Instituto de Investigaciones de Cítricos y Frutales, Cuba
Research Institute of Organic Agriculture (FiBL), Ackerstrasse, CH-5070 Frick, www.fibl.ch

Development of Organic Fruit Production in Cuba

Conversion planning on a large citrus farm in Cienfuegos (Cuba).

Coconut farm in Moron (Cuba). Tests with leguminous cover crops (Neonotonia wightii) and sheep pasturing.

Objectives of the project

- Develop the scientific base of and develop solutions for organic farming in Cuba
- Develop the production, processing, certification and marketing of organic citrus and tropical fruits in Cuba
- Capacity building and development of know how on organic farming in Cuba
- Institution building and development of organic agriculture structures in Cuba
- Development of partnerships between Cuban producers, processors and traders in Europe

Local partners

- Instituto de Investigaciones de Cítricos y otros Frutales (IICF)
- Corporación Nacional de Cítricos (CNC)
- Citricos Ceiba Farm
- Ministerio de la Agricultura
- Asociación Cubana de Agricultura Orgánica
- Instituto de Investigaciones de Pastos y Forrajes (IIPF)
- Instituto Nacional de Investigaciones de la Caña de Azúcar (INICA)
- Instituto de Investigaciones Fundamentales en Agricultura Tropical (INIFAT)
- Instituto de Suelos
- Centro de Mecanización Agropecuaria (CEMA)
- Instituto de Investigaciones de Mecanización Agropecuaria (IIMA)
- Universidad de Ciego de Avila
- Universidad Agraria de La Habana

Project activities

- Development of field research concepts and design of test plots on organic citrus production
- Designing and implementing a 50 ha pilot area of organic citrus production
- Feasibility studies and conversion planning of large scale citrus and tropical fruit farms
- Training of farmers, extension workers, scientists
- Elaboration of extension leaflets
- Building a Cuban certification unit
- Elaboration of market studies and supporting the marketing of organic fruits and processed products

Why organic farming in Cuba?

- large-scale, capital intensive and highly modernised monocultures (economies of scale);
- extreme shortages of fuel, fertilizers and pesticides;
- material incentives and labour reorganisation of the state farms to cooperative-like UBPCs with the objective of preserving productivity;
- creation of an ecological mosaic of production systems and landscape elements;
- well prepared human resources and maintaining a large number of local centres;
- organic farming may not only allow Cuba to survive under high uncertainties but may also release it from economic dependence.

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Evaluation and Development of Organic Citrus Production Methods in Cuba

Objectives

There are three main agronomic questions related to the conversion of citrus plantations in Cuba:

1. How to guarantee nitrogen fertilization?
2. How to substitute herbicides and how to cover the soil?
3. How to produce an optimal compost with the existing raw materials?

Much research work has already been done on these issues for most crops and a lot of practical experience exists on farm level worldwide. But only little experience is available for organic citrus production in the tropics. Therefore it is necessary to study these questions specifically for the case of organic citrus production under tropical conditions in Cuba.

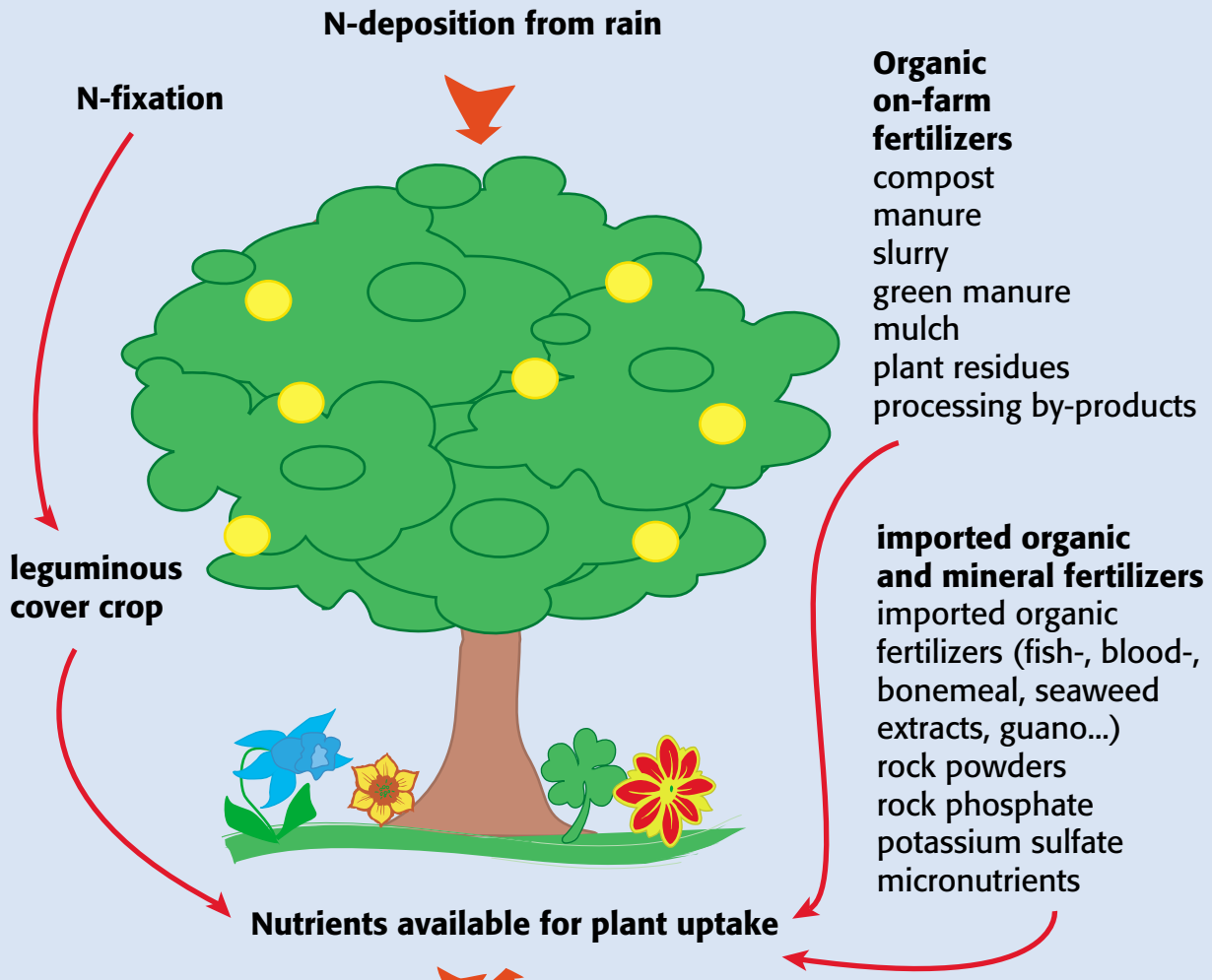
The test plots pursue the following objectives:

- to evaluate specific organic management methods on Cuban citrus plantations in order to develop the best management practice under practical conditions;
- to evaluate and demonstrate the effects of organic production methods under practical conditions.

Fertilization experiment

Crop yields are a fundamental factor of economic success and depend very much on nitrogen fertilization. Before making use of imported fertilizers, assessing the physical and biological condition of the soil and optimizing the level of organic matter are the methods preferred in organic farming to solve nutrient deficiency problems.

A crucial question is how to guarantee nitrogen nutrition on large citrus plantations by organic measures only. The aim of this experiment therefore is to evaluate the agronomic, ecological and economic effects of four different fertilization concepts:



1. Variant 1 «organic on-farm fertilizers»
2. Variant 2 «imported organic fertilizers»
3. Variant 3 «step by step from synthetic to organic fertilizers»
4. Variant 4 «control/status quo».

Cover crop experiment

One of the keys to organic farming is to find solutions to substitute herbicides. In reality this question has to be extended to that of how to manage soil cover on citrus plantations. The objective of the cover-crop experiment is to evaluate the following four different soil management concepts and to study their effects on tree nutrition and on soil conservation:

1. Variant 1 «FiBL sandwich system»
2. Variant 2 «traditional cover crop»
3. Variant 3 «tree strip tillage, alleyway mulching»
4. Variant 4 «herbicide (control/status quo)».

In all four variants, the alleyway is covered by a leguminous cover crop and receives compost applications every second year.

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Evaluation and Development of Organic Citrus Production Methods in Cuba

- Methods of organic fruit production
- Organic farming resarch methods, methods of field research
- Analysis and monitoring of special parameters (soil microbial biomass, carbon and nitrogen mineralization, macrofauna etc.)
- Transfer of methods

Colaboration Contract FiBL-IICF-Ceiba
- Definition of aims, variants and monitoring parameters
- Concept and design of test plots
- Scientific coaching and coordination
- Evaluation and transfer of results

- Methods of citrus production
- Citrus and fruit farming research methods, methods of field research
- Analysis and monitoring of special parameters (pest and disease development, development of cover crops, soil profile etc)
- Plant protection concept

Ceiba Citrus Farm
- Realization of necessary investments
- Implementation in the field: application of all treatments
- Monitoring of simple parameters (yields, manpower etc.)

Inst. Suelos
Soil analysis

CEMA, IIMA
Specific equipment

- **Livestock farms**
- **Sugar cane mills**
- **Citrus processing plants**

Compost raw material

IIPF
Cover crops

INICA, INIFAT
Composting mechanization

Compost experiment

Organic farms must implement a long-term soil management program. The aim is to replenish the soil ecosystem and to make full use of on-farm natural resources. A very important method to improve soil quality and to supply the plants with nutrients from local natural resources is the application of compost.

Composted manure is produced in specialized institutions (Empresas de Suministro Agriopecuario) in a fermentation process. In Cuba there is only little experience with on-farm compost production. The most important question here is the raw material mixture. In Cuba, the following raw materials are available:

- animal manure from poultry, pig and cattle farms
- by-products from the food industry: sugarcane bagasse, citrus-, pineapple- and coffee-pulp and peel
- plant material: plant residues, straw

The objective of the compost experiment is to evaluate five different raw-material mixtures and to develop, at the same time, a system that permits a good fermentation with locally available material. The nutrient value and quality of the compost as well as its effects on the soil will also be studied.

Sugarcane bagasse is available in large quantities in Cuba and is a very valuable raw material for compost production.