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**CUBA'S ALTERNATIVE/INWARD-LOOKING DEVELOPMENT
POLICIES. CHANGING PRODUCTION PATTERNS AND LAND
DECENTRALISATION: TOWARDS SUSTAINABLE SMALL
FARMING (1990-2008)**

Elisa Botella-Rodríguez *

* PhD candidate, Institute for the Study of the Americas. University of London.
Email: Elisa.Rodriguez@sas.ac.uk

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Abstract: While most Latin American countries followed outward-looking policies of agrarian development, since the 1990s Cuba shifted towards food self-provisioning, internal liberalisation and sustainable small farming to face the harsh crisis that followed the Socialist demise of the late 1980s. Although it was an indispensable response to the worst crisis in Cuban history, Cuba is today one of the few countries experimenting with alternative development on a national scale. By considering the current context of globalisation where free trade agreements and progressive agrarian liberalisation have created asymmetrical trade relations, increasing import dependency and vulnerability for small farmers in less developed countries, this paper aims at answering the following questions: (1) What were the policies implemented under inward-looking agrarian development in Cuba (1990-2008)? (2) How did the policies transform Cuba's agrarian production patterns and land structures? (3) How have the inward-looking policies generated new spaces for small farmers in Cuba?

Resumen: Mientras la mayoría de los países latinoamericanos siguieron políticas de liberalización agraria, desde principios de los 90 Cuba se orientó hacia la sustitución de importaciones, la liberalización interna y la agricultura familiar sostenible para hacer frente a la crisis tras la caída del bloque socialista. Aunque fue una respuesta necesaria para afrontar la peor crisis de su historia, Cuba es hoy uno de los pocos países del mundo que experimenta con el desarrollo alternativo en todo el ámbito nacional. Si consideramos el actual contexto de la globalización donde los tratados de libre comercio y la progresiva liberalización agraria han creado unas relaciones comerciales asimétricas, una dependencia cada vez mayor de las importaciones y una vulnerabilidad creciente de los pequeños productores en los países menos desarrollados, este artículo aborda las siguientes cuestiones: (1) ¿Cuáles han sido las políticas implementadas bajo el modelo de desarrollo 'mirando hacia dentro' en Cuba (1990-2008)? (2) ¿Cómo estas políticas han transformado los patrones de producción y la estructura de la tierra en la isla? (3) ¿Ha generado el nuevo modelo agrario espacios para los pequeños productores?

Keywords: Cuba, small farming, sustainability, inward-looking development policies.

JEL: N56, P28, Q18, Q27

CUBA'S ALTERNATIVE/INWARD-LOOKING DEVELOPMENT POLICIES. CHANGING PRODUCTION PATTERNS AND LAND DECENTRALISATION: TOWARDS SUSTAINABLE SMALL FARMING (1990-2008)

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1. INTRODUCTION.

While most Latin American countries followed outward-looking policies of agrarian development, since the 1990s Cuba shifted towards food self-provisioning, input substitution, internal liberalisation and sustainable small farming to face the harsh crisis that followed the Socialist demise of the late 1980s.

Although it was an indispensable response to the worst crisis in Cuban history, Cuba has become one of the few countries, if not the only one, that is currently experimenting with this pattern of alternative development on a national scale.¹ By considering the current context of globalisation where free trade agreements and progressive agrarian liberalisation have created asymmetrical trade relations, increasing import dependency (on food, inputs, expensive agrarian technologies and R&D) and vulnerability for small farmers in less developed countries, this paper on Cuba's agrarian policies aims at answering the following questions:

¹ This article considers inward-looking development as the set of measures implemented in Cuba throughout the 1990-2008 period strongly based on domestic opportunities: family farming and cooperative sector enhancement, local inputs and sustainable technologies and food import substitution. The great majority of studies on Cuba's agriculture called it the Alternative Paradigm (based on Funes, 2002; Funes-Monzote, 2008a; Rosset and Benjamin, 1994). This research will use both terms, alternative and inward-looking, to describe the set of agrarian policies implemented in Cuba during the period 1990-2008.

1. What were the policies implemented under inward-looking agrarian development in Cuba (1990-2008)?

2. How did the policies transform agrarian production patterns and land structures in Cuba?

3. How have the inward-looking policies generated new spaces for small farmers in Cuba?

The paper is organised in five sections, beginning with an historical description of the patterns of agrarian dependent development applied in Cuba prior to 1990. Then, section three explores Cuban agrarian responses and policies to overcome the depression after the Socialist Demise of 1989. Section four concentrates on the changes in agriculture that resulted from the implementation of the new model. In this context, the article explores the changes in production patterns, land structures and new spaces for small farming. The final section concludes with some general ideas on Cuba's alternative agrarian development and sets the basis to understand the spaces for small farmers generated throughout the island.

2. THE CUBAN AGRARIAN MODEL PRIOR TO 1990.

After the 1959 revolution and before the collapse of trading relations with the Soviet bloc in 1990, economic development in Cuba was primarily shaped by two external forces. One was the U.S. trade embargo and its associated efforts to isolate the island economically and politically (Álvarez, 2004). The other was Cuba's inclusion in The Council of Mutual Economic Assistance (CMEA) with highly positive terms of trade.² Both of them conditioned the island to an export-led growth extremely reliant on sugar mono-crop. This strategy later affected the ultimate possibilities of Cuba after the Socialist demise in the late 1980s (Funes et al., 2002; Rosset & Benjamin, 1994).

² The CMEA was an international trade coalition formed by Socialist countries.

2.1. The Agrarian Model after the Revolutionary Triumph.

Cuba's rural economy in the late 1950s was characterised by large export plantations and a highly urbanised population. On the eve of the 1959 Revolution, Cuba was producing approximately 6 million tons of sugar annually and sugarcane was planted on over half the total harvested area. Beef, tobacco and pineapple were other important export crops (Rosset & Benjamin, 1994). Landholdings were extremely concentrated in US companies which controlled 25% of the Cuban land with significant investments in sugar, cattle, and tobacco. Approximately half of Cuban sugar exports went to the U.S., providing over one-third of U.S. sugar imports (Alvarez, 2004; Kost, 1998).

By 1959 the largest 9% of farmers owned 62% of the land and the *latifundio* held over 4 million hectares of idle lands; 200,000 Cuban families were landless and 600,000 were unemployed (Nova, 2006a; Rosset & Benjamin, 1994). Rural dwellings rarely had electricity, sound health conditions or fixed running water (Álvarez, 2004; Nova, 2006a).

After the Revolutionary triumph of 1959, the government aimed to radically transform rural Cuba by giving the land to the tillers through two consecutive agrarian reforms. The reforms were initially coupled with the Cuban Revolution's commitment to transformation, agrarian diversification and industrialisation to lessen the island's dependency on sugar exports (Funes-Monzote, 2006a, 2008a; Gaceta Oficial, 3 June 1959).³ However, new commercial relations with the Soviet bloc ended up deepening Cuba's reliance on sugar exports.

³ The first Agrarian Reform Law, enacted in May 1959, proscribed *latifundia* (defined as estates larger than 402 hectares), mostly distributed some land and geared the development of cooperatives on larger estates. It did not, however, break up huge sugarcane plantations and cattle ranches, with large amounts of US expropriated land remaining in state hands (Funes et al., 2002; Rosset & Benjamin, 1994). The second Agrarian Reform Law was enacted in October, 1963. It expropriated the land of the majority of farmers that owned more than 67 hectares, bringing 70% of the lands under government control (Alvarez, 2004; Gaceta Oficial, 3 June 1959).

2.2. Deepening Dependent Development: the failure of Green Revolution practices.

Cuba's incorporation in the CMEA in 1972 gave the island highly favourable commercial conditions that ended up deepening its economic reliance on sugarcane. The state geared large agrarian plantations, following Green Revolution principles, to intensively produce and sell (throughout the CMEA) sugar at highly subsidised prices (51 cents per pound in 1986 compared with a world market price of 6 cents). The island further enjoyed additional credits and other commercial subsidies from CMEA countries (Alvarez, 2004; Kost, 1998).

As a result, by the late 1980s Cuba had become extremely dependent on sugar cane production for its commercial partners. The USSR and many of the former socialist countries of Eastern Europe were Cuba's main commercial suppliers for agrochemicals, animal feedstock and the large amounts of petroleum, chemicals and fertilizers demanded by its 'giant-style of agriculture.' Likewise, large amounts of food, specifically basic grains such as cereals, beans and rice, were imported from Socialist countries to sustain the Cubans' diet (see Table 1 and 2) (Pastor 1992; Rosset & Benjamin, 1994).

Table 1
Import coefficients for agricultural products in Cuba, 1989⁴

CATEGORY	IMPORT COEFFICIENT (%)
Foodstuffs	
Cereals	100
Beans	90
Rice	49
Raw Materials	
Fertilizer	94
Herbicide	98
Animal feedstock	97

Source: Pastor, 1992.

⁴ The import coefficient is represented as the percentage value added contributed by imported inputs used in the island's production.

Table 2
Structure of Cuban foreign trade in 1988

COUNTRIES	EXPORTS (%)	IMPORTS (%)
USSR	66.7	70.8
Romania, Czechoslovakia, Bulgaria, Poland, East Germany & Hungary.	15.0	13.8
Rest of the world	19.3	15.4
TOTAL	100.00	100.00

Source: MINAGRI, 1988.

Although Cuba's economic and social performance and social indicators during the 1960s and 1970s were impressive (see Table 3), the industrial model of agrarian production began to show its failures in the early 1980s (Tables 4 and 5) (Mesa-Lago, 2009a). By the mid 1980s a great number of commodities and an important proportion of arable land intensively farmed for export-led production began to show signs of environmental degradation and inefficiency (Nova, 2006a, 2008b; Suarez, 2006). The annual growth rate of agrarian production began to decline in 1986 while the sugar monoculture and its contribution to agrarian GDP progressively decreased during the 1980-88 period (see Tables 4 and 5) (Fernández-Domínguez, 2005; González et al., 2000). Beginning in 1986, Cuba's agricultural and livestock activities generally declined and even stagnated. Despite large investments in agriculture (around 30% of total investments in the country during the 1980s), the great availability of tractors and the high use of nutrients per hectare, ongoing increases in productive expenses and labour force were invariably the result through the 1980s (Nova, 2006a).

Table 3
Social Indicators in Cuba, 1957-1989

INDICATORS	1957-58	1989
Open unemployment (%)	16.4	7.9
Real wages (pesos)	n.d.	188
EAP covered with pension (%)	62.6	94,1
Infant mortality (1)	33.4	11.1
Maternal mortality (2)	125.3	29.2
Housing/1.000 inhab.	6.3	6.1

(1) Per 1,000 live births. (2) Per 100,000 births.

Sources: ONE (2001 to 2008); wages from Vidal (2009), pension figures from Mesa-Lago (2008) and housing figures from Mesa-Lago based on population and housing built, as per CCE (1991), ONE (2001 to 2008).

Table 4
Annual Growth rate of net agrarian production (in percentage terms)

1960-75	1976-85	1986-89
2.3	3.5	1.3

Source: González et al., 2000.

Table 5
Share of sugar and sugar derivatives in value of total Cuban exports of goods

YEAR	PERCENTAGE OF TOTAL VALUE OF EXPORTS
1980	84
1985	75
1988	75

Source: MINAGRI; Pastor, 1992.

In the end, capital-intensive patterns of agrarian development adopted by the Cuban government produced extensive soil degradation by imposing 'one-size-fits-all' production guidelines. These patterns ultimately disregarded the unique physical, hydrological, and environmental conditions of Cuba's soils and ignored traditional peasant knowledge (González, 2004). Among the most destructive practices were large-scale irrigation in the absence of proper drainage; widespread use of heavy equipment in agriculture, resulting in soil compaction; and extreme dependency on chemical inputs contributed to soil acidification and contamination of lakes, rivers, and drinking water supplies. Finally, erosion affected over 64% of Cuban farming lands, poor drainage affected 41%, soil compaction 21%, acidification 17%, and finally salinization 12% (Díaz-Briquets and Pérez López, 2000; Sáez, 1997).

3. THE DRAMATIC SHIFT: TOWARDS AN ALTERNATIVE MODEL.

"Today Cuba faces the most difficult challenge in its history...in addition to the worsening blockade exercised for more than 30 years by the United States, it now has to resist the effects of a second blockade provoked by changes in the international order..." (Castro, 1992).

The critical moment occurred in 1989-90 when, half a world away from Cuba, Communism fell. Once the commercial relations with the Soviet Bloc

halted, the US imposed a trade embargo and Cuba confronted an economic catastrophe. Its agrarian GDP collapsed (with a reduction of nearly 50%), Cuban imports dropped by 75% between 1989 and 1994 and a food crisis emerged in 1993 (Alvarez, 2004; Mesa-Lago, 2005). Its consequences directly affected the Cuban economy and its conventional agrarian model, forcing a necessary shift from external dependency to inward-looking development and sustainable family farming.

To overcome the depression of the early 1990s the Cuban government declared the 'Special Period in Peacetime' by building up a set of inward-looking policies that put the country on a 'wartime economy style austerity program.' The worst moment of the crisis occurred during the 1993 food crisis, which pushed the whole island to search for answers (Fernández-Domínguez, 2006; Nova, 2006a).

Throughout the 1990s the state implemented a set of economic measures that involved a dramatic shift from outward-looking (particularly dependent on Soviet bloc trade relations) towards domestic opportunities to open new spaces and reactivate Cuba's economy (Castro, 1992; Cruz, 2008; Fernández-Domínguez, 2005). Demonopolisation, deregulation and decentralisation policies were applied to improve the country's desperate foreign exchange position, diversify the economy (especially agriculture) and attract investment into different economic sectors (Alvarez, 2004; Cruz, 2008). Deregulation, on the one hand, implied a new domestic economic policy based on liberalising foreign investment, the rules governing the possession of dollars by Cuban citizens, and the granting of licenses for private work or self-employment in various activities (Fernández-Domínguez, 2005, 2006; Mesa-Lago, 2005). Decentralisation, on the other hand, enhanced new forms of mixed companies (joint-ventures) in different economic sectors (specifically in the tourist sector; this was not the case in agriculture), the restructuring of management institutions and the banking system, and changes in territorial planning. As will be explained in the following sections, decentralisation particularly affected natural resources (principally land) and family farming throughout the island (Alvarez, 2004).

3.1. The pillars of inward-looking development in agriculture (1990-2004).

During the Special Period, Cuba's agriculture faced a difficult dilemma: how to maintain the social goals of the Revolution while feeding the Cuban population without strategic imports from the Socialist block (Betancourt, 2008)

By considering the real possibilities of an economy extremely reliant on imports, the Cuban government extensively promoted measures to shift from dependent agrarian patterns to sustainable family farming and thereby raise domestic production to feed the population. By and large, four general measures guided the agrarian agenda during the years of the crisis: food import substitution, substitution of local alternatives (based on family farming) for costly external technology, decentralisation of production and agrarian types of holding and internal market liberalisation.

3.1.1. Food import substitution.

Food import substitution was aimed at changing production and consumption patterns to cover Cubans' food requirements without strategic imports from the Soviet Bloc. In 1992, encouraged by the commitments that the International Nutrition Conference made in Rome, the Cuban government introduced the National Programme of Action for Nutrition (PNAN). The program aimed to buffer the consequences of the crisis by prompting civil participation in agriculture for their own nutritional advantage (Companioni et al., 2002; Enríquez, 2000; PNAN, 1994).

In a parallel effort, to deal with food shortages in rural and urban areas, petroleum and difficulties in its transportation, the Cuban government promoted the urban agriculture program through the 1990s. The program started in Havana, where every available space (balconies, terraces, gardens and small peri-urban plots) was used to grow fruits, roots or vegetables (Companioni et al., 2002; Granma, 30 January 2001). Although at the beginning, urban cultivation was a matter of subsistence production, by the mid-1990s this program significantly contributed to the country's overall food security (see Table 6) (GNAU, 2004). Urban gardens shortly became major sources of fresh vegetables

for urban and suburban inhabitants, supplying approximately 60% of all of the vegetables consumed in Cuba in the late 1990s (Sinclair & Thompson, 2001). In particular, with the passage of time Havana become food self-sufficient in perishable food thanks to the urban agriculture program (Funes, 2008).

Table 6
Percentage of urban agriculture from total production levels in 2000.
Specific crops

Products	Percentage
Rice	50.0
Vegetables	70.0
Non-citrus fruits	39.0
Roots	13.0
Eggs	6.0

Source: ACTAF, urban agriculture magazine, 2001.

3.1.2. Alternative technologies based on family farming and traditional peasant knowledge.

Cuba made substantial progress during the 1990s towards novel alternatives, based on small farming, biological pest management, control of plant diseases and weeds, soil management, labour mobilisation and participatory methods for generating new input substitution technology (González et al., 2000; Rosset and Benjamin, 1994). Different research confirmed the effectiveness of applying new green fertilizers. In several cases they were able to substitute up to 80% of nitrogen fertilisation in different crops and to improve the physical characteristics of the soil (Treto et al., 2002; Funes et al., 2002).

These novel technologies, had been introduced some years before the Special period. By the early 1970s, Cuban scientists and research institutions began to focus on the economic implications of substituting local raw materials for imported technologies (Lage, 1992). Conscious of the real possibilities of the dominant agrarian model during the 1980s, young researchers from the Ministry of Agriculture and various universities began to seek alternative technologies

and advanced research and development (R&D) based on family farming techniques (Funes-Monzote, 2006a).⁵ Within this process, increasing partnerships and the generation and recovery of peasant knowledge were pivotal components in regaining traditional Cuban family farming methods, and peasants were encouraged to participate actively in the generation and dissemination of new technologies and domestic food production (Ríos-Labrada, 2006a). With this goal in mind, the Ministry of Agriculture, the National Association of Small Farmers (ANAP) and the Cuban Association of Agrarian and Forestry Technicians (ACTAF) jointly sponsored farmer-to-farmer and farmer/extensionist/scientist workshops throughout the countryside, beginning in the early 1990s. These workshops enable farmers and technicians from different regions to exchange and confront ideas and alternatives based on local technology and family farming (ACTAF, 2008a, 2008b; Funes, 2008; Ríos-Labrada, 2008; Rosset & Benjamin, 1994).

3.1.3. Decentralisation of production and land management.

During the Special Period, the Cuban government responded to food scarcity by reorganising agricultural production to promote greater productivity and therefore substitute food imports. This restructuring process was based on two distinct elements.

One was the conversion of large state farms into smaller cooperatives. On 20 September, 1993, the Council of State enacted Law-Decree No. 142 by

⁵ In the midst of the Special period these young researchers created the Cuban Association of Organic Agriculture (ACAO) to implement sustainable family farming and livestock alternatives. In the late 1990s, the state institutionalised ACAO's and sustainable small farming and small-scale initiatives became official policy managed by ACTAF (Funes, 2006; Funes-Monzote, 2006a, 2006b). In 1999 ACAO received The Right Livelihood Award. Then the Government recognised the potentialities and achievements of Cuba's sustainable family agriculture by institutionalising ACAO within ACTAF (ACTAF, 2008a; Funes-Monzote, 2006b).

establishing Basic Units of Cooperative Production (UBPC) on previous state farms. This legislation was aimed at eliminating the state monopoly on 75% of Cuba's agricultural lands. Although the land remained in state hands, it was given in usufruct to the tillers in the newly created cooperatives for an indefinite period of time (Alvarez, 2004; Nova, 2006a).

The other was the distribution of land in usufruct to thousands of small producers, state workers and pensioners (González, 2004; Sinclair & Thompson, 2001). *Decree Law No. 142* (1988) accordingly authorised the distribution in usufruct of small, dispersed parcels of land that could not be incorporated into UBPCs and also idle lands formerly used to farm tobacco (Deere, 1997). In the eastern province of Ciego de Avila, more than 268 hectares of idle land were distributed to family farmers interested in growing tobacco in free usufruct. Along with the right to self-consumption activities, each family obtained an average of 4.5 hectares to cultivate with non-traditional export crops like cacao, coffee, flowers or tropical fruits; most of them produced in a sustainable way (González et al., 2000; Nova, 2003, 2006b; Villegas, 1999).

3.1.4. Internal market liberalisation.

During the 1990s the state progressively liberalised access to inputs, technology, markets and rural funding. The most important measure adopted on this front was the reopening of the free market of agricultural activities.⁶ On 19 September, 1994 the Council of Ministers enacted *Decree No. 191* which authorised the establishment of free agricultural markets where farmers and cooperatives could sell their surplus production, after fulfilling their commitments to the state, at prices dictated by supply and demand (Álvarez, 2004; Fernández-Domínguez, 2005, 2006). Furthermore, the official law on prices in 1994 introduced more flexible commercialisation and price systems, different methods of hard currency attraction to boost non-traditional crops and a slightly relaxed

⁶ The free market for agricultural products had its origin in the 1980s. Its reopening tried to tackle the increasing presence of informal activities and markets that represented almost 80% of the total economic activities in the 1990s (Nova, 2006a).

and redesigned Acopio price system to promote productive incentives for farmers (Fernández-Domínguez, 2006; González et al., 2000; Nova, 2006).⁷ Financial mechanisms available for agriculture were also decentralised to give greater autonomy to small farmers while reducing state involvement in subsidies and other sources of funding (Álvarez, 2004; González et al., 2000; Nova, 2006b).

3.2. Further decentralisation and liberalisation to boost domestic food production (2004-2008).

'Estamos ante el imperativo de hacer producir más la tierra... para lograr ese objetivo habrá que introducir los cambios estructurales y de concepto que resulten necesarios, para hacer producir más la tierra, a fin de aumentar la disponibilidad de alimentos y reducir las importaciones.' (Raúl Castro, 2008)

The agricultural reforms of the early 1990s, however, went only half-way in Cuba (Nova, 2006a, 2008b). A great number of scholars and civil servants I interviewed during my fieldwork argued that Cuba's inward-looking development still needs to further liberalise commercialisation and prices and decentralise production and landholding structures to enhance productivity growth. However, they also point out that Cuba is undertaking a second era of agricultural transformation to respond to both internal constraints (specifically the three hurricanes in 2005 and 2008) and external changing conditions, including the world food crisis in 2007-2008 (Betancourt, 2008; Cruz, 2008; Nova, 2008a).

Internal liberalisation is actually being broadened by including payments in hard currency (in an incipient phase since 2008) and improvement of logistic support. Initial steps towards the creation of an agricultural input market and investment attraction towards the agricultural sector have been also taken (Betancourt, 2008; Fernández-Domínguez, 2008). Specifically, through the period 2004-2008 the state implemented different incentives for consumers and producers. State-run media declared that these incentives were taken in 2007 to

⁷ Acopio is the state company that controls 90% of agricultural commercialisation, distribution and food supply in Cuba.

increase the price of milk that the government buys from peasants and cooperatives. The incentives raised milk production (which increased 17% in 2007, though it had also risen 18% in 2006) and reduced imports of powdered milk (Fornés, 2008). Also, in 2005-2006 a new estimation of *Acopio* prices based on ANAP's previsions on production costs and prices was introduced (Acosta, 2008; Betancourt, 2008).

Finally, the so-called new *Decree-law 259* enacted in 2008 to distribute idle lands in usufruct contracts for 10 years represents an additional impulse to landholding decentralisation (Granma, 18 July 2008). In 2008 The President of ANAP, Orlando Lugo, announced two parallel measures within the new decree. First, idle, state-owned land would be redistributed in usufruct to 'anyone who wants to produce' (especially individuals, cooperatives, small farmers and even some UBPCs) making specific mention of tobacco and coffee. Yet 51% of the land is idle or insufficiently exploited and a great amount of this land is covered with *marabú* bushes. Though it will require a lot of work this measure could raise farm production. Second, Lugo also declared the creation of agricultural delegations in all municipalities to 'decentralise decision-making, with the ability to take responsibility and use appropriate marketing techniques'. This will enable UBPC and small farmers to directly commercialise their products in nearby communities and reduce *Acopio* control over production and commercialisation (Acosta, 2008; Betancourt, 2008; Mesa-Lago, 2008).

4. KEY TRANSFORMATIONS IN CUBA'S AGRICULTURE: TOWARDS SUSTAINABLE FAMILY FARMING.

4.1. Changes in production patterns: from conventional to input substitution/alternative small farming.

The certain amount of research conducted in Cuba during the 1980s was aimed in the beginning at reducing production costs in industrial agriculture through the substitution of biological inputs for agro-chemicals. Yet preliminary research and traditional family farming techniques in Cuba represented the basis for scaling up the application of ecological practices when no other

alternatives were available. This eventually occurred during the 'Special Period' (Funes-Monzote, 2008a; Rosset and Benjamin, 1994).⁸

4.1.1. Biological pest control and soil management.

One of the corner stones of the Alternative paradigm was the decreasing use of chemicals for management of plant diseases, insect pests, and weeds. By 1982, Cuba, aware of the long term consequences of monoculture, began to shift towards an integrated pest management (IPM) paradigm, the integrated use of a variety of alternative pest, disease and weed control tactics, in order to reduce reliance on agrochemicals (Funes-Monzote, 2006a, 2008a; Rosset & Benjamin, 1994).

In 1985, these efforts were transformed into a major campaign and biological control began to replace pesticides as the conceptual basis for pest management (Funes et al., 2002; Rego et al., 1986). Although these efforts enabled a reduction in pesticides application, in 1991 Cuba still imported \$80 million in pesticides annually. During the Special Period, these imports dropped by \$30 million. By the end of 1991, it was estimated that 56% of Cuban crop land was treated with biological controls, representing an annual savings, after costs, of US \$15.6 million (MINAGRI, 1991). In fact, more than twenty years of research in biological control and other biological strategies had cleverly prepared Cuba for one of the most ambitious enterprises in integrated pest management (IPM) worldwide (Funes et al., 2002; Rosset & Benjamin, 1994).

⁸ There are three stages in the process of converting from conventional to sustainable agro-ecosystems. At level 1, farmers 'increase the efficiency of conventional practices'. At level 2 they 'substitute conventional inputs and practices with alternative practices.' Input-substituted systems at the second level, though demonstrably more sustainable than conventional systems, may nevertheless have many of the same problems that occur in conventional systems (e.g. the use of monoculture). These problems will persist until changes in agro-ecosystem design (i.e. on the basis of a new set of ecological processes) take place at level 3 (Gliessman, 2001, 2006).

Progressively, IPM use was extended, covering over one million hectares in the non-sugar sector by 1999 (Pérez & Vázquez, 2002). In the meantime, the use of pesticides on cash crops was reduced twenty-fold in a 15-year period, from 20 Gg in 1989 to around 1 Gg in 2004 (Funes-Monzote, 2008a; Granma Internacional, 26 November 2004).

Also during the Special period, fertiliser availability plummeted by 80% and local alternatives were required to obtain plant nutrients from organic sources. Cuba responded with a biofertiliser programme that by 1992 was making up 30% of the deficit (MINAGRI, 1992). Recycled organic waste along with other biofertilisers like nitrogen fixing bacteria and earthworm humus, quarried minerals, and peat, helped to replace imported fertilisers (see Tables 7 and 8). In particular, The Institute for Research in Soil and Fertilisers (IRSF) laboratory in Havana now produces enough *Rhizobium inoculum* for the whole nation, providing up to 80% of the nitrogen required by leguminous crops (Funes-Monzote, 2008a).

More unique to Cuba is the commercial use of the free-living nitrogen-fixer *Azotobacter*. By 1991 the IRSF was producing 5 million litres of liquid *Azotobacter*. This organic fertilizer is applied to leaves or soils and provides 40–50 % of the nitrogen needed by non-leguminous plants (MINAGRI, 1991). As a result of other *Azotobacter* benefits, Cuban scientists claimed they had achieved a 30–40 % increase in yield for maize, cassava, rice and other vegetables (Funes et al., 2002; Treto et al. 2002) (see Tables 7 and 8).

In a parallel effort, The Institute for Research in Ecology and Taxonomy developed *Vesicular Arbuscular Mycorrhizae* (VAM) (fungi that penetrate roots and help with uptake of phosphorus and other nutrients) as a mechanism for increasing plant absorption of mineral nutrients. The Cuban government planned to produce 18 tonnes of VAM material for commercial purposes in 1993 (Funes et al., 2002; Martínez Viera & Hernández, 1995).

Table 7
Use of biofertilizers in Cuba's agriculture in 1995

Biofertilizers	Crops	Substitution
<i>Rhizobium</i>	Beans, Maní and vignas	75-80% of nitrogenous fertilizer
<i>Bradyrhizobium</i>	Soya and leguminous forages	80% of nitrogenous fertilizer
<i>Azobacter</i>	Vegetables, yucca, sweet potato, maize, rice	15-50% of nitrogenous fertilizer
<i>Azospirillum</i>	Rice	25% of nitrogenous fertilizer
<i>Fosfobacteria</i>	Vegetables, yucca, sweet potato, citrus and coffee nursery	50-100% of phosphorous fertilizer
<i>Micorrizas VA</i>	coffee nursery	30% of potassium and nitrogenous fertilizer

Source: **Marfínez Viera & Hernández, 1995.**

Table 8
Earthworm humus applied to different crops in specific soil types

Crop	Doses (T/Ha)	Reduction of mineral fertilisation (%)
Potato	5	25-50
Tobacco	4	65 (Phosphorous and potassium)
Banana	10	50
Tomato	4	25-50
Garlic	4	100 (nitrogenous)
Onion	4	50-75
Pepper	4	25
Sweet potato	4	25

Source: **Gandarilla et al. 1995.**

Both the desperate foreign exchange position of Cuba during the crisis and the lack of strategic imported inputs have also meant an important reduction in governmental revenues. As shown in Table 9, bio-preparations have really led to low prices compared to those of industrial imported chemicals from developed countries.

Table 9
Cost of application of different entomo-pathogens and synthetic pesticides (in \$ and Cuban Pesos)

Crops	Bio-preparations	Cuban Pesos	Insecticides	US Dollars
Vegetables	B. thuringiensis	501,430	Thiodan	1,622,253
Various Crops	B. thuringiensis	243,303	Carbaryl	800,521
Pastures	B. thuringiensis	59,080	Carbaryl	397,613
Various crops	V. lecanii	54,048	Tamaron	431,788
Banana	B. bassiana	134,106	Carbofuran	1,680,760
Sweet potato	B. bassiana	878,863	Tamaron	926,790
Rice	M. anisopiae	80,290	Carbofuran	247,245
Banana	P. lilacinus	79,236	Carbofuran	41,375

Source: Maura, 1994.

In short, although biological fertilizers and pesticides based on small farming were a necessary response during the Special Period, we cannot underestimate a fourfold reality. First, the great amount of autochthonous R&D advances made in Cuba. Second, the decreasing costs of these bio-preparations compared to imported ones as well as the low dependency on imported chemicals and technologies. Third, the sustainable environmental impact of these bio-pesticides and bio-fertilizers compared to industrial agriculture patterns. And finally, the appropriateness of these practices for small farming.

4.1.2. Mobilising Labour.

The Classical Model implemented in Cuba since 1959 imposed extensive mechanisation in agriculture (Sáez, 1997). Tractor use increased nine-fold between 1959 and 1989. By 1990 Cuba had one tractor for every forty-three hectares of cultivated land and the number of tractors was almost 90,000, with annual imports of 5,000. By then, Cuba had the highest level of mechanization in Latin America (González, 2004; Saéz, 1997).

After the socialist demise in 1989, the number of tractors in operation dropped dramatically due to a lack of spare parts, maintenance, and fuel to keep them working. This process created the conditions for a labour crisis during the Special Period (Rosset & Benjamin, 1994). The new low-input sustainable

techniques required significant additional amounts of hand labour, to which Cuba responded in several ways.

First, during the 1990s the state promoted the establishment of countryside temporary labour camps to accommodate workers who volunteered their labour for different periods varying from two weeks to two years. In 1991, the first year of two-week volunteer mobilisations, over 146,000 inhabitants of Havana engaged in these activities (MINAGRI, 1991). Two-year volunteers, on the other hand, were organised in work brigades called contingents. They often worked 12 hours per day and received higher salaries and above-average living conditions than in urban areas (Rosset & Benjamin, 1994). Also during the 1990s and early 21st century the state has further promoted the repopulation of rural areas through different programs. By promoting moral and material incentives and creating more land attachment and rural life revitalisation, the state is trying to return people to the countryside (Suarez, 2006).

Second, inward-looking development in Cuba revived the traditional practice of using oxen for cultivation and transport. About 300,000 oxen teams were trained, making the new production systems less fossil fuel reliant. In 1997, 78% of oxen teams were employed in family farming, which represented only 15% of national agricultural land; little by little the use of oxen was extended to the entire agricultural sector (see Table 10) (Ríos & Aguerrebere, 1998; Funes et al., 2002).

Table 10
Number of tractors and work animals (1960-1997)

Energy source	1960	1970	1980	1990	1997
Tractors	9,000	52,000	68,000	85,000	73,000
Oxen	500,000	490,000	338,000	163,000	400,000
Horses	800,000	741,000	811,000	235,000	282,000
Mules	30,000	29,000	25,000	30,000	32,000

Source: Rios & Aguerrebere, 1998.

By and large, oxen teams offer effective mechanical control of weeds and serve as a substitute for herbicides, enhancing sound environmental practices. It should be noted, however, that the use of oxen is more appropriate for traditional small to mid-size farming systems than for large-scale monoculture. It

represented, therefore, an additional stimulus to fuel family farming throughout the island (Funes-Monzote, 2008a).

4.2. Changes in Cuba's land structure: towards cooperativism and family farming.

4.2.1. The new impulse to cooperativism.

After the early impulse of cooperativism (during the 1960s and 1970s), the movement experienced timid advances until the early 1990s. Then, new agrarian guidelines in Cuba enforced the Third Agrarian Reform Law in 1993. The new law encouraged decentralisation, scale reduction of big state enterprises and UBPC advancement as required answers to boost agricultural efficiency and local food production during the Special Period (Alvarez, 2004; Enríquez, 2000).

As a result, by the early 1990s (see Table 11), ten different types of land organisations in Cuban agriculture were grouped in the state sector, the non-state sector, and the mixed sector (Martín, 2002). Within the non-state sector there were two types of production units: collective and individual production units. UBPC and CPA represented collective production units while CCS represented individual farmers in usufruct and individual farmers with private property were individual producers. CPA and CCS particularly group small farmers under both collective and private forms of landholding (see Table 12).

Table 11
Organisation of Cuban agriculture

State sector	Non-state sector	Mixed sector
State farms New-type State farms (GENT) Revolutionary Armed Forces (FAR) farms, including farms of the Young Workers' Army (EJT) and the Ministry of the Interior (MININT) Self-provisioning farms at workplaces and public institutions	Collective production UBPC CPA Individual Production CCS Individual farmers, in usufruct Individual farmers, private property	Joint ventures between state and foreign capital

Source: Martín, 2002.

Table 12
Non-State sector in Cuba

Non-state sector STRUCTURE	ORIGIN	LAND AND RESOURCES
CPA	Farmers own the land	Voluntary association and delivery of land
CCS	Renters, agrarian workers, sharecroppers, owners	Private lands
UBPC	Former state farms	Collective usufruct of land. They buy the tools, animals etc.
LAND IN USUFRUCT IN THE RURAL SECTOR	State owned areas: coffee, cacao and tobacco.	Usufruct: state owned lands
URBAN AGRICULTURE	Courtyards, roofs, balconies, urban or semi-urban plots	Private land or in usufruct. They use organic methods.

Source: Funes et al., 2002.

The transformation of Cuban agriculture progressed quickly. Between 1993 and 1997, approximately 2856 UBPCs were created. By January 1995, the state had granted usufruct rights to 58% of the arable land it had controlled at the beginning of 1990.⁹ In 1997, UBPCs comprised 42% of the agriculture sector while state farms dropped by 33% (Pérez-Villanueva, 2004). During a five-year period, approximately 150,000 workers (formerly employees of state farms) were integrated in the UBPC sector (Pérez-Rojas et al., 1999). UBPC quickly came to predominate in Cuba's agricultural landscape. Specifically through the period 1992-2008, the state owned sector dropped from 75 to 23.2% while non-state farms increased up to 50 percentage points (see Table 13) (ONE, 2007b).

Table 13
Changes in Cuba's Land Distribution (1992-2008)
(Percentage)

Years	State owned sector	Not state owned	UBPC	CPA	PRIVATE AND CCS
1992	75	25	0	10	15
2004	34.5	65.4	38.9	8.9	17.6
2008	23.2	76.8	39.8	10.2	26.8

Source: ONE, 2007b.

⁹ At that time the State controlled 83% of total arable land.

By enhancing 'man's attachment to the land' the state endeavoured to improve labour opportunities and properly define individual and collective responsibility within the UBPC sector, two major problems found in former state farms. Accordingly, UBPC were underpinned by a new model of self-management, self-sufficiency, diversification of property system, and new actors on the agricultural scene (Pérez-Villanueva, 2004). They placed special emphasis on the self-provisioning of associates and their families with cooperative effort. This was a supplementary pillar to improve their housing and infrastructures and a rigorous attachment of workers' incomes to production results during the difficult circumstances of the Special Period (Enríquez, 2000; Funes-Monzote, 2008a). UBPC, at the same time, facilitated better natural resource management and family farmer decision-making. The reduced scale of UBPC, along with their greater diversification and more rational use of inputs, machinery, and infrastructure, helped to mitigate the losses in external inputs and capital during the Special Period (Funes et al., 2002, Funes-Monzote, 2008a).

By and large, the process of land decentralisation enhanced by inward-looking policies in Cuba reduced ten-fold the size of large mixed-crop enterprises while the size of livestock enterprises decreased on average twenty-fold, reaching a size similar to that of CPA (see Table 14) (Nova, 2003; Villegas 1999). This strategy of dividing land into smaller plots within the UBPC sector indirectly implied state acknowledgment of the greater efficiency of production on a smaller scale in Cuba. In particular, the trajectory of CPA was the model to project and form UBPC. The positive returns of CPA, even during the Special Period, demonstrated the solidity of these entities formed by small farmers. Although sugar cane CPA showed decreasing efficiency, CPA generally demonstrated that it could obtain better returns and organisation patterns than any other economic entity during the crisis (see Table 15) (Funes et al., 2002; Funes-Monzote, 2008a; Nova, 2006b).

Table 14
Average size (ha) of State enterprises, UBPC and CPA

Main activity	State enterprises	UBPC	CPA
	1989	1994	1994
Various crops*	4,300	416	483
Citrus and fruit	17,400	101	577
Coffee	---	429	470
Tobacco	3,100	232	510
Rice	27,200	5,040	-
Cattle	28,000	1597	631

Tubers, roots, vegetables, plantain, grains and seeds (beans, corn, soybean, sunflower, sesame, etc.)

Source: Funes-Monzote, 2008a; PNAN, 1994.

Table 15
Economic results of CPA

Activity	Efficient (% of CPA with increasing returns: tonnes per ha)	
	1992	1996
Sugar cane	88	66
Non-sugar cane	83	85
Roots and vegetables	87	91
Livestock	85	84
Coffee	79	84
Cocoa	94	-
Citrus	-	93
Rice	-	47

Source: MINAG, 1996; Nova, 2006a, 2008a.

In short, UBPC essentially have at least identified mechanisms favouring the transition to decentralised production that tends to imitate the values, efficiency, and potential of traditional *campesino* production (Funes-Monzote, 2008a). Although they face many problems, this at least represents a substantial improvement over large state farms in Cuba.¹⁰

¹⁰ The strong influence of the state still remains in many UBPC. UBPC also face decreasing labour force availability and still maintain high debts with the Central Bank after the initial purchase of machinery and equipment from the state (which have deteriorated) (Nova, 2006a; Pérez-Villanueva, 2004). Also, the unclear circumstances and period of usufruct

4.2.2. New spaces for family farmers.

Family farmers have a long tradition in Cuba. They were the main agricultural producers until the early 20th century, when the sugar mono-crop and US investment displaced them socially and economically. Before the times of the Cuban Revolution of 1959, the 'campesino' sector practised diversified agriculture with traditional mixed farming strategies. According to the agricultural census of 1946, by applying mixed crop-livestock patterns and better organisational efficiency, up to 90% of the farms were diversified and yielded between 5 and 75 hectares (CAN, 1951).

While state agricultural companies were dramatically affected by the loss in inputs and funding during the Special Period, and delayed adapting to change, inward-looking development policies created some spaces for *campesino* sector production. Cuban peasants were at least able to buffer the scarcity of material resources during the extraordinary conditions of the Special Period (Holt-Giménez, 2006; Wright, 2005). They maintained agricultural diversification, fostered low costs for food products, avoid the creation of a rural proletariat and strengthen the system of private property (Jiménez, 1992; Ricardo, 2003).

The valuable and decentralised technical agricultural capacity developed in Cuba during the 1980s and 1990s also enabled the mixture of knowledge coming from scientists, researchers and peasants to support sustainable family farming so as to overcome famines and scarcity all over the island (González et al., 2000). By giving equal or even better opportunities than those found in the

contracts have ended up in many cases hindering efficiency and enhancing the employment of cheap labour in many UBPC (particularly in the livestock sector) (Fernández-Domínguez, 2005). Although significant plot reductions have been applied, the average size of several UBPC is still large for most of the main agricultural activities (Alvarez, 2004; Nova, 2006a, 2008a). The lack of resources made many UBPC almost unmanageable while the sector still holds over 19% of idle areas in Cuba (ONE, 2008).

cities, the state additionally enhanced the campesino sector through several incentives to keep people living in the countryside (Suárez, 2006).¹¹

Overall, the most important drive of inward-looking development towards family farming was the reopening of the *Mercado libre campesino* coupled with the mandate to decentralise land structures. Whereas in the late 1980s the private sector in Cuba's agriculture represented 18% of the country's arable land, ten years later this sector accounted for 25% of the farmland and participated significantly in production for both internal consumption and export. Through the 1990s small farmers contributed greatly to total agricultural sales to the state during the years of crisis (see Table 16). In 1996, 70.7% of total agricultural direct sales to the state were made by small or cooperative farmers (Martín, 2002; Lugo-Fonte, 2000).

Table 16
Campesinos' contribution to total sales to the state for various products in Cuba, 2000.

PRODUCT	PERCENTAGE OF TOTAL SALES TO THE STATE
Roots, tubers and vegetables	43
Sugar cane	18
Tobacco	85
Coffee	55
Cocoa	61
Beans	74
Corn	64
Milk	32
Rice	17
Fruit	59
Citrus	10
Pork	43
Fish	53
Honey	55

Source: Lugo-Fonte, 2000.

¹¹ Particularly, to fight against unemployment, the rural-urban exodus and the challenge of large-scale extension of low input agriculture (highly dependent on labour force), the state has promoted incentives since the early 1990s such as the *Municipalización de la educación* programme (University at all levels, Educational Television etc.), countryside campaigns or even higher salaries and other economic incentives (Suárez, 2006).

Today private farming in Cuba is carried out independently or in groups under two kinds of cooperative production: CPA and CCS. Both entities sell their products to the state based on agreements regarding their production potential, and also cultivate crops and raise animals for self-provisioning. They may also sell agricultural products directly in the local market or to middlemen (Funes-Monzote, 2008a). As shown in Table 17, dispersed *campesinos* and CCS obtained higher returns per hectare in 2007 than any other land structure while CPA achieved better returns than UBPC the same year (ONE, 2008).

Table 17
Agricultural and cultivated land under different structures, 31 December 2007

Concept	Area (MH)		Structure (%)		Returns (%) Tonnes/Ha
	Agricultural	Cultivated	Agricultural	Cultivated	
TOTAL	6,619.5	2,988.5	100.0	100.0	45.1
State	2,369.3	692.3	35.8	23.2	29.2
Non-state	4,250.2	2,296.2	64.2	76.8	54.0
UBPC	2,448.3	1,190.0	37.0	39.8	48.6
CPA	585.8	305.2	8.8	10.2	52.1
CCS	818.5	533.7	12.4	17.9	65.2
<u>Disperse campesinos</u>	392.6	264.5	5.9	8.8	67.4
Others	5.0	2.8	0.1	0.1	55.6

Source: ONE, 2008.

Gonzalez et al. further argue that one of the best examples of successful small farming in Cuba was livestock raising during the Special period. From 1995 to 2000, the number of livestock animals under private management increased, as did the production of livestock products. In the meantime, state and UBPC livestock production experienced no signs of recovery (González et al., 2000). In 2006, the small farmer sector, with only 13% of the grazing land, owned more than 43% of Cuba's livestock (MINAGRI, 2007) (Table 18).

Table 18
Structure of livestock production in Cuba, 2006

Type of production	Land area (Thousand of Ha)	Percentage of land area	Owners	Head (Thousand)	Percentage of national herd	Head/ owner
State enterprises*	1.221.6	48.3	4.569	1.082.5	27.3	236.9
UBPC	780.1	30.8	2.470	969.6	24.4	392.5
CPA	201.7	8.0	1.063	191.8	4.8	180.5
CCS+individuals	325.8	12.9	236.088**	1.728.4	43.5	7.3
Total	2529.3	100		3972.3	100	

Source: MINAGRI, 2007.

*Including livestock and crop enterprises dedicated to livestock rearing.

** Including individual owners or in CCS and farmers with or without land.

More importantly, the Cuban *campesino* has gained a pivotal role in the preservation of traditional crop and livestock varieties, which are indispensable to genetic improvement and sustainable agriculture from a local perspective (Ríos-Labrada, 1999, 2004; Wright, 2005). For example, within ANAP, I analysed the Agro-ecological Farmer to Farmer Movement which has systematized much traditional agricultural experience and reinforced sustainable principles in Cuba's agriculture (Perera, 2004; Holt-Gimenez, 2006). Since 1997 ANAP's employment of novel technologies based on 'group to group' mechanisms is represented in 155 municipalities (85% of the total territory), reaching over 100,000 smallholders (Acosta, 2008; Holt-Giménez, 2006). Currently, ANAP has more than 328,000 associates and 4269 cooperatives, which cultivate more than 600,000 hectares. Even more interesting is the fact that today small farmers in Cuba produce, under agorecological principles, over 65-70%of food for national consumption with just 27% of the cultivated land (Acosta, 2008; ANAP, 2008).

At the same time, the Local Agriculture Innovation Programme (PIAL) is based on participatory grassroots processes and developed by the National Institute for Agricultural Sciences since the late 1990s (INCA). By integrating more than 4,000 farmers (over 10% of Cuba's peasants), this initiative fosters decentralisation and state support for R&D institutions to transform small farmers into members and real participants of the national agrarian innovation program, less dependent on external inputs and imported technologies for production

(Ríos-Labrada, 2006a, 2006b, 2008). By organising seed fairs in local markets and experimentation with many varieties, peasants are able to choose the seeds they find most appropriate. Farmers also learn how to interact with each other by exchanging their valuable peasant knowledge and employing organic practices. They also benefit from the interaction between professional researchers and farmers (Ríos-Labrada, 2006a). In this context, PIAL has reduced food scarcity, vulnerability and volatility at the household level while opening new rural development windows in deprived rural communities throughout Cuba (Ponce, 2008).¹²

Overall, *campesino* agro-ecological experiences in Cuba have made a great deal of progress and today undoubtedly represent a key resource for enhancing domestic food production and the implementation of a sustainable and agro-ecological approach on a national scale (Funes-Monzote, 2008a, 2008b). However, many experiences enhanced by alternative technologies throughout the country are still unknown while small farmers face important constraints to increase productivity.

5. CONCLUDING REMARKS.

"Though they said we were a satellite of the Soviets, our planet has disappeared and we are still here circling around." (Cuban officials interviewed by Rosset and Benjamin, 1994: 8)

In the midst of the most severe crisis in its history, Cuba dramatically shifted from export dependency to inward-looking development. By substituting local food and inputs for imported technologies, decentralising land structures (by promoting family farming) and progressively liberalising markets, Cuba has

¹² Interview with farmers of the CPA La Palma, Pinar del Río, Cuba, 27 June, 2006

Interview with farmers of Batabanó, La Habana, Cuba, 13 November, 2008

Interview with farmers of San Antonio de los Baños, La Habana, Cuba, 19 November, 2008

Interview with farmers of San José de Las Lajas, La Habana, Cuba, 15 November, 2008

become one of the few countries, if not the only one, that has experimented with this type of Alternative development, creating some spaces and opportunities for small farmers.

This paper has discussed the set of agrarian policies implemented in Cuba during the 1990s under the so-called Alternative paradigm, and how the application of local and sustainable technologies fostered changing production patterns, decentralisation of land structures and family farming throughout the island. The paper also points out that the inward-looking development implemented in Cuba (despite its exceptional history, geography, climate and political system) during the 1990s, even if unexpected or required, involves crucial issues to consider when designing national and international agendas of agricultural development in small economies and discussing the future of small farmers in the global era. While in other regions similar strategies of sustainable rural development are mere pilot projects rarely acknowledged by official policy, in Cuba these initiatives represent much more than that. Urban agriculture, cooperativism and organic practices based on sustainable small farming are part of the official agrarian policy (Pretty, 2002).

So far, what Cubans have already achieved under conditions of adversity deserves special attention and in-depth study. Whole peasant families are developing avant-garde biotechnology and supplying their members and neighbours with organic alternatives for poisonous pesticides, chemical fertilisers, animal feedstuffs and expensive technologies imported from Western countries (Rosset & Benjamin, 1994; Wright, 2005).

Moreover, the food crisis in 2007-2008 opened avenues for further thinking and research regarding other initiatives to feed less developed countries with special emphasis on local and sustainable small farming strategies. Whilst conventional agriculture in Cuba represents only 6-8%, low input agriculture in averages accounts 92-94% (Funes, 2008). If we take into account international oil prices, increasing prices of basic food, input and raw material and environmental contamination, the Cuban alternative may be an alternative with the potential to lessen external dependency and feed small developing nations while fostering family farming production and environmental sustainability.

Acronyms

ACAO	<i>Asociación Cubana de Agricultura Orgánica</i> (Cuban Association of Organic Agriculture)
Acopio	National Union of State food collection and distribution agency
ACTAF	<i>Asociación Cubana de Técnicos Agrícolas y Forestales</i> (Cuban Association of Agricultural and Forestry Technicians)
ANAP	<i>Asociación Nacional de Pequeños Agricultores</i> (National Association for Small Farmers)
CADECA	<i>Casas de Cambio S.A</i> (currency exchange bureaus)
CAP	Common Agrarian Policy
CARG	Compound Annual Rate of Growth
CEEC	<i>Centro de Estudios de la Economía Cubana</i> (Centre for Research of the Cuban Economy)
CMEA	Council of Mutual Economic Assistance
CPA	<i>Cooperativas de Producción Agropecuarias</i> (Agricultural Production Cooperative)
CSS	<i>Cooperativas de Crédito y Servicio</i> (Credit and Service)
CUC	Cuban Convertible Peso (equivalent to one dollar) (<i>Peso Convertible Cubano</i>)
GATT	General Agreement on Tariffs and Trade
INCA	<i>Instituto Nacional de Ciencias Animales</i> (National Institute of Agricultural Sciences)
INIE	<i>Instituto Nacional de Investigaciones Económicas</i> (National Institute for Economic Research)
IPM	Integrated Pest Management
IRSF	The Institute for Research in Soil and Fertilisers
MAG	Ministry of Agriculture and Livestock (Costa Rica)
MINAGRI	Ministry of Agriculture (Cuba)
MST	Landless Workers' Movement
NAFTA	North American Free Trade Agreement
NGO	Non-Governmental organisation
NTAEs	Non-traditional Agrarian Exports
ONE	National Bureau of Statistics
PIAL	<i>Programa de Innovación Agraria Local</i> (Local Agrarian Innovation Program)
PSD	Participatory Seed Diffusion project
R&D	Research and Development
RNFE	Rural non-farm Employment
SAPs	Structural Adjustment Programs
TNC	Trans-national Corporations
UBPC	<i>Unidades Básicas de Producción Cooperativa</i> (Basic Units for Cooperative Production)
WTO	World Trade Organisation

APPENDIX I

Classical versus Alternative Model

<i>Classical Model: Costa Rica</i>	<i>Alternative Model: Cuba</i>
<p>External dependence of:</p> <ul style="list-style-type: none"> - the country on other countries - provinces on the country - localities on the province & the country <p>Cutting edge technology:</p> <ul style="list-style-type: none"> - Imported raw materials for animal feed. - Widespread utilisation of chemical pesticides and fertilizers - Utilisation of modern irrigation systems - High consumption of fuel and lubricants. <p>Tight relationship between bank credit and production; high interest rates.</p> <p>Priority given to mechanisation as a production technology.</p> <p>Introduction of new crops at the expense of autochthonous crops and production systems.</p> <p>Search for efficiency through intensification and mechanisation.</p> <p>Real possibility of investing in production and commercialisation.</p> <p>Accelerated rural exodus.</p> <p>Satisfying ever-increasing needs has serious ecological or environmental consequences such as soil erosion, salinisation water logging etc.</p>	<p>Maximum advantage taken of:</p> <ul style="list-style-type: none"> - the land - human resources of the zone or locality - broad community participation - cutting edge technology, but appropriate to the zone where it is used - organic fertilisers and crop rotation - biological control of pests - biological cycles and seasonality of crops and animals - natural energy sources (hydro, wind, solar, slopes, biomass, etc) - animal traction - Rational use of pastures and forage for both grazing and feedlots, search for locally supplied animal nutrition. <p>Diversification of crops and autochthonous production systems based on accumulated knowledge.</p> <p>Introduction of scientific practices that correspond to the particulars of each zone; new varieties of crops and animals, planting densities, seed treatments, post harvest storage etc.</p> <p>Preservation of the environment and the ecosystem</p> <p>Systematic training (management, nutritional, technical).</p> <p>Systematic technical assistance.</p> <p>Promotes cooperation among producers, within and between communities</p> <p>Obstacles to overcome:</p> <ul style="list-style-type: none"> - difficulties in the commercialisation of agricultural products because of the number of intermediaries with control over the market - poverty among the peasantry - distances to markets and urban centres (lack of sufficient roads and means of transport) - illiteracy

Source: Rosset & Benjamin, 1994; Rosset, 2005.

APPENDIX II

Cuba's Structural Economic and Agricultural Reforms during the 1990s

Demonopolisation	<p>1992: Constitutional reform, decentralisation of state monopoly on foreign trade</p> <p>1994: Vice President Carlos Lage announces that all sectors of the Cuban economy are open to foreign investment. It only permits financial arrangements with foreign companies for the purchasing of agricultural inputs.</p> <p>1995: The Council of State enacts Law 77 on foreign investment, more transparent than the previous legislation it supersedes.</p>
Deregulation	<p>1992: Constitutional reform, approval of mixed property and other types.</p> <p>1993: Fidel Castro announces a series of policies intended to collect foreign exchange currency. The most important one is the free circulation of convertible currencies, mainly the U.S. dollar.</p> <p>Council of State promulgates Law-Decree No. 140 dealing with free circulation of convertible currencies. In essence, this repeals previous legislation that penalized possession and use of convertible currencies by the general public.</p> <p>Council of State enacts Law-Decree No. 141 authorizing self-employment in several areas of economic activity. Joint Resolution No. 1 authorizes 117 activities, 16 of which are related to agriculture.</p> <p>The Politburo of Cuba's Communist Party agrees to apply new principles to state agriculture in search of efficiency.</p> <p>1994: Decree No. 192 of the Council of Ministers authorizes the establishment of free markets for industrial products and crafts throughout the island.</p> <p>1995: Foreign investment law The opening of CADECAS</p> <p>1996: Decree on free trade zones and modification of tariff law</p> <p>1997: reordering and enhancement of national consumer markets.</p>
Decentralisation	<p>1993: Third land reform, Council of State enacts Law-Decree No. 142 establishing BUCP on previous state farms to eliminate state monopoly on most agricultural lands. Although the land remains the property of the state, it is given in usufruct for an indefinite period of time to the newly created cooperatives.</p> <p>The Minister of Agriculture announces that more than 268 hectares were given in free usufruct to families interested in growing tobacco in the eastern province of Ciego de Avila. In addition to the right to self-consumption activities, each family received an average of 4.5 hectares.</p> <p>Self-funding strategies in hard currency for state companies.</p> <p>New types of mixed companies: joint ventures.</p> <p>1994: Law-Decree No. 147 by the Council of State restructures the state bureaucracy. 17 previous state committees, national commissions, and institutes are integrated under six new ministries:</p> <ol style="list-style-type: none"> 1. Economics and Planning 2. Foreign Investment and Economic Collaboration 3. Tourism 4. Finances and Prices 5. Labour and Social Security 6. Sciences, Technology, and Environment. <p>Council of Ministers enacts Decree No. 191 authorizing the establishment of free agricultural markets</p>

	<p>throughout the island where farmers and state enterprises can sell their surplus production, after fulfilling their commitments to the state, at prices dictated by supply and demand.</p> <p>1995: changes in companies and territorial planning.</p> <p>Orlando Lugo, President of ANAP announces that 5,835 families throughout Cuba had received usufruct approximately 12,000 hectares of tobacco lands and 1,153 individuals had received coffee lands. In Ciego de Avila a total of 19,870 hectares of pasturelands had been transferred to 369 livestock workers for milk production. Each worker received 50 hectares and 40 cows. Another 619 hectares were given to 46 workers for vegetable and <i>vianda</i> production for self-consumption and sales in agricultural markets.</p> <p>1997: Decree-law to restructure the banking system</p>
Others	<p>1994: Council of Ministers announces sharp price increases beginning June 1, September 1, and October 1 for cigarettes, beer, rum, railroad, aerial, and inter-provincial transportation, gasoline, electricity, water, and sewage.</p> <p>Alfredo Jordán, Minister of Agriculture, announces payments in hard currency of a small part of their salaries to workers in all stages of the tobacco sector.</p> <p>Cuban newspaper <i>Trabajadores</i> announces that the first middle school in the countryside (ESBEC) has been converted into an agricultural community for workers in the area of Jagüey Grande (Matanzas). For many years, the ESBEC program brought middle school students from urban areas to participate in a 4-hour work, 4-hour study program in the countryside.</p> <p>1995: National Assembly of People's Power approves the 1995 State Budget Law. It anticipates revenues at around 12 billion pesos (the same amount of dollars at the official exchange rate of one peso to one U.S. dollar) and expenses at about 113 billion pesos. The one billion pesos deficit is 4.6% lower than in 1994.</p> <p>Cuban government announces the introduction of a "convertible peso" to be used in international transactions. Equivalent to the U.S. dollar, the new peso will circulate along with hard currencies.</p>

Source: Álvarez, 2004; Cruz, 2008; Nova, 2006a.

APPENDIX III

Different institutions/programs promoting sustainable small farming in Cuba

a) Asociación Cubana Para la Agricultura Urbana (ACTAF/CAAO): ACTAF (a governmental association founded in 1987) is focused on agrarian transition towards an ecological balance, with a gender perspective, which has a participatory approach and respect for the technical-professional ethic. At the forefront of the transition towards sustainable agriculture, ACAO, formed in 1993, brought together farmers, field managers, field experts, researchers and government officials to enhance the spread of organic-based alternatives to produce enough food for Cubans (Pretty, 2002). Today ACTAF is formed by agricultural researchers, producers, and activists who promote organic research and production to 'create a national conscience to support agriculture harmonious with human beings and nature (Monzote, 1997).' It also 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 professionals have attended in recent years (Murphy, 1999; ACTAF, 2006, 2008).

b) The National Association of Small Farmers (ANAP): a good example of Cuba's family farmers and state connectedness. ANAP is a non-governmental organisation that in harmony with the government enhances small farmers' interests towards Cuba's agricultural progress. Today this NGO (dependent from the state) is composed of more than 3800 cooperatives (CPA and CCS) and produces 63 percent of Cuba's overall agrarian production (Acosta, 2008). By spreading the 'farmer to farmer' technology nationally, and organising workshops between officials of the Ministry of Agriculture or Higher Education and *campesinos*, and international gatherings with other small farmers' groups (like the MST of Brazil or *Vía Campesina*), ANAP and the Cuban government share a true project of transformation. Their consensus is based on sustainability, reducing scarcity and viewing domestic markets as an emergent property of valuable systems of social, human and natural capital (Acosta, 2008; ANAP, 2008).

c) Fundación de la Naturaleza y El Hombre (The Foundation for Nature and Man). This integrated, multidisciplinary organisation has an ecological focus. The foundation works closely with the Cuban Ministry of Culture to promote the blossoming ecological consciousness of Cuba. This NGO sponsors Havana's Permaculture Project carried out through the Australian/Cuban 'Green Team,' which does direct agricultural work at the neighbourhood level. This Foundation sees urban agriculture as a way of sustaining the family in the city against the harsh crisis as well as a cultural approach that reshapes the interaction between humans and nature. By recovering a good cultural balance between humans and nature (lost for many years under the Green

Revolution mentality) this Foundation attempts to spread the family farmer knowledge across the island. Thus, it organises workshops and agroecological meetings to educate both urban inhabitants and rural farmers and also publishes the ecology magazine *Se Puede* (You can do it) (Sánchez, 2006).

d) Asociación Cubana de Producción Animal (Cuban Association of Animal Production-ACPA) is an NGO (also dependent on the state) that currently focuses on developing local seed stock in grains and legumes to promote organising national self-sufficiency in livestock feed, traditionally imported from abroad. ACPA is helping to support the community-based animal raising associations across the country, focusing primarily on Havana (Murphy, 1999).

e) INCA (Instituto Nacional de Ciencias Animales, Universidad de La Habana): this research institution is formed by researchers and farmers engaged in the international project of participatory seed diffusion throughout the island. These PSD projects concentrate on improved seeds and the diffusion of organic practices amongst peasant communities. By integrating diversity, organising seed fairs and local markets, and experimenting with many varieties, peasants choose the types they find most appropriate for their land and climate conditions. Once farmers see the favourable effects of genetic diversity testing, they organise themselves in farmer research groups. These groups are in charge of promoting knowledge, social organisation and entrepreneurial centres that sponsor intensive genetic flows and continued discussion surrounding local innovation (Ríos-Labrada, 2006a). The project has currently evolved by defining PIAL (Programas de Innovación Agraria Local) groups through the island.

Source: ACTAF, 2008a; Cruz & Sánchez, 2005; Funes, 2006, 2008; Murphy, 1999; Ríos-Labrada, 2006a, 2006b, 2008; Sánchez, 2006.

BIBLIOGRAPHY

- ACTAF. 2001. *Urban Agriculture Magazine*, vol.1, no.1, July, 2001.
- ACTAF. 2008a. *Plan Estratégico de la actividad de Cultivos varios*. Havana: Biblioteca ACTAF.
- ACTAF. 2008b. *Estrategia, estatutos y reglamentos de la Asociación Cubana de Técnicos Agrícolas y Forestales*. Havana: Biblioteca ACTAF.
- Alvarez, J. 2000. 'Differences in Agricultural Productivity in Cuba's State and Non-State Sectors: Further Evidence,' *Cuba in Transition*, vol.10, p. 98-120. Washington D.C.: Association for the Study of the Cuban Economy.
- Álvarez, J. 2004. *Cuba's agricultural Sector*. Florida, Gainesville: University Press of Florida.
- Álvarez, M.D. 2002. 'Social Organization and Sustainability of Small Farm Agriculture in Cuba,' in F. Funes, F., García, L., Bourque, M., Pérez, N., Rosset, P., (eds), *Sustainable agriculture and resistance: Transforming food production in Cuba*. (Oakland: Food First Books), p. 72-89.
- ANAP. 1992. ANAP statistics. Havana: Cuba.
- ANAP. 2008. ANAP statistics. Havana: Cuba.
- Betancourt, G. 2005. *El comercio agrícola internacional bajo las reglas de la OMC y su impacto para Cuba*. Havana: Instituto de Investigaciones Económicas. (Material no editado).
- Borrego, J. 2006. 'Pago Luego Exijo', *Granma*, 22 February.
- Bu, A. (et al). 2008. *Producción, transformación y comercialización de los productos agropecuarios*. Cuba: INIE.
- CAN (Censo Agrícola Nacional) 1951. Memorias del Censo Agrícola Nacional, 1946. P. Fernández y Cía, Havana, Cuba.
- Castro, F. 1992. 'Discurso pronunciado en la Conferencia de Naciones Unidas sobre Medio Ambiente y Desarrollo.' Rio de Janeiro, Brasil.
- Castro, F. 1996. 'Speech at UN World Food Summit.' 18 November 1996.
- Castro, R. 2008. 'Mientras mayores sean las dificultades, más exigencia, disciplina y unidad se requieren.' Speech at the conclusion of the Constitutive Session of the National Assembly of the Cuban Parliament. Granma, February 25, 2008.
- Comité Central de Estadísticas (CCE). 1991. *Anuario Estadístico de Cuba 1989*, Havana.
- Companioni, N. (et al.) 2002. 'The growth of urban agriculture,' in: Funes, F., García, L., Bourque, M., Pérez, N., Rosset, P. (eds.), *Sustainable agriculture and resistance: Transforming food production in Cuba*, (Oakland: Food First Books), p. 220-236.

Cruz, M.C, and R. Sánchez. 2005. *Ciudad Sustentable. Reflexiones sobre: la agricultura y sus relaciones en el ambiente urbano*. La Habana, Cuba: Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre.

Cruz, M.C. and R. Sánchez. 2001. *Agricultura y ciudad, una clave para la sustentabilidad*. Colombia, Bogotá: Linotipia Bolívar.

Decreto Ley No. 142, Cuba, 1988.

Deere, C.D. 1997. 'Reforming Cuban Agriculture,' *Development and Change*, no. 28, p.649-669.

Díaz-Briquets, S. and J. Pérez López. 2000. *Conquering Nature: The Environmental Legacy of Socialism in Cuba*. Pittsburgh, Pa.: University of Pittsburgh Press.

Domínguez, J.I. (et al.). 2004. *The Cuban Economy at the Start of the Twenty-First Century*, Harvard University: The David Rockefeller Center Series on Latin American Studies.

Echeverría, R. 2000. 'Options for rural poverty reduction in Latin America and the Caribbean,' *Cepal Review*, no. 70, p. 151-164.

Enriquez, L. 2000. *Cuba's New Agricultural Revolution: The Transformation of Food Crop Production in Contemporary Cuba*. (Development Report No. 14). Oakland, CA: Food First.

EPS (Economic Press Service). 2008. 'Crece la producción de la agricultura urbana,' *Economic Press Service*, year 21, no.15, August 2008, Havana, Cuba.

Espina, M. 2003. *Efectos sociales del ajuste económico: igualdad, desigualdad y procesos de complejización de la sociedad cubana*, Congreso de la Asociación de Estudios Latinoamericanos (LASA), Dallas, 2003, inédito.

Espinosa, E. 1992. *La alimentación en Cuba. Su dimensión social*. Tesis presentada para la obtención del grado de Dr. en Ciencias Económicas. Universidad de La Habana, Havana, Cuba.

FAO. 1997. Food Security Statistics. Rome: FAO.

FAO. 1998. *Evaluating the potential of organic agriculture to sustainability goals*. FAO's Technical Contribution to IFOAM's Scientific Conference, Mar del Plata, Argentina, November.

FAO. 1999a. *Implicaciones de las políticas económicas en la seguridad alimentaria*, Roma: FAO

FAO. 1999b. *Organic Agriculture*. Committee on Agriculture 15th Session, 25-29 Jan 1999. Available at <http://www.fao.org/unfao/bodies/COAG/COAG15/X0075E.htm>

FAO. 2000. Colaboración Internacional. *Cuba Country Report*. Chapter 6. Available at web.icppgr.fao.org/oldsite/CR/CR/CUBA/c6.htm

FAO. 2003. *Fertiliser Use by Crop in Cuba*. Land and Water Department Division. FAO, Rome.

- FAO. 2003. *Trade Reforms and Food Security, Conceptualising the linkages*. Commodities and Trade Division, FAO, Rome.
- FAO. 2004a. *The State of Food and Insecurity in 2004*. Monitoring progress towards the World Food Summit and Millennium Development Goals. FAO, Rome.
- FAO. 2004b. *Food and Agriculture Indicators*. Cuba. Available at www.fao.org/countryprofiles
- FAO. 2004c. *Política de desarrollo agrícola: conceptos y principios*, Roma: FAO.
- FAO. 2009. *Food Security Statistics*. Rome. Archived at <http://www.fao.org/economic/ess/food-security-statistics/food-security-statistics-by-country/en/>.
- Fernández-Domínguez, P. (et al.). 2007. *Cuatro experiencias exitosas en UBPC*. Havana: Biblioteca ACTAF.
- Fernández-Domínguez, P. 1997. *El Nuevo modelo agrario: un desafío en el umbral del tercer milenio*. Havana: ANEC.
- Fernández-Domínguez, P. 2005. 'La evolución de la agricultura cubana y su contribución al desarrollo económico', private email to Elisa Botella. 22 June 2006.
- Ferriol, A. 1996. 'La seguridad alimentaria en Cuba,' *Revista Cuba: Investigación Económica*, año 2, no. 3, Ciudad de la Habana, julio-septiembre.
- Ferriol, A. 1998. *Pobreza en condiciones de reforma económica: el reto a la equidad en cuba*; XXI Congreso de la Latin American Studies Association, The Palmer House Hilton Hotel, Chicago, Illinois, septiembre 24-26 de 1998.
- Ferriol, A. 2004. 'La alimentación en Cuba', in E. Alvarez y J. Máttar (eds), *Política social y reformas estructurales: Cuba a principios del siglo XXI*, LC/L.2091, México, D.F., Sede Subregional de la CEPAL en México/Instituto Nacional de Investigaciones Económicas/ Programa de las Naciones Unidas para el Desarrollo (PNUD).
- Fornés, F. 2008. 'La Leche que Prometió Raúl...', *Encuentro en la Red*, Havana, 26 February 2008.
- Funes, F (et al.). 2002. *Sustainable agriculture and resistance: Transforming food production in Cuba*. Oakland: Food First Books.
- Funes, F. 2002. 'The organic farming movement in Cuba,' in Funes, F., García, L., Bourque, M., Pérez, N., Rosset, P. (eds), *Sustainable agriculture and resistance: Transforming food production in Cuba*. (Food First Books: Oakland), p. 1-26.
- Funes-Monzote, F. 2006a. 'Towards sustainable agriculture in Cuba,' private email to Elisa Botella. 18 March 2006.
- Funes-Monzote, F. 2008a. *Farming like we're here to stay: The mixed farming alternative for Cuba*. PhD thesis, Wageningen University, The Netherlands.

Funes-Monzote, F.R. and M. Monzote. 2002. 'The Cuban experience in integrated crop-livestock-tree farming,' *LEISA Newsletter*, no.18, p.20-21. Archived at URL: <http://www.ileia.org/2/18-1/20-21.PDF>

Gaceta Oficial (La Habana). 1959. Primera Ley de Reforma Agraria, 3 June 1959.

Gandarilla, H. 1992. *Uso de la rotación papa-col-boniato en el manejo de nematodos*. Informe del Laboratorio Provincial de Sanidad Vegetal. Ciudad de La Habana.

García, J. 2002. 'Situación y Perspectivas de la Agricultura Orgánica, con Énfasis en Latinoamérica,' *Revista Acta Académica Universidad de Costa Rica*, mayo 2002.

Garriaca, N. (et al.). 2001. *¿Una nueva ruralidad en América Latina?*. Buenos Aires, Argentina: CLACSO.

Gliessman, S.R., 2001. *Agroecology: Ecological processes in sustainable agriculture*, Boca Raton, USA: CRC Lewis Publishers.

Gliessman, S.R., 2006. *Agroecology: The ecology of sustainable food systems*, Boca Raton, USA: CRC Lewis Publishers.

GNAU (Grupo Nacional de Agricultura Urbana). 2004. *Lineamientos para los subprogramas de La Agricultura Urbana (2005-2007)*, MINAG, Havana, Cuba.

González (et al.). 2000. *Cuba: El sector agropecuario y las políticas agrícolas ante los nuevos retos*, Mep-Asdi-Universidad: Uruguay.

González, C.G. 2004. 'Trade Liberalization, Food Security and the Environment: The Neoliberal Threat to Sustainable Rural Development,' *Transnational Law and Contemporary Problems*, vol. 14, p.419-498.

Granma (La Habana) Consideraciones del Ministerio de la Agricultura sobre la producción y comercialización de productos agropecuarios, 3 July 2006.

Granma (La Habana), 25 December 2006.

Granma (La Habana), 29 September 2000.

Granma (La Habana), Commission for Economic Affairs to the National Assembly, 22 December 2006.

Granma (La Habana), Crece impacto social de la Agricultura Urbana, 9 December 2003.

Granma (La Habana), Decreto-Ley No. 259 sobre la entrega de tierras ociosas en usufructo, 18 July 2008.

Granma (La Habana), Felicitación de Raúl por los resultados de la agricultura urbana. *Granma*, 30 January 2001.

Granma (La Habana), Fortalecen red estatal de mercados agropecuarios. *Granma*, 19 December 2003.

Granma (La Habana), Necesarios cambios en relaciones con el sector cooperativo-campesino, 18 December 2006.

Granma Internacional (La Habana), En 15 años: La Isla redujo 20 veces uso de plaguicidas. *Granma Internacional*, 26 November 2004.

Hagelberg, G.B. and J. Alvarez. 2007. 'Cuba's Disfunctional agriculture,' *Cuba in Transition*, ASCE, p. 144-158. Washington DC.

Hatchwell E. and S. Calder. 1995. *Cuba in Focus: A guide to the People, Politics and Culture*. London: Latin America Bureau.

Holt-Jiménez, E. 2006. *Campesino a Campesino: Voices from Latin America's Farmer to Farmer Movement for Sustainable Agriculture*. Oakland, CA: [Food First Books](#).

Jiménez, F. M. 1992. 'Régimen de Estructura Agraria: Tenencia de la Tierra y Tamaño de las Fincas en la Cuba del Futuro,' *Desarrollo Agrícola de Cuba*, vol. I, Miami, Florida.

Kay, C. 2006. 'Rural Poverty and Development Strategies in Latin America,' *Journal of Agrarian Change*, vol. 6, no.4, p. 455-508.

Kost, W. 1998. 'Cuba's Agriculture: Collapse & Economic Reform,' *Agricultural Outlook*, Economic Research Service/USDA, October 1998, p. 26-30.

Lage, C. 1992. Interview on Cuban television, 6 November, 1992.

Lage, C. 1997. 'Palabras de Carlos Lage ante el Congreso...', *Granma* (La Habana), 10 October 1997.

Lappé, F.M. (et al.).1998. *World Hunger: Twelve Myths*. New York and London: Grove Press and Earthscan, 2nd edition.

Lugo-Fonte, O. 2000. 'Nuestro deber patriótico es producir para el pueblo.' Entrevista a Orlando Lugo Fonte, presidente de la Asociación Nacional de Agricultores Pequeños (ANAP). *Granma*, 17 May 2000.

Martin, L. 2002. 'Transforming the Cuban countryside: Property, markets, and technological change,' in: Funes, F., García, L., Bourque, M., Pérez, N., Rosset, P. (eds.), *Sustainable agriculture and resistance: Transforming food production in Cuba*. p. 57-71. Oakland: Food First Books.

Martín, L. 2007. *Equidad y movilidad social en el contexto de las transformaciones agrarias de los años noventa en Cuba*. The David Rockefeller Center for Latin American Studies, working paper series (No. 07/08-2).

Martín, M. and D. Pérez. 2007. 'Agricultura Cubana...', *Juventud Rebelde*, 16 December 2007.

Martínez Viera, R. and G. Hernández. 1995. *Los biofertilizantes en la agricultura cubana. Proceedings of the Second National Meeting of Organic Farming. Conferences and Round tables*. Animal Sciences Institute, ICA (May 17-19), ACAO, Havana, Cuba, pp. 43-47.

Maura, J.A. 1994. *Producción de Biopesticidas. El caso de Cuba*. Informe Taller Regional sobre Tecnologías Integradas de Producción y Protección de Hortalizas. FAO. Cuernavaca, México, p. 69-74.

Mesa-Lago, C. 1998. 'Assessing Economic and Social Performance in the Cuban Transition of the 1990s,' *World Development*, vol. 26, no. 5, p. 857-876.

Mesa Lago, C. 2005. 'Social and economic problems in Cuba during the crisis and subsequent recovery,' *CEPAL Review*, n°.86, p.177-199.

Mesa-Lago, C. 2008. 'The Cuban Economic at the Crossroads.' *Boletín Real Instituto Elcano*, May 2008.

Mesa-Lago, C. 2009a. 'Balance económico-social de 50 años de Revolución en Cuba,' *América Latina Hoy*, no. 52. p. 41-61.

Mesa-Lago, C. 2009b. 'Las crecientes disparidades económicas y sociales en Cuba: Impacto y recomendaciones para el cambio.' Preparado para el Proyecto sobre la Transición (CTP) Instituto de Estudios Cubanos y Cubano-Americanos (ICCAS), Universidad de Miami. Private email to Elisa Botella, 13th September, 2009.

Miedema J. and M. Trinks. 1998. *Cuba and Ecological Agriculture. An analysis of the conversion of the Cuban agriculture towards a more sustainable agriculture.* MSc thesis, Wageningen Agricultural University.

MINAGRI (Ministerio de Agricultura). 1988. *Datos básicos.* Ministerio de la Agricultura, Havana, Cuba.

MINAGRI. 1989. *Datos básicos.* Ministerio de la Agricultura, Havana, Cuba.

MINAGRI. 1991. *Datos básicos.* Ministerio de la Agricultura, Havana, Cuba.

MINAGRI. 1992. *Datos básicos.* Ministerio de la Agricultura, Havana, Cuba.

MINAGRI. 1996. Statistics bulletins. Internal documents, Ministry of Agriculture of Cuba, Havana, Cuba.

MINAGRI. 2002. *Datos del Grupo Nacional de Agricultura Urbana.* Ministerio de la Agricultura, Havana, Cuba.

MINAGRI. 2007. *Datos básicos.* Ministerio de la Agricultura, Havana, Cuba.

Monreal, P. 2004. 'La globalización y los dilemas de las trayectorias económicas de Cuba', in Pérez Villanueva (et al.) (eds), *Reflexiones sobre la Economía Cubana* (Havana: Editorial de Ciencias Sociales), p.471-490.

Monreal, P. 2007. 'Industrial Policy and Clusters in Cuba,' in Domínguez (et al.) (eds), *The Cuban Economy at the Start of the Twentieth Century*, (Harvard University: The David Rockefeller Center), p. 91-119.

Murphy, C. 1997. 'Cuba's Transition to Organic Agriculture,' *Cuba Update*, Winter 1997.

Murphy, C. 1998. 'Urban Garden's Increase Food Security in Times of Crisis: Havana, Cuba,' *Community Food Security news*, Fall, 1998.

Murphy, C. 1999. *Cultivating Havana: Urban agriculture and food security in the years of crisis.* (Food First Development Report No. 12). Oakland: Institute for Food and Development Policy.

NGO/CSO Forum for food sovereignty. 2002. *Food Sovereignty: A Right For All*. Political Statement of the NGO/CSO Forum for Food Sovereignty. <http://www.peoplesfoodsovereignty.org>

Nova, A. 1993. Cuba: *¿Modificación o Transformación Agrícola?* Mimeographed article. La Habana, Cuba: CEEC.

Nova, A. 2001. Cuba: 'Hacia Agricultura Sustentable,' in *Evolución y Trayectoria de La Agricultura Cubana*, FLACSO Universidad de La Habana.

Nova, A. 2003. 'La UBPC y el cooperativismo en la agricultura cubana.' Private Email to Elisa Botella, June 2006.

Nova, A. 2004. 'La agricultura urbana y la producción de alimentos', private email to Elisa Botella. 26 June 2006.

Nova, A. 2005. 'La Agricultura en Cuba 2000-2006', private email to Elisa Botella. 14 October 2008.

Nova, A. 2006a. *La agricultura en Cuba: evolución y trayectoria 1959-2005*. La Habana: Editorial Ciencias Sociales.

Nova, A. 2008b. 'El modelo agrícola cubano en la etapa 1993-2008', private email to Elisa Botella. 14 October 2008.

Nova, A. 2008c. 'El modelo agrícola cubano en la etapa 1959-1990', private email to Elisa Botella. 14 October 2008.

Nova, A. 2008d. 'El Actual Mercado Interno de los Alimentos', private email to Elisa Botella. 14 October 2008.

Nova, A. 2008e. 'La agricultura en Cuba actualidad y transformaciones necesaria', private email to Elisa Botella. 14 October 2008.

Nova, A. 2008f. 'Modelo agrícola cubano surgimiento y evolución 1510 hasta 1959', private email to Elisa Botella. 14 October 2008.

OECD. 2003. *Agricultural Policies in OECD Countries. Monitoring and Evaluation*. Paris: OECD.

ONE: National Bureau of Statistics. 1989. *Anuario estadístico de Cuba, 1989*, Havana.

ONE: National Bureau of Statistics. 1990. *Anuario estadístico de Cuba, 1990*, Havana.

ONE: National Bureau of Statistics. 1994. *Anuario estadístico de Cuba, 1994*, Havana.

ONE: National Bureau of Statistics. 1997. *Anuario estadístico de Cuba, 1997*, Havana.

ONE: National Bureau of Statistics. 1998. *Anuario estadístico de Cuba, 1998*, Havana.

ONE: National Bureau of Statistics. 2000. *Anuario estadístico de Cuba, 2000*, Havana.

- ONE: National Bureau of Statistics. 2001. *Anuario estadístico de Cuba, 2001*, Havana.
- ONE: National Bureau of Statistics. 2003. *Anuario estadístico de Cuba, 2003*, Havana.
- ONE: National Bureau of Statistics. 2004. *Anuario estadístico de Cuba, 2004*, Havana.
- ONE: National Bureau of Statistics. 2007a. *Anuario estadístico de Cuba, 2007*, Havana.
- ONE: National Bureau of Statistics. 2007b. *Panorama uso de la tierra, Cuba 2007*, Havana.
- ONE: National Bureau of Statistics. 2008a. *Panorama Económico y Social 2007*, Havana.
- ONE: National Bureau of Statistics. 2008b. *Anuario estadístico de Cuba, 2008*, Havana.
- ONE: National Bureau of Statistics. 2009. *Anuario estadístico de Cuba, 2009*, Havana.
- ONE: National Bureau of Statistics. 2010. *Anuario estadístico de Cuba, 2010*, Havana.
- Pagés, R. and R. Castaño. 2006. 'Orden para la Comercialización', *Granma*, 14/II.
- Pastor, M. Jr. 1992. *External shocks and adjustment in contemporary Cuba*. The International & Public Affairs Center, Occidental College (Working Paper).
- Perera, J. 2004. *Programa Campesino a Campesino en Cuba: Un movimiento agroecológico a escala nacional*. Proceedings II International Symposium on Agroecological Livestock (SIGA 2004), Cuba, pp. 176-179.
- Pérez, N., and L.L. Vázquez. 2002. 'Ecological Pest Management' in Funes, F., García, L., Bourque, M., Pérez, N., Rosset, P. (eds.), *Sustainable agriculture and resistance: Transforming food production in Cuba*. Oakland: Food First Books, p. 109-143.
- Pérez-Rojas, N. (et al.). 1999. *Cambios tecnológicos, sustentabilidad y participación*. Cuba: Universidad de La Habana.
- Pérez-Villanueva (et al.). 2004. *Reflexiones sobre la Economía Cubana*. Havana: Editorial de Ciencias Sociales.
- PNAN (Plan Nacional de Acción para la Nutrición). 1994. *Plan Nacional de Acción para la Nutrición*. República de Cuba, Havana, Cuba.
- Pretty, J. 2002. *Agri-Culture. Reconnecting People, Land and Natur*. London: Earthscan Publications Limited.
- Puerta, R. A. and J. Alvarez. 1993. *Organization and Performance of Cuban Agriculture at Different Levels of State Intervention*. (International Working Paper

Series IW93-14). University of Florida, Gainesville: Food and Resource Economics Department, Florida, July 1993.

Quintana, D. (et al.). 1995. 'Mercado agropecuario: ¿apertura o limitación?,' *Cuba: Investigación económica*, no. 4, La Habana: Instituto Nacional de Investigación Económica (INIE), diciembre.

Rego (et al.).1986. 'Eficacia técnico-económica de *Lixophaga diatraeae* basada en el índice poblacional de *Diatraea saccharalis*,' *Revista Protección Vegetal* (Cuba), vol. 1, p. 255-260.

Republica de Cuba. 1999. *Norma Cubana de Producción Orgánica*. Dept. Quality Control, MINAG, Havana.

Ricardo, J.M. 2003. 'Family Farms: the cornerstone of the agricultural sector in the Cuba of the future,' *Cuba in Transition, ASCE 2003*, p.234-246.

Río-Labrada, H. (et al.). 2006. *Fitomejoramiento participativo: Los agricultores mejoran cultivos*. Havana, Cuba: Instituto Nacional de Ciencias Agrícolas (INCA).

Ríos, A. and S. Aguerrebere. 1998. *La tracción animal en Cuba*. Evento Internacional Agroingeniería, Havana, Cuba.

Ríos-Labrada, H. 1999. *Participatory Plant Breeding in Cuba*. Havana, Cuba: INCA.

Ríos-Labrada, H. 2004. 'Logros en la implementación del fitomejoramiento participativo en Cuba,' *Cultivos Tropicales*, vol.24, no. 4, p.17-23.

Rodríguez-Castellón, S. 1999. 'Cuba: la Evolución y Transformación del Sector Agropecuario en los Anos Noventa,' *Economics Press Service*, no. 14 July 1999. IPS, Havana.

Rodríguez-Castellón, S. 2004. 'La agricultura orgánica en Cuba', in Pérez Villanueva (et al.) (eds), *Reflexiones sobre la Economía Cubana* (Havana: Editorial de Ciencias Sociales), p.367-383.

Rosset, P. 1999. *The multiple functions and benefits of small farm agriculture: In the context of global trade negotiations*. (Food First Policy Brief No. 4). Oakland: Institute for Food and Development Policy.

Rosset, P. 2005. 'Moving Forward: Agrarian Reform and Food Sovereignty.' Land Research Action Network (LRAN). Archived at: <<http://www.landaction.org>>

Rosset, P. 2006. *Food is different*. London and New York: Zed Books.

Rosset, P. and M. Benjamin. 1994. *The Greening of the Revolution: Cuba's Experiment with Organic Agriculture*. Melbourne: Ocean Press.

Sáez, H. 1997. 'Resource Degradation, Agricultural Policies, and Conservation in Cuba,' *Cuban Studies*, vol. 27, p. 49-50.

Sinclair M. and M. Thompson. 2001. *Cuba Going Against the Grain: Agricultural Crisis and Transformation*. Oxfam America.

Treto, E. (et al.). 2002. 'Advances in organic soil Management,' in Funes (et al.). (eds.), *Sustainable agriculture and resistance: Transforming food production in Cuba*. (Oakland: Food First Books) p. 164-189.

Vandermeer, J. (et al.). 1993. 'Cuba and the Dilemma of Modern Agriculture,' *Agriculture and Human Values*, vol.10, no.3, p.3-8.

Via Campesina. 2002. Food Sovereignty. Flyer distributed at the World Food Summit +5, Rome, Italy. <http://www.peoplesfoodsovereignty.org/statements.html>

Vidal, P. 2009. 'La macroeconomía cubana en 2008: datos al cierre del año,' *Economic Press Service*, 15 de enero 2009.

Villegas, R. 1999. '¿Qué tipo de propiedad representan las UBPC?' in Pérez Rojas, N., Echevarría, D., González, E., García, M. (eds.), *Cambios tecnológicos, sustentabilidad y participación*. (Cuba: Universidad de La Habana), p. 167-183.

World Food Summit. 1996. Declaration adopted at the World Food Summit. Italian Senate of the Republic, Rome, 13-16 November 1996, Rome: FAO.

Wright, J. 2005. *¡Falta Petroleo! Cuba's experiences in the transformation to a more ecological agriculture and impact on food security*. PhD thesis, Wageningen University, The Netherlands.

LIST OF INTERVIEWS AND MEETINGS

Acosta, X. 2008. Interview with Ing. Xiomara Acosta, Civil Servant, Project manager, ANAP, Cuba, 10 Nov. 2008.

Arteaga. C. 2008. Interview with BA. Carlos Arteaga, ACTAF, Havana, Cuba, 9 Oct. 2008.

Betancourt, G. 2008. Interview with Guillermo Betancourt, INIE, Havana, Cuba, 15 October-25 Nov. 2008.

Calderón, L. 2009. Interview with Luis Calderón, Planification director, IDA, San José, Costa Rica, 2 May. 2009.

Calves, E. 2008. Interview with Eduardo Calves, PIAL program, INCA, Havana, Cuba, 6-14 Nov. 2008.

Cruz, J. 2008. Interview with Dr. Jesús Cruz, Facultad de Economía, Universidad de La Habana, Havana, Cuba, 01-15 Nov. 2006.

Fernández-Domínguez, P. 2006. Interview with Pablo Fernandez, Ministry of Economy and Planning, Cuba, 20 June. 2006.

Fernández-Domínguez, P. 2008. Interview with Pablo Fernandez, Ministry of Economy and Planning, Cuba, 27 November. 2008.

Funes, F. 2006. Interview with Dr. Fernando Funes, ACTAF, Havana, Cuba, 23-25 June. 2006.

Funes, F. 2008. Interview with Dr. Fernando Funes, ACTAF, Havana, Cuba, 2-15 October. 2008.

Funes-Monzote, F. 2006b. Interview with MSc. Fernando Funes-Monzote, Havana, Cuba, 3-29 June. 2006.

Funes-Monzote, F. 2008b. Interview with PhD Fernando Funes-Monzote, Havana, Cuba, 1 October-29 November. 2008.

Interview with farmers of Batabanó, La Habana, Cuba, 13 November, 2008

Interview with farmers of San Antonio de los Baños, La Habana, Cuba, 19 November. 2008

Interview with farmers of San José de Las Lajas, La Habana, Cuba, 15 November. 2008

Interview with farmers of the CPA La Palma, Pinar del Rio, Cuba, 27 June, 2006

Nova, A. 2006b. Interview with Dr. Armando Nova, University of Havana, Centre for the Study of the Cuban Economy (CEEC), 27 June. 2006.

Nova, A. 2008a. Interview with Dr. Armando Nova, University of Havana, Centre for the Study of the Cuban Economy (CEEC), 2 October-27 Nov. 2008.

Ponce, M. 2008. Interview with MSc. Manuel Ponce, PIAL leader in Havana province, 6-15 Nov. 2008.

Ríos-Labrada, H. 2006b. Interview with Dr. Humberto Ríos and his Research Team of INCA, 29 June. 2006.

Ríos-Labrada, H. 2008. Interview with Dr. Humberto Ríos and his Research Team of INCA, 1st Nov. 2006.

Sánchez, R. 2006. Interview with Roberto Sánchez, Fundación Núñez Jiménez para la Naturaleza y el Hombre, Havana, 19 June. 2006.

Suárez, J. 2006. Interview with Jesús Suárez, University of Matanzas, Cuba, 12 June. 2006.

Universidad Agraria de la Habana (Cuba). 2006. EIDAR, *Encuentro Internacional de Desarrollo Agrario y Rural, por un Desarrollo Sostenible*, 6-9 June 2006.

Universidad de La Habana, Facultad de Economía (Cuba). 2008. III Seminario Internacional sobre cooperativismo, 18-20 November 2008.

Universidad de Matanzas, Estación Experimental de Pastos y Forrajes de Indio Hatuey (Cuba). 2006. *Agricultura Sostenible y Desarrollo Agropecuario*, 12-15 June 2006.

Villalobos Briceño, A. L. 2009. Interview with Lorena, Central Pacific region, IDA, Costa Rica, 2-3 June. 2009.

Viquez Astorga, J. 2009. Interview with Judith Viquez, Caribbean region, IDA, San José, Costa Rica, 8-9 June. 2009.