

Original article

Actions for the implementation of the Local Agricultural Innovation System in the municipality of Pinar del Río



Acciones para la implementación del Sistema de Innovación Agropecuaria Local en el municipio Pinar del Río

Ações para a implementação do Sistema de Inovação Agrícola Local no município de Pinar del Río

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ABSTRACT

The work proposes a plan of actions to implement the Local Agricultural Innovation System in the municipality of Pinar del Río, thus contributing to food security and local development that includes state and non-state service entities, enterprises and productive units, science and technology units, popular councils and non-governmental organizations, among others, as part of the implementation of the National Plan for Food Security and Sovereignty and Food and Nutrition Education, based on the governance of Local Food Systems, which favors the structural and content updating of the Municipal Development Strategy and the definition of Local Development Projects aimed at food production, processing and marketing. To this end, empirical methods, surveys, interviews and work

with specialists were used to establish the practical theoretical bases for the diagnosis as a reference for the proposed objective: to propose an action plan for the Local Agricultural Innovation System that contributes to the plan for food security and sovereignty and nutritional education in the municipality in a sustainable way and that allows a healthy food production that meets the needs of local self-sufficiency in the municipality of Pinar del Río on the basis of good agroecological practices.

Keywords: food production; food and nutrition security; local development.

RESUMEN

El trabajo propone un plan de acciones para implementar el Sistema de Innovación Agropecuario Local en el municipio Pinar del Río, contribuyendo así a la seguridad alimentaria y al desarrollo local que abarca entidades de servicios estatales y no estatales, empresas y unidades productivas, unidades de ciencia y técnica, consejos populares y organizaciones no gubernamentales, entre otros, como parte de la implementación del Plan Nacional de Seguridad y Soberanía Alimentaria y Educación Alimentaria y Nutricional, sobre la base de la gobernanza de Sistemas Alimentarios Locales lo que propicia la actualización estructural y de contenidos de la Estrategia de Desarrollo Municipal y la definición de Proyectos de Desarrollo Local que apuntan a la producción de alimentos, su transformación y comercialización. Para ello, se emplearon métodos empíricos, encuestas, entrevistas, trabajo de mesa con especialistas lo cual permitió establecer las bases teóricas prácticas para el diagnóstico como referente del objetivo propuesto: proponer un plan de acciones del Sistema de Innovación Agropecuario Local que tribute al plan de seguridad y soberanía alimentaria y educación nutricional en el municipio de forma sostenible y que permita una producción de alimentos sana que supla las necesidades del autoabastecimiento local del municipio Pinar del Río sobre la base de buenas prácticas agroecológicas.

Palabras clave: producción de alimentos; seguridad alimentaria y nutricional; desarrollo local.

RESUMO

O trabalho propõe um plano de ação para implementar o Sistema de Inovação Agrícola Local no município de Pinar del Río, contribuindo assim para a segurança alimentar e o desenvolvimento local

que inclui entidades de serviços estatais e não estatais, empresas e unidades produtivas, unidades de ciência e tecnologia, conselhos populares e organizações não governamentais, entre outros, como parte da implementação do Plano Nacional de Segurança Alimentar e Soberania Alimentar e Educação Alimentar e Nutricional, baseado na governação dos Sistemas Alimentares Locais, que favorece a actualização estrutural e de conteúdo da Estratégia de Desenvolvimento Municipal e a definição de Projetos de Desenvolvimento Local destinados à produção, transformação e comercialização de alimentos. Para tal, foram utilizados métodos empíricos, inquéritos, entrevistas e trabalho com especialistas para estabelecer as bases teóricas práticas do diagnóstico como referência para o objetivo proposto: propor um plano de ação para o Sistema de Inovação Agrícola Local que contribua para o plano de segurança e soberania alimentar e educação nutricional no município de forma sustentável e que permita uma produção alimentar saudável para satisfazer as necessidades de autossuficiência local no município de Pinar del Río, com base em boas práticas agroecológicas.

Palavras-chave: produção alimentar; segurança alimentar e nutricional; desenvolvimento local.

INTRODUCTION

The concept of food security has evolved over time, in accordance with the current situation and the cultural development of each era. At the United Nations Conference on Food and Agriculture held in 1943, a commitment was made to create a permanent organization, which took shape on October 16, 1945, with the founding of the then *Food and Agriculture Organization* (FAO). It was there where, as a result of the world food crisis, derived from the rise in international prices, the concept of Food Security was conceived (Avilleira Cruz et al., 2021).

One of the most prioritized sectors in Cuba is food production. For this reason, the country's top management under the leadership of scientists and researchers has formed a strategic work projection that integrates researchers from different scientific disciplines, together with sectors and actors from different levels of action in the search for sustainable solutions in food production, from the vision of the science of sustainability (Díaz Pérez et al., 2021).

On July 22, 2020, two important policies were approved to advance the food sector. One, aimed at promoting territorial development (Pidt) that crystallizes Article 68 of the Constitution regarding the need to recognize the autonomy and legal personality of municipalities in order to consolidate their

productive base and another policy, which supports the profound transformations required by the national agricultural system for the successful implementation of the Food Sovereignty and Nutritional Education Plan (Saen). The latter is the first national plan in Cuba, accompanied by the Food and Agriculture Organization of the United Nations from the methodological point of view, based on experiences in the region.

The Saen plan insists on improving the Cuban State's work management in the organization of local, sovereign and sustainable food systems that integrate the production, transformation, commercialization and consumption of food. It also seeks to promote a food culture and nutritional education for a healthy population.

On the other hand, the Saen Plan leads all roads geometrically to the necessary Local Food Systems (Sal). On this, Díaz-Canel Bermúdez et al. (2020) comment that they are systems built by local actors where they are part of their projections and dynamics, pursuing among other aspects:

- Articulate the vertical-sectoral and the horizontal-territorial, in favor of an integral vision of the processes of food production, transformation, commercialization and consumption
- Promote social participation in the design and management of the Sal
- Empowering local stakeholders, promoting participation, fostering interactions, synergies and complementarities among them
- Improve regulatory processes at the local level
- To guarantee the training and qualification of human talent
- Promote greater innovation capabilities in the municipalities

The deployment of the Sal requires the design and implementation of a coherent system of knowledge management, training, education and innovation that reaches all stakeholders (managers, farmers, producers, among others) through participatory dialogue, collective protagonism and learning (Díaz-Canel Bermúdez et al., 2020).

The aforementioned authors conceive the work system for the Saen on the basis of the governance of the Sal. The aforementioned researchers also state that in recent decades there have been other programs and initiatives that have created capacities and tools of undoubted value for the country in this area (Díaz-Canel Bermúdez et al., 2020):

- Articulated Platform for Integral Territorial Development (Padit)
- Project for the Strengthening of Municipal Capacities for Local Development (Prodel)
- Local Agro livestock Innovation Program (Pial)
- Agro-chains and Sustainable Agriculture Support Project (Paas)

In addition to all these results, in 2022, the Food Sovereignty and Food and Nutritional Security Law and its regulations were approved. This law establishes the general legal framework to achieve food sovereignty, as well as to strengthen food and nutritional security in terms of protecting the right of every person to healthy and adequate food (National Assembly of People's Power, 2022).

In this context and as part of local development, planning with a strategic approach that consolidates as one of the fundamental issues in the public agendas of territorial governments is of utmost importance, based on the use of their potential and the solution of local problems that contribute to improving the quality of life of the population (Gil Hernández et al., 2019).

The institutional framework achieved and running in the country creates the conditions for the improvement of food sovereignty management from the government at the municipal level and to achieve a greater impact. Despite the efforts made by the Cuban government, limitations are still present in the management of food sovereignty that are evidenced in a parceled management, lack of horizontal integration of actors at the municipal level, insufficient knowledge about the management of each of its components, predominance of sectoral and top-down approaches in decision-making, among others (Ramos Crespo & González Pérez, 2019).

In the preliminary research, it was found that the municipality of Pinar del Río has important socioeconomic potentialities with emphasis on the agricultural and livestock sector, which can be used to influence the management of the Food Security and Sovereignty and Nutrition Education Program (Ssaen) and the levels of satisfaction of the population, and for this purpose it will be worked with some of the good practices learned from the Pial Project and others previously mentioned that contribute to the local development established in the municipality.

Based on this background, the President's guidelines and the work system of the provincial group of the Saen plan in Pinar del Río, the objective of this research is to propose a plan of actions of the Local Agricultural Innovation System (Sial) that contribute to the plan for food security and sovereignty and nutritional education in the municipality, in a sustainable way and that allows a

healthy food production that meets the needs of local self-sufficiency in the municipality of Pinar del Río based on good agroecological practices.

MATERIALS AND METHODS

During the development of the research, methods and techniques were used according to each defined stage or objective. Within the empirical methods, the bibliographic review was used as the main resource to carry out an analysis of the methodological theoretical foundations on program management as part of the Development Strategy. Besides, documentary analysis is used to study the theoretical references of the Sial in Cuba and the design of action plans to implement local development systems, as well as to evaluate the bibliographic material related to the different conceptions about Sial in terms of food production. Updated official institutional documentation and research related to the thematic approached in Cuba and in the province are used.

Theoretical methods:

The dialectical-materialist method is used as the basis for the requirements imposed by current conditions in terms of planning and local development.

The induction-deduction method to determine the generalities and regularities of the action plan design process.

The historical method was used to determine the evolution and trends of food production planning at the local level in Cuba and in the province of Pinar del Río.

RESULTS AND DISCUSSION

The updating of the Cuban economic model favors the local scenario to make the country's development more sustainable. Institutional and governmental authorities assume new challenges in the face of the ongoing transformations, without haste but without pause, decentralized development planning and management are promoted, based on endogenous potentialities and resources as indicated by Expósito Caballero and González Escalante (2018).

These new approaches require capacity building to reconcile interests in the territory, to build alliances between the different local actors, taking into account the cooperative and private sectors, based on a common agenda that meets the demands in terms of information needs to manage knowledge (Ortiz Pérez et al., 2021).

This is why Sial's experiences enrich and transform the practices of other stakeholders and, at the same time, allow the system to open new learning areas (Ortiz Pérez et al., 2021).

The objectives for implementing the Sial in the territories ensure that these innovation systems are able to match local demands for agricultural innovation with development priorities at the territorial level.

In order to establish the Sial in the territory, a survey of the strengths, weaknesses and challenges of the local agricultural production context was carried out. The application of techniques such as discussion workshops with local stakeholders and analysis of guiding documents of the municipality made it possible to trace the triangulation of strengths, weaknesses and challenges of the agricultural and livestock context that, together with those of innovation, can provide elements for the development of the action plan that is finally proposed (Table 1).

Table 1 - Triangulation of strengths, weaknesses and challenges of the agricultural and livestock context

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Perception of the need for agricultural development as a dynamic agent of local economic development. 2. Willingness to integrate and strengthen the productive sectors. 3. Qualified professionals to act directly in the 	<ol style="list-style-type: none"> 1. Insufficient competencies of local stakeholders in the management and implementation of local agricultural projects. 2. Little culture and systematization of horizontal relations among local stakeholders. 3. Insufficient availability of resources for food production and general functioning of productive systems. 4. Deficit and obsolescence of technical and support infrastructure for the agricultural and livestock sector.

<p>agricultural context to enable local development.</p> <p>4. Local Development Strategy that integrates all the productive and service sectors of the municipality.</p> <p>5. Integrality of the General Land Use Plan of the economic-productive, social and environmental base of the municipality.</p>	<p>5. Limited participation of women and young people in the agricultural and livestock sector</p> <p>6. Limited knowledge of sources of financing for development in the agricultural and livestock sector.</p> <p>7. Incidence of extreme environmental phenomena affecting the productive agricultural and livestock sector.</p> <p>8. Inadequate soil management.</p> <p>9. Insufficient supply and quality of drinking water and treatment of solid and liquid waste.</p> <p>10. Limited application of good agroecological practices.</p> <p>11. Little use is made of the municipality's agricultural production potential.</p> <p>12. A large number of enterprises in the territory operate with inputs and production committed to offshore balance sheets.</p> <p>13. Little use is made of the participatory appraisals with a social and gender equity approach conducted in the territory in the Local Development Strategy (LDS).</p>
<p>Challenge: Take advantage of the potential of human resources to promote agricultural projects for sustainable local development.</p>	

Source: Prepared by the authors and specialists

In recent years, important transformations in the functioning of the economy and society have occurred in the world. The assimilation and generation of innovation is one of the factors that have contributed significantly to promote a change at the level of enterprises, universities, institutions and organizations, which conceptualize innovation as the combination or synthesis of knowledge in the form of new products, processes or services with added value (Gorgoy Lugo & Torres Paez, 2019).

The implementation of the PIAL project, as a logical continuation of the work developed within the framework of the Participatory Phyto-improvement project initiated in Cuba at the end of 1999, has

continued to generate evidence in favor of the importance of diversity management to achieve food security for rural families. Since the early 1990s, Cuban scientists have sought an alternative to agriculture, based on the promotion of organic agriculture, through agrarian reforms, changes in agricultural policy and the transformation of existing institutions. Cuban small farmers, in turn, were encouraged to develop an integrated farming system involving the use of biological controls, biofertilizers, animal traction, home gardens and crop diversification. This context of change contributed to cooperation between farmers and scientists, helping the development of diversity-based agriculture. PIAL is among the programs coordinated by the National Institute of Agricultural and Livestock Sciences of Cuba and has a dual purpose: on the one hand, to revitalize the agricultural and livestock sector by increasing the participation of small farmers in the system of food production and environmental protection in Cuba and, on the other hand, to favor the resilience of the food system through crop diversification. PIAL is supported by universities, research institutes, international non-governmental institutions and the agricultural and environmental sectors of the Cuban government. PIAL participants also showcase and promote the use of crop mixtures, crop rotation and biopesticides to mitigate production losses caused by soil and storage pests and to restore soil fertility. In this way, they have eliminated the use of manufactured inputs, reduced crop losses, stabilized yields, and maximized income (González García & Saborit Garcés, 2018).

For this reason, and as a result of the lessons learned from the Local Agricultural Innovation Project (PIAL), the Local Agricultural Innovation System (SIAL) was created, which promotes improvements in the technological, organizational, institutional and economic contexts or in agricultural development policies. It provides appropriate solutions for local conditions, in terms of human welfare and equity, through a creative process of critical assimilation of proposals, construction, action and collective learning. This proposal for participatory management of innovation and development at the territorial level seeks to strengthen the country's current innovation system by providing a model built between scientists and producers to promote agrifood and local development.

The University of Pinar del Río is one of the institutions that has developed an important role in the territory in the field of innovation. Among the main innovative activities carried out, the following stand out: university and agricultural extension through the coordination of the PIAL, workshops and participatory diagnoses, advice to the government on the strategic projection of the territory, advice on project formulation, training for producers *in situ*, technology transfer through the participatory innovation modalities explained above, as well as action intervention in vulnerable communities, with

outstanding work of local agricultural innovation groups (Gial), such as, Gial of Fruit Trees, Gial of Women Landholders, Gial of Handicrafts, Gial of Mini-industries (González Hernández et al., 2018).

One of the priorities of government management in current times is the development of technological innovation for any territory; the promotion of science, technology and innovation as pillars of its progress must be taken into account.

The cooperative and private sector exploits 70% of the land, producing a high percentage of food. This sector currently represents more than 500,000 small farmers; therefore, agriculture is in need of an innovation system that can effectively meet its demands for technologies and knowledge of all forms of production.

According to Ortiz Pérez et al. (2021), the challenges of development in agricultural systems are complex and it is difficult for isolated individuals or institutions to manage them successfully, because they often involve changes at different levels. This is why the Sial promotes the articulation between the different local actors that makes it possible to solve problems in the agricultural and livestock sector through the active participation of its inhabitants and decision-makers.

During the exchanges with specialists, municipal decision-makers and producers, an attempt was made to demonstrate, through reflection and exchange with the different local actors, the application of innovation and its impact on the territory. To this end, in the current context of innovation, it is important to define the strengths, weaknesses and challenges for strengthening Sial in the territory of the municipality of Pinar del Río (Table 2).

Table 2 - In the context of innovation, strengths, weaknesses and challenges for the strengthening of the Sial in the municipality of Pinar del Río

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Recognized prestige of the Municipal Administration Council (Cam), Local Development Group (GDL) and the Multi-stakeholder Management Platform (PMG) on the work carried out by the Pial project in the municipality. 2. The integration achieved with productive entities and producers. 3. There is a commitment on the part of the productive entities and producers to the actions of the Pial project. 4. Support from the university to develop activities of the Local Development projects. 5. Undergraduate and graduate students linked to innovation activities in productive entities. 6. Sial's work methodologies are included in the Agronomy curriculum, in the Agricultural Extensionism subject and in the Environment Curricular Strategy. 7. Potential of the Cooperative and the Gender and Youth axis of the municipality to develop circles of interest with children of the primary and pre-university education system in the communities of the territory. 	<ol style="list-style-type: none"> 1. The non-presence of government officials and institutions in the first and second editions of the Sial Diploma. 2. The work of the Pial project has not been consolidated at the desired level in other cooperatives in the municipality. 3. Some institutions and organizations have yet to become aware of and implemented Sial methodologies, practices and principles. 4. Not having at least one local seed bank created by Pial in the municipality. 5. The number of jobs generated by the actions of the Local Development Projects (LDP) is still insufficient.
<p>Challenge: Strengthen multi-stakeholder coordination forums to promote the development of innovation at the local level.</p>	

Source: Prepared by the authors and specialists

The Local Agricultural Innovation System is based on several principles that act from the ideological level, on its conceptual and methodological foundations and are transversal in action. The most important ones set guidelines on the type of participation promoted by Sial. They are horizontality, equity and social inclusion.

Based on the characterization carried out on a participatory basis to identify the strengths and weaknesses to strengthen the Sial in the municipality, a set of actions was designed to integrate essential actors of the PMG to consolidate the necessary synergy in the development of capacities, as well as local development based on innovation. These actions lay the foundations for implementing the Sial in the municipality of Pinar del Río.

Taking into account the local agricultural and innovation context, the actions to implement the Sial in the municipality of Pinar del Río are elaborated.

For the projection of the action plan (Table 3), it has been taken into account the indications, guiding documents and definitions issued by the country's management, aimed at meeting the demands established for the different destinations:

- Sustainable Development Goals
- Compendium on municipal self-sufficiency
- Technical booklet of crops for municipal self-supply
- Tourism, seed and urban agriculture development programs
- Development projections of the Ministry of Agriculture (Minag) in the province
- Report of the first workshop "Food production with more science"
- Work system for the implementation of the Food Security and Food Sovereignty and Food and Nutrition Education Program (Ssaen) with more science

As well as, policies that are established nationally or provincially and that are of mandatory compliance such as those of regulatory agencies).

It is important to highlight that all these actions will be carried out by the council of the municipal administration and the local development group where the University of Pinar del Río "Hermanos Saíz Montes de Oca" plays a fundamental role in the whole process of guidance, accompaniment and knowledge management.

Table 3 - Plan of actions to implement the Sial in the municipality of Pinar del Río

Stages	Actions	Responsible	Resources to be used	Date
Formation of the Auxiliary Group Facilitation / Catalyzation	Dispatching with political and government authorities	Cam, UPR and Minag	Communication products Printed material, audiovisuals, tutorials and legal documents.	September 2021
	Carry out exchanges to raise awareness with PMG, GDL, Cam	Cam, UPR and PMG	Complementary communication products, support material on Sial	
	Socialize Sial through political and mass organizations.	PMG, Political and mass organizations	Printed and audiovisual communication products, tutorials, scientific articles, etc.	October 2021
	Form a group of facilitators and catalysts that favor the insertion of Sial.	PMG	Surveys, interviews and focus groups	
Carrying out activities that generate learning zones.	Identify actors, leaders and experiences of the different productive bases.	Group of facilitators and catalysts	Surveys, discussion groups and focus groups	November and December 2021
	Create spaces for the exchange of debates, reflections for the conformation and formation of learning zones.	PGM, Group of facilitators and catalysts,	Agro-ecological fairs and festivals, agricultural interest circles, farm visits, project creation, rural women's movement,	

			young farmers' movement, etc.	
	Socialize the results obtained in the learning zones created.	PMG, Group of facilitators and catalysts, local and provincial media.	Communication products, brochures, pamphlets and scientific articles.	
Formation of GIALs / people's councils and PMGs and facilitating their operation.	Create GIALs according to the different activities carried out in each community.	PMG, Facilitators and Catalysts Group,	Surveys, interviews and focus groups	January, February and March 2022
	Identify interests and demands of producers for each GIAL.	PMG, Gial	Participatory workshops, dialogue of knowledge with farmers and producers	
	Map the location of farms and leaders according to the GIALs formed to contribute to local development.	PMG, Facilitation Group, Gial	Agrodiversity fair	
	Socializing good practices from the GIALs	PMG, Facilitation Group, Gial	Communicative product, brochures, articles, participation in events	
	Arranging opportunities for exchange between producers in farms and production units and research centers.	PMG, Facilitation Group, Gial	Interactive Best Practices Workshop	

	Jointly build and design the participatory action plan and the platform's annual plan.	PMG, facilitation group and Gial	Consultation meetings	
	Diagnose training demands.	PMG, Facilitation Group,	Surveys, interviews, focus groups	April and May 2022
	Elaborate other local development projects with funding sources.	PMG, facilitation group and Gial	Calls for local development projects, sources of financing for local development projects.	
Planning of local agricultural development strategies that take into account the Sial management cycles.	Develop motivation and sensitization workshops for local stakeholders.	PMG, facilitation group and Gial	Communication products, exhibition of results, fairs, contests, workshops, etc.	June and September 2022
	Characterize the productive, social and environmental environment.	PMG, facilitation group and Gial	Survey, interview and focus group.	
	Mapping the levels of perception of problems, potentials and demands.	PMG, facilitation group and Gial	Survey, interview and focus group.	
	Design modalities of action.	PMG, Facilitation Group,	Workshops, Nops techniques; discussion groups.	
	Socialize the operation and results	PMG and local and provincial media	Information note, television and radio spots	

	of the Gials in the municipal context.	(TV, radio and press)		
Reconciling local demands with municipal agricultural development policies and strategies	Identify in the Cam and Minag working group the demands of the agricultural and livestock sector (Sensitization of stakeholders -CCS, UBPC-; equity approach).	PMG Facilitation/catalyst group	Discussion groups, exchanges and debates.	September and December 2022
	Promote exchange workshops to reconcile the demands of the strategy with these identifications in the productive context.	PMG, Facilitation Group, producers	Discussion groups, exchanges and debates.	
	Visit and exchange the experiences of advanced producers in local innovative processes or local enterprises.	PMG Facilitation group, producers	Productive context of action.	
	Generate spaces for the socialization of accumulated experience and good practices.	PMG, Facilitation Group, producers	Visit to agroecological reference farms, exchange between producers, fairs, festivals, exhibitions, communication	

			products, workshops, contests	
	Participate in events organized by the different mass and political organizations, Anap, Actaf, Minag, Citma, FMC, UJC.	PMG, Facilitation Group, producers	Calls for grassroots, municipal, provincial, national and international events.	
	Exchange experiences with producers from other municipalities, provinces and countries.	PMG, and producers	International Diversity Fair in Havana. Provincial and local fairs.	
	Disseminate the operation, results and impacts of Sial in the territory.	PMG, Local and provincial media (TV, radio and newspapers)	Communication products, television and radio spots.	
Dissemination of Sial results and impacts.	To publish scientific articles in peer-reviewed and high impact journals.	PMG	Best practice references and support materials.	
	To interview leading producers who stand out for their good practices in Pinar del Río TV.	PMG and Media	Evidence of good practices of leading producers.	

Source: Prepared by the authors and specialists

The proposed action plan presupposes an integral public management approach with training, integration of local actors and social participation as essential elements within the knowledge management process and the responsibility of local actors in their local development for the strengthening of the Local Agricultural Innovation System in the municipality of Pinar del Río.

The success of the Sial Action Plan will ensure that innovation in the locality is sustainable, and also requires great responsibility from the actors that make up the platform and that there is a close link and interaction between the municipal government and all the links of technological innovation and the productive sector in order to consolidate the development of the municipal territories, with the autonomy and endogenous development that is required.

The action plan defined followed the established precepts and guidelines of the different national agencies and organizations in order to produce important changes in the manifestation of the problems detected in the municipality, in food production on a local scale.

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Conflict of interest:

Authors declare not to have any conflict of interest.

Authors' contribution:

Yuliany Pacheco Correa designed the actions for the implementation of the Local Agricultural Innovation System in the municipality of Pinar del Río.

Armando del Busto Concepción carried out the theoretical-methodological conception for the design of actions for the implementation of the Local Agricultural Innovation System in the municipality of Pinar del Río.

Sara Suleima Madan Reinoso elaborated the draft and made the final revision of the article.

Luis Alberto García Velázquez carried out the collection, analysis and interpretation of data and information.

All the authors reviewed the writing of the manuscript and approve the version finally submitted.



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