconsumos</i>	601,000
<i>Campesinos</i>	561,000
<i>Empresa de Cultivos Varios</i>	203,000
TOTAL	2,018,000

Source: *Grupo Provincial Agropecuario*, 1998

One of the main goals of urban agriculture is to provide a daily per capita production of 300 grams of fresh vegetables for all urban inhabitants. This is based on FAO recommendations for human consumption. Table V shows 1998 production plans and actual production for the major cities.

Since home and workplace gardens are mostly for self-provisioning, gardeners plant what they most want to eat: fresh vegetables, root and tuber crops, culinary herbs, and some fruit. Almost all gardeners with open soil space (as opposed to raised beds) grow *viandas*. Many raise small animals for meat, cooking lard, eggs, and milk.

*Autoconsumos* raise similar crops, since they usually produce for workers. Lunch is the main meal in Cuba, and is especially important since there is little tradition of eating breakfast. Workplaces, and therefore *autoconsumos*, are responsible for providing workers with a hearty, filling meal at midday. *Autoconsumos* that have enough room will raise animals for meat and eggs, and sometimes even have dairy cattle. Havana's *autoconsumos* produced 8,355,000 eggs, 1,392,000 liters of milk, and 240 tons of meat for workers' lunches in 1997 (Fuster, 1997b).

*Organopónicos*, on the other hand, see their job as providing the complimentary foods that neighborhood residents cannot get from the ration, and which are best when bought fresh each day. Their products include lettuce, green onions, New Zealand spinach, chard, tomatoes, green beans, and a few other vegetable and condiment crops.

**TABLE V: MAIN CROPS GROWN IN HAVANA**

<b>Vegetables</b>	Spanish Name	Biological (Latin) Name
Beets	<i>Remolacha</i>	<i>Beta vulgaris</i>
Cabbage	<i>Col</i>	<i>Brassica oleracea</i>
Carrots	<i>zanahoria</i>	<i>Daucus carota</i>
Celery	<i>col</i>	<i>Apium graveolens</i>
Chard	<i>acelga</i>	<i>Beta vulgaris</i>
Chives	<i>cebollina</i>	<i>Allium ascalonicum</i>
Corn	<i>maíz</i>	<i>Zea mays L.</i>
Cucumber	<i>pepino</i>	<i>Cucumis sativus</i>
Eggplant	<i>berenjena</i>	<i>Solanum melongena</i>
Garlic	<i>ajo</i>	<i>Allium sativum L.</i>
Green Beans	<i>habichuela</i>	<i>Phaseolus vulgaris</i>
Lettuce	<i>lechuga</i>	<i>Lactuca sativa</i>
Okra	<i>Quingombó</i>	<i>Hibiscus esculentus</i>
Onion	<i>Cebolla</i>	<i>Allium cepa</i>
Peanut	<i>Maní</i>	<i>Arachis hypogaea</i>
Pepper	<i>Ají</i>	<i>Capsicum frutescens</i>
Radishes	<i>Rábano</i>	<i>Raphanus sativus</i>

Spinach	<i>Espinaca</i>	<i>Spinacia oleracea</i>
Squash	<i>Calabaza</i>	<i>Cucurbita maxima.</i>
<b>Fruit Crops</b>		
Avocado	<i>Aguacate</i>	<i>Persea auericana</i>
Banana (fruit)	<i>Plátano fruta</i>	<i>Musa paradisiaca</i>
Banana (frying)	<i>Plátano macho (vianda)</i>	<i>Musa balbisiana</i>
Chirimoya		<i>Annona chirimola</i>
Coconut	<i>Coco</i>	<i>Coco nucifera</i>
Grapefruit	<i>Toronja</i>	<i>Citrus paradisi</i>
Grapes	<i>Uvas</i>	<i>Vitis spp.</i>
Guava	<i>Guayaba</i>	<i>Psidium guajava</i>
Sour Oranges	<i>Naranja agria</i>	<i>Citrus aurantium</i>
Soursop (or sweetsop)	<i>Anón</i>	<i>Annona squamosa</i>
Lime	<i>Limón</i>	<i>Citrus aurantifolia</i>
Mandarin Orange	<i>Mandarina</i>	<i>Citrus nobilis</i>
Mango	<i>Mango</i>	<i>Mangifera indica</i>
Mamey	<i>Mamey</i>	<i>Calocarpum sapota</i>
Melon	<i>Melón</i>	<i>Citrullus vulgaris</i>
Orange	<i>Naranja</i>	<i>Citrus aurantium</i>

Papaya	<i>Fruta bomba</i>	<i>Carica papaya</i>
Pineapple	<i>Pina</i>	<i>Ananas comosus</i>
Passion Fruit	<i>Maracuya</i>	<i>Passiflora</i> spp.
Tamarind	<i>Tamarindo</i>	<i>Tamarindus indica</i>
Tomatoes	<i>Tomate</i>	<i>Lycopersicon esculentum</i>
<b>Viandas</b>		
Cassava	<i>Yuca</i>	<i>Manihot esculenta</i>
Plantain (frying)	<i>Plátano (macho)</i>	<i>Musa balbisiana</i>
Potato	<i>Papa</i>	<i>Solanum tuberosum</i>
Sweet Potato	<i>Boniato</i>	<i>Ipomoes batatas</i>
Taro	<i>Malanga</i>	<i>Alocasa</i> spp.
<b>Legumes</b>		
Pigeon pea	<i>Gandul</i>	<i>Cajanus cajan</i>
Black beans	<i>Frijol negro</i>	<i>Phaleolus</i> spp.
Red beans	<i>Frijol colorado</i>	<i>Phaseolus</i> spp.
Soy beans	<i>Soya</i>	<i>Glysine max</i>
Garbanzos	<i>Garbanzos</i>	
Other		
Rice	<i>Arroz</i>	<i>Oryza sativa</i>
Sugar Cane	<i>Caña de azúcar</i>	<i>Saccharum officinarum</i>

Sources: FAO, 1990; Moskow, 1995 & Chaplowe, 1996



The rich diversity of Havana's crops provides key carbohydrates, proteins, vitamins, and minerals. Popular gardens have countered the historic lack of food crop variety and the monotony of foods available in the first years of the crisis. The popular gardens have brought back many traditional crops that for years were difficult to find such as passion fruit, sesame, and custard apples (*anón*). Gardens have also helped introduce new crops and varieties not previously eaten in Cuba, such as spinach.

These crops are grown almost entirely with active organic methods. Havana's city government passed a law prohibiting the use of chemical pesticides in agriculture within city limits, and has worked diligently to promote ecological alternatives. They have established an extension system based on organic and sustainable methods. The Urban Agriculture Department provides numerous workshops and training sessions to promote organic, low input agricultural techniques based on existing, local renewable resources. As a result, Havana's urban vegetable gardens have become the most organic sector of Cuban agriculture (Fuster, 1997a).

One of the most successful aspects of this integrated approach is the nationally coordinated biological control program. It emphasizes prevention, and employment of locally produced organic pest and disease control agents when necessary. This extensive program has played a key role in allowing Cuba to survive the food crisis (Rosset & Moore, 1997). Many gardeners have learned from extensionists how to make homemade botanical insecticides from tobacco plants in the mustard family and certain varieties of hot peppers.

## **V. Agricultural Extension Services**

One of the most important services established by Havana's Urban Agriculture Department is the city's network of extension agents. Extensionists are organized to respond to the needs of producers throughout the city and assist them in all aspects of gardening. Extensionist workers are organizers, teachers, and referral experts, directing gardeners to the appropriate research centers, information services, and other resources in the city. Extensionists also connect gardeners to one another, inform them about upcoming workshops, and help them acquire needed inputs.

When the city's extension network was initially designed, one extensionist was assigned to each of Havana's 15 municipalities. Extensionists obtain intimate knowledge of the gardens in their municipality, including the unique needs of their assigned district, and closely monitor local successes and difficulties. Local assignment helps build ongoing personal and working relationships between local government, extension agents, and gardeners, facilitating their effective collaboration.

There are many examples of what can happen when such relationships are formed. The first extension worker assigned to the neighborhood of Santa Fe, on the western outskirts of the Playa municipality, was Luis Sanchez, a longtime resident of this community.

Thanks in part to his commitment and good communication, Santa Fe came to have one of the highest concentrations of gardens in Havana. The gardeners had already gained extensive gardening knowledge at a time when gardeners in other neighborhoods were just learning how to farm. Santa Fe gardeners employed many organic techniques, including compost-making, companion planting, trees for shade cover, and integration of permaculture principles (Murphy, 1995).

The decentralized structure of the extension system encourages accountability. Gardeners in each neighborhood get to know their local agents, and expect them to visit regularly, take concern in how the gardens are doing, and offer assistance and advice. If an extensionist lets too much time go by between garden visits, the producers will appeal to the nearby neighborhood government office, which is never inaccessible. There is a strong sense of entitlement among farmers: that they deserve these high quality services and extension agents should fulfill this role and be committed to the neighborhood.

By December 1997, Havana had 67 extension workers located in 13 of the 15 municipalities (Paez, 1998). Extension, and all official agriculture projects, are coordinated in each municipality by an agriculture delegate appointed by MINAG. Each municipality has an extension team with two to seven people, depending on the size and number of gardens. One person had been in charge of the two municipalities of Centro Habana and Habana Vieja, but now the few producers in this area consult directly with the provincial level of the Urban Agriculture Department. *Cerro* is also densely populated with little open space, but boasts several *organopónicos* and enough other agricultural activity to warrant a number of extension workers. In most other municipalities, the extension structure has been increasingly decentralized, and most extensionists are now working in a specific *Consejo Popular*, the grassroots neighborhood level of Cuba's governmental structure. For example *Arroyo Naranjo*, has ten extension workers, each one responsible for one of the ten *consejos* in that municipality.

Havana's extension agents spend all day traveling around their municipality or *consejo* on foot, bicycle, or bus, visiting the producers in their region. They serve all of the different farms and gardens in their municipality or *Consejo Popular*. They assist gardeners in crop monitoring, identification of pest and disease problems, and help with obtaining necessary biological control products. One important responsibility of the extension agents is to distribute land to growers. Local citizens petition the agent directly for garden plots. The agriculture representative is then obliged to find a suitable garden plot and secure use rights for the gardener. When the first harvest begins, the extension worker issues the grower a selling permit. If one of the gardeners is not making the plot productive, it is the extensionists' job to talk to them, warn them, and give the land to someone else if necessary.

Havana's agricultural extension workers are also community organizers. They have been central to the creation and success of the *Grupos de Horticultores*, and continue to encourage individual gardeners to associate with nearby groups. They assist in the integration of new members, the formation of new clubs, and help the clubs access the

resources and information that they need. Their work facilitates the grassroots level of the national transformation to a “new agricultural model” (see Rosset and Benjamin, 1994) favoring locally produced, low input, sustainable techniques. While not all gardeners are convinced that organic is always best, there is a growing consensus that large quantities of food can be grown in small areas with no external inputs, and that harmful pesticides should not be used on fresh vegetables in urban settings. This is largely due to grassroots work of extensionists.

To promote agroecological techniques, resource sharing, and production coordination, and the coordination of urban logistics, the urban extension agents work closely with Havana’s seed houses and the state agricultural research centers. These different services cooperate effectively and complement each other’s work. Educational workshops offered to both extension workers and city gardeners exemplify the coordination among these agencies. So far over 30,000 people have gone through training sessions and seminars organized by extension services and research institutes in Havana (Paez, 1998).

## VI. Seed Houses

One of the best examples of public-private partnerships in agriculture are the Havana seed houses. There are twelve seed houses in Havana in various municipalities, including *Plaza*, *Playa*, *Marianao*, *Habana del Este*, and *Diez de Octubre*. The seed houses sell garden inputs, including seeds and tools, locally produced biological control products, biofertilizers, packaged compost, worm humus, and other garden inputs.

When the seed houses first opened, they were run by MINAG employees. But as part of the broad move to decentralize and to encourage self-management and self-financing, the employees were made independent managers of the stores in which they worked. Each seed house is now run by one of these self-employed managers, who maintains a beneficial state affiliation, but has a high degree of autonomy. The independent managers set prices for the products they sell, as well as setting their own salaries based on net profits.

Upon becoming independent, many seed house managers complained that it was impossible for them to stay properly stocked without shutting down all the time to seek out and purchase inventory items. Managers needed to be on-site, they affirmed, to keep the shop open regular hours. In the time-consuming task of going to and picking up inventory, to keep the shop stocked, shops were closing too often to keep regular clients. Some closed too often to turn a profit and began to lose money.

MINAG responded by purchasing a delivery truck in 1996, and having someone purchase and deliver inventory items to each of the seed houses. This person has no fixed or guaranteed salary, but is paid by each of the seed house managers. The Ministry gave an initial guide of what each seed house should pay for this monthly delivery service, but is not regulated and may fluctuate with quality of service (Iturriaga, 1997). If the delivery person does an insufficient job, the seed houses are not required to pay him. But, conversely, if the seed houses want good service, they must make it worth his while. This

measure is designed to increase accountability and quality of service; the delivery person is accountable to the seed houses that are in turn accountable to urban growers.

The volume of business has increased greatly for the seed houses since the delivery service began, and one person is no longer sufficient to serve all the seed house needs. Several seed houses have additionally hired their own full-time person to organize and pick up inventory. This has freed up the delivery service to deal directly with state suppliers, buying seed inputs and state-produced tools, while the seed house buyer negotiates directly with local farmers for ornamental and medicinal plants and tree saplings.

Some of the seed house items are supplied and delivered directly by the *Empresa de Suministro Agropecuario* (Agricultural Supply Enterprise). Other items are purchased from the Soils Institute, the Plant Protection Institute (INISAV), or other state research centers. Many publications are purchased from the Ministry of Agriculture's publishing house, *AgInfor*, although there are numerous other sources for technical and educational materials. Most ornamental plants are purchased from local small producers or from Havana's *campesinos*.

## THE MOST COMMON SEED HOUSE ITEMS

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- Seeds
- Plants
  - Ornamental
  - Medicinal
  - Tree saplings (mostly fruit-bearing)
- Clay pots
- Machetes
- Garden hoes
- Sprinkler heads
- Books
- Educational pamphlets
- Worm humus
- Biofertilizers
- Biological pest and disease controls

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Source: Perez, 1998

A major seed house limitation is the lack of refrigeration. Many biological control agents and biofertilizers are microorganisms that can only live a few days without refrigeration. The seed houses must sell them within a day or two of delivery, or they will no longer be active. Cuba is still in the process of establishing trust in organic techniques, so it is crucial that producers find these products effective. Otherwise, growers will cease to use them, and the seed houses will no longer stock these items of utmost importance to Havana's pest control.

Some seed houses manage the lack of refrigeration by only filling pre-paid orders, and will not stock them otherwise. The Department of Urban Agriculture is currently seeking funds to purchase small refrigerators for each of the seed houses, to extend the life span of the products they promote.

Havana's newest and largest seed house to date was opened in the Diez de Octubre municipality. Instead of calling it a seed store, it was named the Tienda de Atención a la Agricultura Urbana y Sostenible (Attention Center for Urban and Sustainable Agriculture). The site had been a bar before 1959, and then a barbershop until the mid 1980s. There are now three people working in this shop. Leandro Perez, the manager, an administrator, and a trained agronomist spends all day at the shop. The second person, an elderly agricultural lay person in charge of contracts for seed house items, does some on-site consultations. In early 1998, a young woman trained as a forestry engineer was hired. She is now in charge of sales and forestry consultations.

The Diez de Octubre tienda currently stocks the standard inventory of seeds, garden clippers, plants, etc., but has a farther-reaching vision. Mr. Perez has an ambitious plan to turn his seed house into an urban agriculture training and education center. He plans to compile a reference library and build a conference room. He also plans to "adopt" three *autoconsumos* at nearby day care centers, providing them with seeds, tools, and extension services. All three are in the Cerro neighborhood of Atares, one of the poorest neighborhoods in Havana. He also plans to hire a full-time person to coordinate education, training, and inventory control.

The Diez de Octubre seed house is a pioneering effort. Minister Jordan wants more seed houses to go in this direction. He included this goal in his 11 point program for urban agriculture (see p.22). These points indicate that there will be support for increasing the number of seed houses and expanding the services offered to the producers in their area.

## VII. Agricultural Research Centers

Cuba has an extensive agricultural research sector, with most head laboratories and administration offices inside Havana City limits. The Department of Urban Agriculture has been working with all institutes and laboratories to determine how they can best serve the needs of city growers (Iturriaga, 1997). More and more research stations are working directly with urban gardens, providing resources and/or technical assistance to popular gardens, *organopónicos*, and *autoconsumos*. They also provide research results, informational brochures, some products like seed inoculants or biological pest controls to urban gardeners. Most importantly, they work directly with extension agents to improve their agricultural knowledge, and the extensionists in turn take research results or institute products to the gardeners in their area.

Before the Special Period, all of these research centers focused on large scale, conventional methods. Since 1989 they have shifted their emphasis to lower input methods, and the alternative organic and ecological practices put forth in the New Model. It has become clear in recent years that many institutes recognize the specific needs of urban producers, feel a responsibility to them, and have taken a strong role in supporting food production in the city.

National Institute for Basic Research Tropical Agriculture (INIFAT) is the research center that has been working most directly with urban gardens. Other institutes that provide direct services are the Plant Protection Research Institute (INISAV), the Pastures and Forages Research Institute (IIPF), and the Soil and Fertilizer Research Institute. Institutes working with specific crops or animals have also joined the effort to increase urban production, such as the Rice Research Institute and the Swine Research Institute. Each research institute now has a National Plan and a Plan for the City (Havana), detailing concrete tasks and responsibilities in urban agriculture (Fuster, 1997a).

## National Institute for Basic Research in Tropical Agriculture (INIFAT)

INIFAT was the first agricultural research station in all of Latin America (INIFAT, 1984). It was the only research institution in Cuba until 1959, directed mainly by the funding for plantation agriculture, investigated mainly export crops, and heading a small group of territorial stations. After 1959, a vast network of specialized agricultural research centers was created to address the complex needs of a national agricultural system and the real agricultural needs of a people. Although the newly created institutes were all specialized, INIFAT maintained an integral, holistic approach to agricultural science. INIFAT has many connected departments and research projects in soil, fertilization, plant science, pest and disease control, and seed genetics. INIFAT is still seen as the leader in many aspects of research and extension among other institutes, although its various departments are smaller than the specialized agricultural research centers.

INIFAT now directs the National Extension Commission, and has four researchers that direct urban extension projects focusing on Havana and provincial cities. They give training to extension workers, and provide workshops and extension services for all of the different kinds of gardens. INIFAT also has educational programs that target *organopónicos* covering soil management, compost and fertility management, and crop improvement (Companioni, 1998). Their research is dedicated to adapting and developing cropping systems specifically in urban conditions.

INIFAT also coordinates a new network of seedling nurseries in Havana. By late 1997 one nursery had been finished, and was producing 30,000 seedlings per month (Companioni, 1998). Three more were constructed in 1998. Seven more nurseries will be

built with funding from MINAG, the European Union, and a German NGO, around the main agricultural areas of the City of Havana, supplying urban producers and home gardeners. The nurseries will grow vegetable crop seedlings like tomato and onion, but will also sow fruit tree saplings for use in the urban reforestation program. INIFAT and MINAG are committed to keeping prices low and accessible. The seedling and saplings reared at nurseries will be sold at prices much lower than those currently available elsewhere. Vegetable seedlings, for example, sell at five *centavos* a piece, lower than the seven *centavos* at popular nurseries.

INIFAT's role in extension has become quite widely known among growers, and many now go directly to the INIFAT central headquarters for seeds, information, and advice. The researcher/extensionists in the Urban Agriculture Department are very accessible and take personal interest in helping producers. Their participatory and reciprocal approach to research projects links growers to investigation and results. They have built strong personal and working relationships with many city producers, and stress the importance of recognizing local knowledge and learning from growers, not just trying to teach them.

## Plant Protection Research Institute (INISAV)

INISAV is another research center that has directly assisted urban producers. As the leading institute in the national network of plant protection, INISAV heads 14 provincial laboratories, 60 regional plant protection stations, and over 200 Centers for the Reproduction of Entomophages and Entomopathogens (CREEs) (Fernandez, 1996). To support the biological control needs of Havana, INISAV has opened 11 CREEs right in the capital. Unlike the industrial-scale biological production enterprises run by INISAV, the aim of these CREEs is decentralized, small-scale, cooperative production of biocontrol agents needed at the local level.

### **Main biocontrol products made by INISAV**

- *Beauveria bassiana* to control banana root borer, sweet potato weevil, rice water weevil, and the sugarcane borer.
- *Bacillus thuringiensis* to control diamondback moth, cassava horn worm, tobacco budworm, and various *lepidoptera*.
- *Metarhizium anisopliae* to control *C.sordidus*, *L.brevirostris*, *Mocis* spp., *P. xylostella*, *D. saccharalis*, and the greater wax moth *Galleria mellonella*.
- *Verticillium lecanii* specifically bred to control the sweet potato whitefly, one of the most damaging pests in Cuba (and around the world).
- *Paecilomyces lilacinus* to control destructive nematodes.
- *Trichoderma* sp. fungus is used to control soil borne diseases that attack tobacco, tomatoes, peppers, and other crops. A different strain is also used to protect seeds from fungus during storage.

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Source, INISAV, 1997; Fernandez, 1996

One of the CREEs in Havana is on-site at the *autoconsumo-organopónico* run by a group of elderly residents from the Santovenia retirement home in Cerro. INISAV specialists trained several elders in the preparation, use, and application of the various biological control products. The Institute also provides the retirement home garden with continued plant protection services, regular pest and disease monitoring, quality control of the biocontrol products made on-site, and application of biocontrol products when needed for serious pest outbreaks.

In order to disseminate knowledge and promote the use of biological control products, INISAV has done much education and extension work of their own. Extension workers are trained to give integral service in pest and disease management, soil management, irrigation techniques, plant care, and general cultivation to urban gardeners (Fernandez, 1996). They specifically train people about local pests and diseases, and the biological control agents that combat them. In mid-1997, INISAV contracted two young psychology graduates to help work with the extension agents to explore the non-agricultural aspects that may hinder producers' acceptance of new technologies, and to look at the social and interpersonal aspects that permit good extension work.

INISAV works directly with the urban agriculture representatives at all levels, but especially at the neighborhood level of the *Consejo Popular*. All of the *Consejo* representatives and extensionists have been trained in some aspect of biological plant protection to assist in grassroots pest and disease monitoring and control (Paez, 1998).

## Institute for Research on Pastures and Forage (IIPF)

IIPF is located in Bauta, a small town just over the western border of Havana City, in the province of Havana. This institute has played a significant role in supporting urban gardens, hosting organic agriculture workshops, and training urban growers. IIPF hosted the first permaculture training course in Cuba attended by many community gardeners and extension workers. IIPF also produces and sells worm humus and worm-raising stock to assist gardeners in starting their own vermiculture programs.

IIPF also sponsors research on medicinal plant cultivation and use. The head of this project has linked MINAG to the Cuban Ministry of Public Health in medicinal plant projects. IIPF provides medicinal plant material to a local doctor in the nearby town of Cangrejas. The doctor works directly with plant medicines, and she has arranged for the local pharmacy in town to dispense them as well.

## Soils and Fertilizer Research Institute

The Soils Institute has headed all work on soil management and fertility since the Special Period began. The Institute has completely redirected research to explore non-chemical means of soil improvement, including work with compost, animal manure, green manure, and biofertilizers. The Institute has carried out pioneering work in worm composting in



tropical conditions, developing their own composting technology and consulting other countries in Latin America.

The Soils Institute has a small production site at the main laboratory, where they make several soil amendments and fertilizers. They package and sell these products directly to growers at very low prices. But since the lab is on the southwestern outskirts of the city, it is not easy for growers to travel there. Most of their sales take place through the seed houses, to whom they make deliveries every 15 days (Perez, 1998). The Soils Institute supplies the seed houses with worm humus, which the seed houses sell directly to the public at one peso per kilogram—an affordable price for community gardeners. They also sell the Soils Institute's *Fosforina*, a biological phosphorus solubilizer. The Soils Institute provides printed recommendations that accompany all saleable products. They also sell directly to large *autoconsumos* and *organopónicos*.

## VIII. Non Governmental Organizations and Collaborative

### Projects

There are a number of Cuban and foreign non-governmental organizations (NGOs) in Cuba today. Most of the Cuban NGOs were formed after the Special Period with hopes of addressing various new issues brought about by the crisis and by 1995, there were over 200 (Diaz, 1997). Most Cuban NGOs focus on community development, and several of these have given special priority to supporting urban gardens and community food security efforts.

***Asociación Cubana Para la Agricultura Urbana (ACTAF/ACAO)*** ACAO consists of agricultural researchers, producers, and activists who promote organic research and production. The mission of ACAO is to “create a national conscience to support agriculture harmonious with human beings and nature (Monzote, 1997).” ACAO holds workshops and training, publishes a quarterly journal, *Agricultura Orgánica*, and sponsors an annual international organic agriculture conference which many of the world's most recognized organic agriculture figures have attended in recent years.

***Fundación de la Naturaleza y El Hombre (The Foundation for Nature and Man)*** This integrated, multidisciplinary organization has an ecological focus. The foundation works closely with the Cuban Ministry of Culture to promote the blossoming ecological consciousness of Cuba. Although most work is ecologically philosophical and not directly agricultural, this NGO sponsors Havana's Permaculture Project carried out through the Australian/Cuban “Green Team,” which does direct agricultural work at the neighborhood level. The *Fundación* also publishes the ecology magazine *Se Puede* (You can do it).

***ProNaturaleza (ProNature)*** is an activist NGO with a conservation-oriented ecological focus. *ProNaturaleza* addresses the conservation issues of deforestation, erosion, energy, and mining, among other concerns. Membership dues support the

organization. Many members are academics and other professionals from the natural sciences, including the director of the botanical garden, the host of Cuba's weekly ecology TV show, *Etorno*, and several professors from the biology and geography departments of the University of Havana. *ProNaturaleza* promotes urban agriculture as part of an ecologically sustainable future.

***Consejo Ecumenico/ DECAP (The Cuban Council of Churches)*** has a number of community development and popular ecology projects, including a specific Agricultural Projects Department. They have published a very useful series of educational and "how- to" pamphlets for urban gardeners on worm composting, integrated pest management, and seasonal crops, and have sponsored many educational workshops for urban and rural farmers both in Havana and around the island. Their urban agriculture programs use farmer-to-farmer technology transfer models.

***Grupo Para el Desarrollo Integral de la Capital (Group for the Integral Development of Havana)*** is an urban planning NGO that heads the network of the Havana's neighborhood transformation workshops, combining housing/construction work with social and ecological work. They have played the very important role of promoting and supporting urban agriculture in planning forums.

***Cuba Solar*** is a sustainable energy NGO that is involved in research, education, and application of energy technologies that include: solar, wind, minihydro, and biomass conversion. They have helped several gardens with designs for windmill generated water pumps and irrigation systems.

***Proyecto Comunitario de Conservación de Alimentos (Community Food Preservation Project)*** educates Havana residents about how to dry, can, and otherwise preserve commonly eaten foods. The project is run by a retired couple, Vilda and Pepe Lima, who are rooted in their local community, host a regular radio show, and give workshops all through Havana at churches and through block committees to help people make the most use of the food items they produce.

***Martin Luther King Center*** was organized by a Baptist Church in the working class neighborhood of Pogolotti in Marianao. This center promotes varied community development projects. Many of these projects promote community gardens as a means to empowerment, self-reliance, and healthy community.

***Asociacion Cubana de Producción Animal (Cuban Association of Animal Production- ACPA)*** is an NGO that currently focuses on developing local seed stock in grains and legumes to promote organizing national self-sufficiency in livestock feed, traditionally imported from abroad. ACPA is helping support the community-based animal raising associations across the country, focusing primarily on Havana.

## International Organizations

There are several international non-governmental organizations that have exchange projects in Cuba coordinated with local NGOs that directly involve urban agriculture. These exchanges focus on the interchange of experiences and ideas and include:

The Institute for Food and Development Policy/ Food First, USA  
AgroAcción Alemania, Germany  
The Green Team, Australia  
Oxfam, Canada and Oxfam, USA

## IX. *Mi Programa Verde*

One of the newer programs involved in reforesting the city, and enhancing food security, is the program called “*Mi Programa Verde*” (My Green Program). The use of “My” in the name conveys the idea that each citizen should feel ownership of the program, and should take personal responsibility for the reforestation of the city. The goal of *Mi Programa Verde* is to plant 17 million fruit and wood-bearing trees by the year 2000. By 1997, over five million trees had been planted by 5120 grassroots projects (*Grupo Agropecuario*, 1997).

All of the trees that *Mi Programa Verde* promotes will have the secondary benefits such as bearing edible fruit, provide fuel for cooking, or wood for building. The Ministry of Agriculture, Havana’s city government and the city planning commission, have promoted this long-term concept to increase urban biodiversity and options for food production. Vegetable gardens produce much in the short run, they say, but Havana must increase permanent fruit yields if the city is to be truly sustainable.

There are now 86 nurseries in Havana that raise tree saplings for *Mi Programa Verde* (Fuster, 1998). One of the nurseries is a small cooperative on the southern outskirts of Havana. It specializes in producing fruit trees saplings, ornamental plants, and some unusual food crops. It is one of the only places in Cuba that is currently propagating cashew trees that are perfectly adapted to the Cuban climate, but have become virtually extinct in Cuba.

The nursery is faced with the chronic shortages characteristic of the Special Period. For instance, there are not enough plastic potting bags in which to sow seedlings. The nursery has appealed to local garbage collectors, who sometimes find large sheets of discarded plastic, asking them to bring what they find to the nursery. These sheets are then cut to the right size and sewn into potting bags.

With great determination, Havana’s nurseries and *Mi Programa Verde* are moving speedily ahead. Saplings and small trees are being sold at more locations, including all

seed houses and most *organopónicos*. In this fashion, Havana's gardens have not allowed the crisis to deter them, but have confronted the crisis with creativity and dedication, overcoming many obstacles to build a flourishing urban garden program in the midst of the Special Period.

## X. Obstacles, Challenges, and Solutions

Many challenges exist in maintaining and expanding urban food production. Increased resources are being put into this system both through public and private channels. The efforts of bilateral cooperation has helped to resolve some and Cuban creativity and determination have begun to solve others.

The main problems facing Havana's gardens and farms today are:

- water shortage
- lack of arable soils
- pest and disease control
- lack of seed diversity
- labor shortage and lack of youth involvement

Solutions to these problems are being addressed with imagination, creativity, and a strong commitment to sustainable methods. Dependence is shifting toward human resources: solving problems through education, training, and focusing on prevention. Prevention strategies include increasing crop diversity, planting in-season, efficient use of water, and soil building practices which help prevent pest and disease problems. Together with growers and neighborhood governments Havana's extension workers are engaged in finding solutions to these problems.

### Water Shortage

This is the principle obstacle for the gardens in Havana. Havana's most accessible water source is the national aqueduct that brings potable water into the homes and buildings of the capital. This water cannot satisfy all household needs in Havana. Many of the water pipes in the city are very old, and Havana, like Washington, DC, loses up to half of its water supply to leaks (Coyula, 1996). In some neighborhoods, municipal water is only "turned on" for several hours each day, and city residents must collect it in holding tanks for use until the following day when the water is turned on again. For these reasons, there is a need to find irrigation water sources that will not reduce the drinking water supply. Havana's local government has recently restricted use of urban water supply in agriculture to conserve water for drinking, washing, and sanitation. Havana's local government has put some restrictions on the use of municipal water for irrigation, and is working with the Ministry of Agriculture to help growers find alternative sources.

The Ministry of Agriculture has also restricted some use of municipal water, and is trying to help gardeners access alternative sources. There has been flexibility in this aspect. Some small gardens have been given permission to use municipal water, and even to install water tanks. These permissions are seen as short-term provisional solutions. Many wells are being dug, deploying both hand and electric pumps. With a fairly high water table, subterranean sources appear to be the best long-term solution.

At the same time, much work is being done to find cultural methods that would maximize water use efficiency through management. Prevention of water loss through evaporation can be largely attained through increasing soil fertility and shaded areas. Planting broad leaf crops very close together allows plant leaves to shade the beds, dramatically slowing evaporation. Crops that do not require much water are planted whenever possible. Microjet drip irrigation systems are becoming more common, and Cuba has opened a modern factory for the production of tubing and pieces needed for these systems.

## Lack of Arable Soils

In highly urbanized areas there is often inadequate open soil space for agriculture and much of the available urban soil is degraded or polluted. Some empty lots are full of gravel, broken glass, and pieces of metal. Some have extremely hardened soils that are almost impossible to break (Sorhegui, 1995). In some areas there is literally no top soil and in order to garden it must be obtained elsewhere and shipped in. In addition, tropical soils are typically low in organic matter, and most Cuban soils contain less than one percent.

Poor soil is best treated by increasing the amount of organic matter. Good crop rotation and use of green manures prevent soil depletion and can improve soil fertility. Compost increases fertility and organic matter levels in the soil, increasing water retention and improving crop nutrition. Compost-making is very easy for urban gardeners, and requires no resources other than crop residues. In some areas with little or no soil, gardeners plant into 100 percent compost. The use of vermiculture is spreading as well. In areas with workable soil, composting and acquisition of organic soil amendments are the current solution. Cover crops and green manure are still rarely used, but offer great potential. In areas where no arable soil exists, organic matter and top soil must be brought in. This is expensive due to shortages in the transportation sector, but the long-run benefits compensates for the cost.

## Pests and Disease Control

Some of Havana's gardens have significant problems with pests and disease. The severity of attacks vary according to the crop and insect species involved, since certain insects prefer particular plants. Whiteflies, one of the most damaging pests in Cuba, attack high shade crops like tomatoes and peppers. Aphids prefer celery, lettuce, beans, and cabbage. Diseases, nematodes, and weeds also affect horticultural crops. Incidence and damage

levels vary, depending on crop species, environmental conditions, and management (Altieri, et al., *in press*).

Pest and disease control is largely managed by preventative cultural practices such as biodiversity, soil care, crop rotation, and the modification of planting dates. Additionally, INISAV promotes these prevention measures:

1. Laboratory pathogen analysis of all soil, compost, or other organic matter that will be brought into the city as a growing medium.
2. Tree planting, both flowering and fruit bearing, to increase biological diversity and provide permanent hosts for beneficial insects and other “bioregulators.”
3. Surrounding the borders of each garden with ornamental flowers, which can provide a physical barrier to harmful pests, and provide a home to beneficials.

Increasing use is being made of plant-based insecticides and repellents as well. The Cuban Council of Churches published an educational pamphlet with these recipes made from commonly available ingredients:

**TABLE VI PLANT BASED PEST CONTROL**

<u>Insecticidal Plant</u>	<u>Useful Plant Part</u>	<u>Preparation Method</u>	<u>Use Against</u>
Garlic	Cloves and seeds	Crush in water	Larvae
Yellow Mamey	Seeds	Dry, grind, dissolve in water	All kinds of insects
Calendula	Flowers	Steep in water for 24 hrs	Larvae and insects
Onion	Bulbs and leaves	Crush in water	Molds, fungus
Neem tree	Fruit and leaves Seeds	Dry, grind and dissolve in water	All kinds of insects

Source: Consejo de Iglesias de Cuba, 1997b

Although prevention and home remedies are key, there are treatment methods as well. When serious pest outbreaks do happen, they are increasingly combated with biological control products. Havana’s extensionists, research institutes, and seed houses are doing an excellent job of increasing popular knowledge of, and confidence in, biological controls. Increasingly available and affordable, their use is becoming more generalized.

## Lack of Seed Diversity

Due to the centuries of colonialism, the loss of the traditional small farm sector, and the promotion of the modernist agricultural model, there is a serious lack of genetic seed and crop diversity in Cuba. There is only one kind of melon available in Cuba, and only one kind of squash. There is also a near absence of fruits perfectly adapted to Cuban conditions such as anon, chirimoya, guanabana, and passion fruit.

This lack of diversity has been addressed by the popular gardens, which are bringing back many rare crops and introducing new crops cultivated in the recent past. The additional species stabilize and strengthen the ecosystem. Urban gardeners are growing a wider variety of fruits and vegetables than large-scale growers, and conserving unique cultivars that might have otherwise died out.

This has largely been possible due to popular seed saving. Seed saving is not difficult with some education and basic training, and can help each gardener, neighborhood, and community become more independent. Seed saving allows the cultivation of locally adapted crops and varieties that are suited to the conditions of each particular site. The Urban Agriculture Department has offered a series of workshops for urban gardeners and extensionists on seed saving. Together with the Green Team, the Department offered a three-week seed saving workshop for over 20 urban gardeners in 1996. This course was taught by Jude and Michel Fanton, the founders of the Australian Seed Savers Network. Many of the participants now regularly save and exchange their seeds. There are some efforts, resulting from this course, to start a more formal seed saver network.

## Labor Shortage and Lack of Youth Involvement

Cuba has chronic agricultural labor shortages. Over 80 percent of the population lives in the cities (Diaz, 1997; Coyula, 1997). There is also a cultural urban bias that leads people to reject agricultural work and to associate it with poverty, underdevelopment and slavery. Policy makers are especially concerned about these attitudes among the youth, and aim to get more young people involved in agriculture.

A multi-faceted approach is needed. The Ministry of Agriculture has been taking one of the most important steps, giving away land. Socio-cultural work also needs to be done to reverse some of the negative prejudices against agriculture. A more enjoyable experience with agriculture combining agricultural education and experimentation might be a way to address this.

Appreciation of plants and preservation of agricultural and educational programs, and also through two weekly television shows, *Etorno* and *De Sol a Sol*. The latter is a regular Sunday night show followed by a musical program highlighting *Decimas*, traditional *Son*, and other rural music. Such creative measures are needed to bring young people back into agriculture. The aging of growers is a worldwide problem, and urban food production is an effective tool in this change.

## Theft

Theft was a significant problem in the first few years of the gardens, but has decreased markedly as food scarcity eases. It still occurs, but mostly in large, unattended areas that are in dense urban areas with little other production nearby. Many community gardens and *organoponicos* have organized their schedules such that someone is present most of the time, including at night. Minor losses still occur but are generally ignored and accepted.

Many gardeners believe that theft will continue to decrease as the food scarcity eases and gardens are increasingly appreciated as important to the community. Close neighborhood relations can also create consciousness of gardens as belonging to the community, further reducing or preventing theft.

One gardener told a story of theft prevention. He said that he had never built a fence, and refused to do so, "I taught the children on my block about the garden and the different crops. I paid them a little for helping me, and would send home food with them for their families. These are the kind of relations that prevent theft, and that is better than a fence."

## XI. How Urban Agriculture has Improved the Cuban Diet

Havana's urban food gardens have been central to relieving the food crisis. They have improved both the quantity and quality of food available in the city. Some neighborhoods now produce up to 30 percent of the food supply. (Sanchez, 1997). By producing food in the city, urban gardens have lifted the burden previously weighing on rural areas to feed the entire country. City gardens have reduced dependency on fuel-intensive transportation and refrigeration systems. Neighborhood production has greatly increased local self-sufficiency by growing the food right where it is eaten. This increases community food security enormously, making food more affordable and available. People who work long days or face a long commute have especially difficult finding time to buy food, and it is difficult for the average worker to find affordable food outside of the ration system. The presence of a neighborhood garden where local people can stop on their way home from work to purchase produce is an important community resource.

Neighborhood gardens are also committed to donating food to local schools and day care centers. Eighty percent of urban gardeners donate in this way (Moskow, 1995). This has helped many schools provide all school children with an adequate daily lunch.

Although urban production has not provided for all of Havana's food needs, it has greatly increased food intake quality. There is a direct link between eating a variety of foods and staying healthy (FAO, 1995), and the gardens have increased both the quality and variety of foods consumed in Havana.



Nutritional well-being requires access to enough nutritious and safe food to meet the dietary needs of the household throughout the year: Attaining better food supplies and nutritional well-being is more than just producing enough food locally. It also requires sufficient resources (such as land and labor), tools skills, and knowledge. Roads and transport to market are necessary so that goods such as food and other essentials can be traded and so that household members can find employment as well as having access to other commercial and government services. (FAO, 1995)

Prior to the Special Period, foods such as fresh vegetables, corn, and *viandas* were considered low prestige and were not often consumed by those who could afford meat. Even during the times of comparative wealth and abundance, the typical diet did not include as many fresh vegetables as it does today. This fresh produce has been an important addition to the traditional diet of rice, beans, and meat. Today, vegetarian food stuffs are being recognized for their nutritional value—necessary for physical growth and good health. The carbohydrates, proteins, and micronutrients contained in fresh vegetables are needed by the body. With an increased availability, Havana residents are eating more vegetables now than before the Special Period.

Urban gardens have also provided condiments and culinary herbs, which indirectly improve nutrition by making food more edible (i.e. people eat more beans if they are well seasoned). The gardens have also been responsible for the massive increase in medicinal plant availability. Many urban gardens cultivate herbs that are used to treat health problems. Many neighborhood doctors now rely heavily on traditional plant medicines to treat their patients.

## XII. Conclusions

Havana's urban gardens have been central to mitigating the food crisis. Many analysts erroneously believed that with the easing of the food crisis, urban gardens in Havana would begin to fade away, but just the opposite has occurred. Havana's farms and gardens have slowly and steadily increased in size and number, but most importantly in quality, as urban gardeners learn and use increasingly effective gardening techniques. Some neighborhoods now produce much of their own food, and have increased the freshness, quality, and variety of the urban diet. Urban gardens are also helping to bring back traditional crops and uncommon varieties that had been absent from Havana for many years

The success of Havana's gardens hinges on the supportive role of the Cuban state, its political commitment to urban food production, and its direct involvement in resolving concrete problems. Havana's gardens are an impressive testament to what this

commitment can accomplish, in spite of scarce resources, when a city is dedicated to building an urban agriculture program. The key elements in Havana's success have been:

- political will
- real access to public lands
- coordination of, not competition for, local resources
- concrete programs to support small producers
- encouraging producers' sense of ownership
- establishing a strong extension program
- guaranteeing affordable inputs
- strong local demand for fresh produce

Although the gardens face limitations and challenges, the gardeners and agriculture professionals have identified the main areas that need to be improved and have developed comprehensive strategies to address them using organic and agroecological techniques. The commitment to organic strategies has been and is still on the rise. This is due to the active work of Havana's extension workers, the Cuban Organic Farming Association (CAAO), the research being done in Cuba's agricultural research stations, and other pioneers in the field. Most importantly the results have spoken and convinced both producers and policy makers that urban organic farming is a viable way to increase community food security.

Other cities in the world have much to learn from the Cuban experience with urban agriculture. Havana has proven that a large city with a history of dependence on food imports can dramatically increase community food security and improve the quality and variety of available produce. All this can be achieved while enjoying the related environmental benefits of community greening and beautification. With continued commitment to food security and effective access to public resources and community participation, these gardens will belong to Havana's cityscape for years to come.

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