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Local agricultural innovation system for rural producers in Consolación del Sur, Pinar del Río, Cuba

Raymundo Vento Tielves, María Mercedes González Hernández, Evelyn Pérez Rodríguez,
Bettina Eichler-Löbermann, Iracely Milagros Santana Ges, Reina María Rodríguez García,
Belkys María Pelegrin González, Daileen Caro Sánchez

¹University of Pinar del Río, Center for Environment and Natural Resources Studies, Cuba

²Rostock University, Agricultural and Environmental Faculty, Germany

Corresponding author. E-mail: ventotielves@gmail.com and tielve@upr.edu.cu

Abstract

The research developed inserted in the DiveCropS Project: Diversifying Cropping Systems financed by DAAD of Germany, in the region of Consolación del Sur, in Pinar del Río province, in Cuba. In this region the use of inappropriate technologies has caused serious damage to agricultural production, decreasing yields and limiting food production, decreasing yields and limiting food production, and Limited integration of rural actors in carrying out production, transformation and marketing processes significantly limits the productive results of family farming farms. In response to this problem, the objective of Implementing a Local Agricultural Innovation System (Sial) is outlined in order to achieve synergy between rural producers for greater agricultural productions in the Consolación del Sur municipality. The research methodology used begins with a Diagnosis of the model of agricultural production, Study of the Climatic changes in the region, Study to management of soil and water and other indicators. The results achieved allow us to demonstrate that the characteristics of the agricultural context in the Consolación del Sur municipality show marked potential in productive systems with a high range of diversity and with an important vocation for the development of local enterprises of high productive value, but do not achieve full development. of their capacities due to the insufficient integration between rural actors. The implemented Local Agricultural Innovation System allows achieving greater synergy and integration between rural producers that allows a closure of the processes from production, transformation and commercialization, the actions proposed in the innovation system presuppose a comprehensive management approach with training, integration of rural actors and social participation, as essential elements within the process of knowledge management and technological innovation, reaching the closure of productive processes of agroecological techniques, agroindustry and commercialization.

Keywords: Agroecology, agroforestry, biodiversity, family farming, soil

Contact Address: Raymundo Vento Tielves, University of Pinar del Río, Center for Environment and Natural Resources Studies, Cuba, e-mail: tielve@upr.edu.cu.

Introduction

Innovation has played a leading role in the development of countries and economic activity as a whole, among them is the agri-food sector, in which the application of various innovations has managed to improve productivity and access to food, (Villatoro-Hernández, Soto-Flores, Cuevas-Zuñiga, 2020).

In the agricultural field, innovation is verified as interactive learning that combines scientific knowledge and the knowledge accumulated by producers. Practices should be oriented towards the empowerment of diversified agricultural systems, with capacities to increase production and promote integration and participation processes that promote substantial social improvements in rural areas. (Suset, Miranda y Machado, 2018).

In the case of Cuba, an eminently agricultural country, a situation occurs that complicates the development of agricultural activity at the national level, given that only 20% of the population lives in rural areas and 80% is integrated into urban centers. This puts at risk any local development strategy in the agricultural sector that is desired to be developed in rural territories (González et al., 2018).

This situation determined the following problem to be investigated: in the system agriculture sector in Consolación del Sur the use of inappropriate technologies has caused serious damage to agricultural production, decreasing yields and limiting food production, decreasing yields and limiting food production, and Limited integration of rural actors in carrying out production, transformation and marketing processes significantly limits the productive results of family farming farms.

The Objective of research is the Implementing a Local Agricultural Innovation System (Sial) is outlined in order to achieve synergy between rural producers for greater agricultural productions in the Consolación del Sur municipality.

Material and Methods

The research was carried out in The Consolación del Sur municipality is located on the southern plain of the central eastern part of the province, bordering to the north with the municipalities of Viñales, La Palma and Los Palacios, to the south with the Gulf of Batabanó, to the east with the Los Palacios municipality and to the west with the Pinar del Río municipality

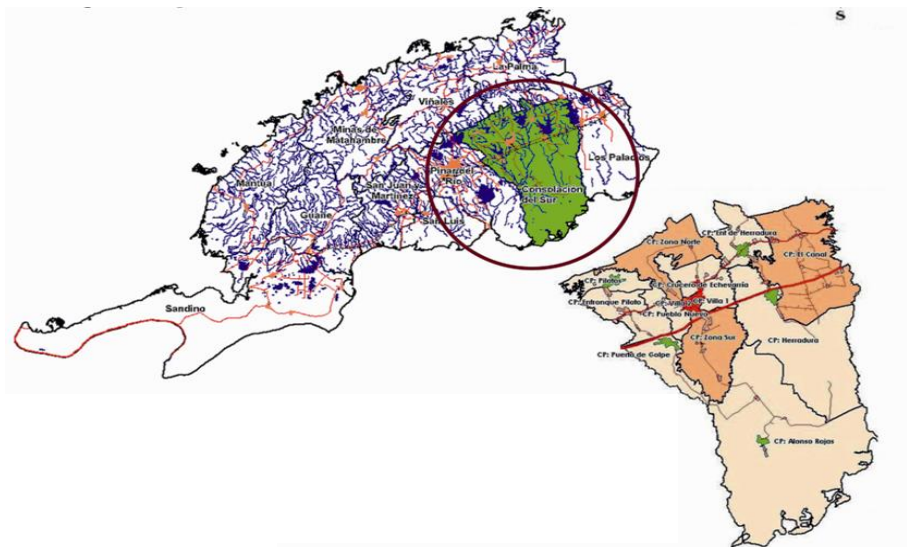


Figure 1. Consolación del Sur Municipality, province of Pinar del Río.

The municipality has a territorial area of 1,111.90 km² and a population according to the 2012 Census of 88,055 inhabitants for a population density of 79.2 inhabitants/km².

The climatic characteristics it can be considered within the classification of humid tropical savanna bioclimate, the fundamental variables that will determine its behaviour are:

- ✓ Precipitation: The annual average in the areas of greatest economic importance is 1,346.5 mm and more than 80% of this in the rainy period (May-October).
- ✓ Temperature: The temperature behaves as follows: the annual average minimum is 20.4 0C, with an average maximum of 29.8 0C.
- ✓ Relative Humidity: The average relative humidity is 79.6%.

The soils, for the most part, are of medium category, predominated by type II Gley Ferralitic. Soil situation according to study 1: 25,000

- ✓ Agricultural area affected by strong and medium erosion (14,429.28 ha) 23.03%.
- ✓ Agricultural area affected by acidity (56,902.27 ha) 90.8%.
- ✓ Agricultural area affected by low fertility (62,010.66 ha) 98.9%.
- ✓ Agricultural area with shallow soils (14,429.28 ha) 3.03%.

The Methodology applied in the research was based on through the Participatory Rural Diagnosis and field observations, the characterization of the agricultural production of the municipality was carried out.

- ✓ Diagnosis of farms and research areas
- ✓ Study to management of soil and water
- ✓ Agroforestry technologies and methodologies registry
- ✓ Diagnosis of type of agriculture production
- ✓ Methods of inventory and monitoring of biological diversity in agro ecosystems
- ✓ Monitoring and validation of the biodiversity
- ✓ Study of the Climatic changes in the region
- ✓ Monitoring and validation of Good Agricultural Practices
- ✓ Validation of the Rural Extension Program in the area

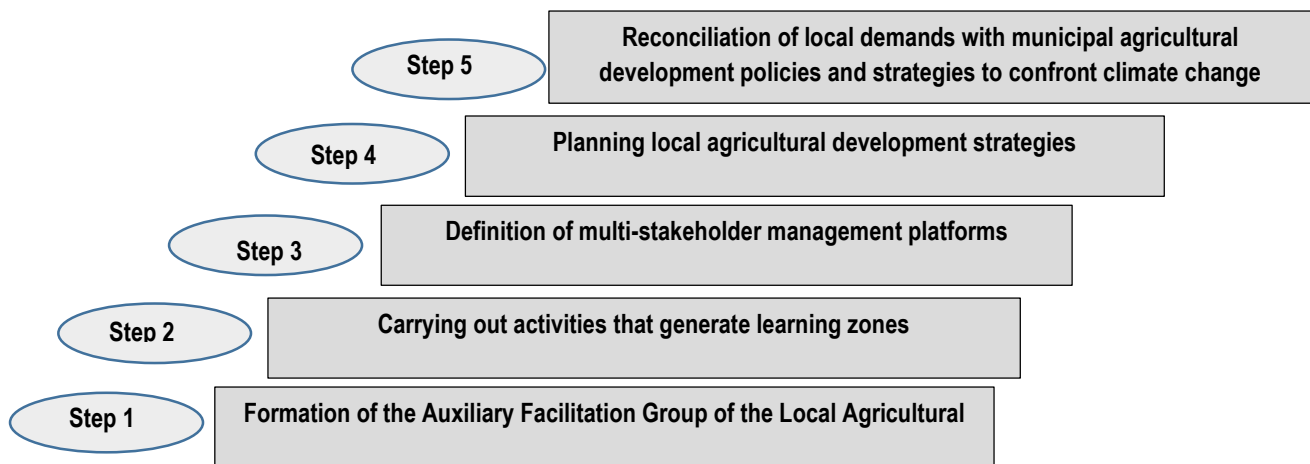
Results and Discussion

Throughout human history, innovation has played a fundamental role in the development of societies. In the agricultural field, innovation is verified as interactive learning that combines scientific knowledge and the knowledge accumulated by producers.

For the implementation of the local agricultural innovation system to confront climate change, the following problems were determined through the diagnosis

- ✓ Low natural fertility and soil degradation.
- ✓ Soil Erosion reaches 21.39% with an Acidity of 93.9%.
- ✓ Salinity is 4.25%, in addition to the advance of the saline intrusion wedge that covers 26.44% of the municipal territory.
- ✓ Loss of biodiversity and ecological potential.
- ✓ Pollution and poor quality of water.
- ✓ There is limited development of Urban and Suburban agriculture.
- ✓ Difficulties with irrigation systems, machinery and the modernization of agroindustry and livestock.
- ✓ Little industrial development related to the agricultural economic base.
- ✓ Limited development and use of renewable energy sources (solar, biomass, etc.)

Chronology to achieve creation of Local Agricultural Innovation System



An important element in the success of the implementation process of the Local Agricultural Innovation System is a capacity of the human capital. The management of local agricultural innovation bases its success on the training of human capital, man is the starting point of the success of the results.

The Good Agricultural Practices implemented through the Local Agricultural Innovation System includes:

- ✓ Diversification of Productions
- ✓ Planting of forest and fruit trees in boundaries or living fences
- ✓ Conformation of Living Barriers
- ✓ Forest design for biological corridors
- ✓ Design of agro-silvo-livestock models
- ✓ Agroforestry and agrobiodiversity techniques
- ✓ Application of good agricultural practices in crop diversity

Integration is achieved in management with training, innovation, collaboration between local actors and social participation, as essential elements within the of local agricultural innovation

Conclusions and Outlook

Agriculture through its production processes generates environmental impacts, with severe impacts and great vulnerability to climate change

The implemented of Local Agricultural Innovation System from agricultural producers in Consolación del Sur is the best solution for the confront to Climate Change and to increase the resilience of the system farms and integrated use and management of soil, water, crops and health

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