



# Teaching in an innovative experience to strengthen local production of common bean seed (*Phaseolus vulgaris* L.) in Báguanos municipality, Holguín province

## Experiencia innovadora para fortalecer la producción local de semilla de frijol común (*Phaseolus vulgaris* L.), en el municipio Báguanos, provincia Holguín

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**ABSTRACT:** This paper describes the lessons of an innovative experience that was developed to strengthen the local production of common bean (*Phaseolus vulgaris* L.) seeds in Báguanos municipality, Holguín province. This paper describes the lessons of an innovative experience that was developed to strengthen the local production of common bean (*Phaseolus vulgaris* L.) seeds in Báguanos municipality, Holguín province. This initiative arose because this territory does not have access to diversified and quality seed in this species. Agriculture in this region is developed under rainfed conditions and the best soils are dedicated to the cultivation of sugar cane. A group of innovation managers set out to find a solution to this problem. The objective was to define and evaluate a sustainable seed production methodology for the Báguanos municipality, where producers have access to diversified and quality seed in the case of common beans. The Multi-Stakeholder Management Platform (PMG, according its acronyms in Spanish) was the space that allowed the articulation of local actors to create a local seed production system. Producers from a Local Agricultural Innovation Group (GIAL, according its acronyms in Spanish) with soil and water conditions on their farm. They specialized in seed production, taking the lead in this experience. As a result, an efficient local system of common bean seed was obtained, which is preserved in an air-conditioned room attended by an "Arnoldo Matos" Cooperative of Credit and Services producer. This same entity is responsible for marketing the common bean seed with all forms of production that demand the product in the territory. Starting in 2015, with the implementation of this local seed system, an increase in the production of common beans was achieved in Báguanos municipality for eight years, but as of 2022 this experience was greatly affected by various causes.

**Key words:** innovation, system, land stakeholders.

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**RESUMEN:** El presente trabajo describe las enseñanzas de una experiencia innovadora que se desarrolló para fortalecer la producción local de semillas de frijol común (*Phaseolus vulgaris* L.), en el municipio Báguanos, provincia Holguín. Esta iniciativa surgió, ya que este territorio no cuenta con acceso a semilla diversificada y de calidad en esta especie. La agricultura de esta región es bajo condiciones de secano y los mejores suelos se dedican al cultivo de la caña de azúcar. Un grupo de gestores propusieron buscar una solución a esta problemática. El objetivo fue definir y evaluar una metodología de producción de semilla sostenible para el municipio de Báguanos, donde los productores tengan acceso a semilla diversificada y de calidad para el caso del frijol común. La Plataforma Multiactoral de Gestión (PMG) permitió la articulación de actores locales para crear un sistema de producción local de semilla. Productores (as) de un Grupo de Innovación Agrícola Local (GIAL) con condiciones de suelo y agua en sus fincas, se especializaron en la producción de semilla, llevando el protagonismo de esta experiencia. Como resultado, se obtuvo un sistema local eficiente de semilla de frijol común, que se conserva en un local climatizado atendido por un productor de la CCS “Arnoldo Matos”, entidad que es la responsable de comercializar la semilla de frijol común con todas las formas de producción en el territorio. A partir del año 2015, con la implementación de este sistema local de semilla, se logró un incremento de la producción de frijol común en el municipio Báguanos durante ocho años, pero a partir del 2022 esta experiencia se afectó en alta medida por variadas causas.

**Palabras clave:** innovación, sistema, actores involucrados con la tierra.

## INTRODUCTION

FAO in the year 2022 presented the strategic plan for the period 2023 to 2031 (1), of the commission on genetic resources for food and agriculture, it was agreed a set of priority activities to strengthen seed production programs, which includes the multiplication of first generation seeds, taking into account the comparative advantages of the public and private seed sectors, where it was necessary to strengthen national seed associations and support the emergence of local seed companies involved in their production and distribution through better access to new varieties, capacity building activities and appropriate credit schemes.

It is necessary to strengthen the capacity of farmers in seed multiplication in order to improve the quality of seeds produced in the local sector in Cuba, the experience of the Local Agricultural Innovation Project (PIAL, according its acronyms in Spanish) (2), in everything related to local seed production in 75 municipalities where this project was located, relying on the links of the local Agricultural Innovation System (SIAL) (3,4), which supports the intervention of all local agencies to obtain good quality seed. They also point out that it is not only the responsibility of the organized group of farmers that produces it (GIAL), but also of the multi-stakeholder management platform (PMG) formed in the SIAL of the territory, of the research centers and of the seed company, which are responsible for providing certified seed of the new varieties and, with the support of the local seed banks formed in the PIAL project in the different localities(5), can also provide quality seed material of local foundation.

The experience that you will see is closely linked to the principle of ecological production, in that sense (6), he stated that agroecology is a hinge between scientific knowledge and community knowledge, treasured by each group, sector, and community. It is learned and validated by doing, building and following a rational, integrating, practical and comprehensive method. The problem to be solved in this work is how to ensure that producers in Báguanos municipality have access to a diversified and quality seed for the case of common beans, with the overall objective: Establish a structure to obtain diversified and quality seed

demanding by producers in Báguanos municipality, through the implementation of a certified local production system for the case of common bean.

## MATERIALS AND METHODS

This initiative began in July 2014 in Báguanos municipality of Holguín province, Cuba. When a team of innovation managers from the Holguín Agricultural Extension, Research and Training Unit (UEICA-H) in the framework of the PIAL became interested in boosting local seed production. To materialize this initiative, steps began to be taken to gradually approach the objectives set.

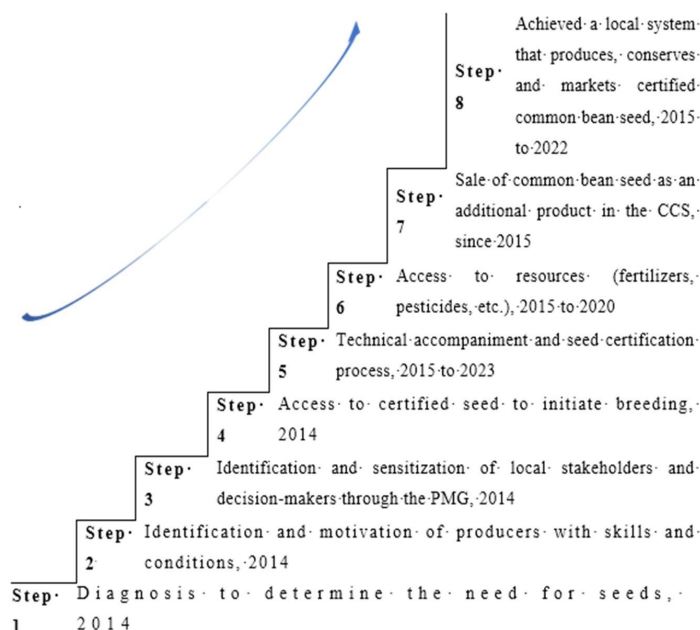
The methodology used details in depth the entire process carried out at each step (7). Figure 1 shows them in stages.

**Step 1.** Diagnosis to determine the need for seeds. Diagnostic workshops were held in agricultural entities. It was agreed to initiate the experience in the cultivation of common beans.

**Step 2.** Identification and motivation of producers with the aptitude and conditions on their farms to produce seed. Experimental producers were selected who produced and conserved common bean seed by hand, and training was provided in seed production technology.

**Step 3.** Identification and sensitization of local stakeholders and decision-makers through the Multi-stakeholder Management Platform (PMG). Various spaces and visits by managers and local stakeholders to the farms of the producers involved were used. On November 15, 2015, the new municipal delegation was established in Báguanos, which includes a seed specialist who is the person who assumes the functions previously held by the SICS. In January 2019, the local seed certification committee was established. In 2020, the actions of the PMG are evaluated with its members and a sample of producers.

**Step 4.** Access to certified seed to start breeding. Local Agricultural Innovation Group (GIAL) seed producers. Local seed certification is the obligatory process for verifying the identity, production, benefit and quality of seeds, in accordance with the provisions of Cuban law, in order to ensure their purity and genetic identity, as well as adequate levels of physical, physiological and sanitary quality,



All steps are progressive and systematic from 2014 to 2022

**Figure 1.** Stepwise process describing the steps taken by actors and managers in Báguano municipality to form a local seed system for common bean (*Phaseolus vulgaris* L.)

under the supervision and control of the seed inspection and certification service also in Mexico (8). To initiate the experience, the seed producing and marketing company provided the producers with the starting material (certified seed) of the varieties BAT 304 and CUL 156. At present, after the execution of biodiversity fairs (9) and tasting workshop, there are 19 varieties of registered category, coming from the Grain Research Institute (IIG, according its acronyms in Spanish) through the World Food Program (WFP) and there are selection criteria and demands for varieties from the producers of the municipality of Báguanos.

**Step 5.** Technical support and seed certification process. The extensionist and the UEICA-H specialists accompanied the local seed producers throughout the process. The specialist from the Territorial Plant Protection Station that serves the territory was in charge of carrying out field inspections as part of the seed committee and taking samples for the provincial laboratory.

**Step 6.** Access to resources (fertilizers, pesticides, etc.). Local seed production is included in the municipal development program. Local actors have been playing their role. Báguanos Agrarian Enterprise, today UEBI, allocates fertilizer and pesticides to protect the seed, the Municipal Delegation of Agriculture incorporated into its work system the monitoring and control of local production of common bean seed. PCC (Cuban Communist Party) and the local government incorporated visits to farms and facilities involved in the system into their tours. The municipal development program includes local seed production among its strategic axes.

**Step 7.** "Arnoldo Matos" Credit and Services Cooperative (CCS) belonging to the San Gerónimo popular council of municipality Báguanos markets common bean seeds with entities and producers of the municipality. New airs for

producers of the territory, the problem of access and quality of common bean seed begins to be solved.

**Step 8.** A local system that produces, preserves and markets certified common bean seed was achieved. This experience is described as a system that closes a cycle. The seed is produced by farmers in the territory, the advice and certification of the seed is by technicians and inspectors of the municipality of the seed committee where they participate among other prominent farmers in the production of beans, this product is stored in a climate-controlled room, the seed is also treated and marketed by this entity. The entire process includes marketing, which is carried out in the municipality and complies with established regulatory frameworks.

## RESULTS AND DISCUSSION

In Báguanos, the Multi-stakeholder Management Platform (PGM, according its acronyms in Spanish) and the Extension Commission has a group of actors working in the local development of the municipality made up of representatives of all agencies and the top management of the government and the party. The leadership is carried out by the president of the municipal government, the mayor and the Municipal University Center (CUM). UEICAH develops activities and actions where members of this management group participate, here agreements are made, new actions are planned and possible bottlenecks are discussed.

Among the main results achieved by the articulation with these actors, a functioning and strengthening of the local seed system (LSS) is achieved. Since 2015, locally certified common bean seeds have been marketed. The collaboration, integration and support of the top management of Báguanos municipality has been strengthened. Through its participation

in training spaces, exchanges of experience and tours to productive systems.

The local system of common bean seeds is implemented nine years ago in the municipality, it began to make important contributions to Báguanos municipality since its inception, allowing this initiative to be strengthened and sustainable over time as seen in Figure 2, it is observed that there was a sustainable growth from the years 2015 to 2018, In 2019 and 2020, fuel limitations appeared that affected the production volumes of seed grains and in 2020 the bean flower trip (*Megalurothrips usitatus*) appeared, wreaking havoc in the commercial and seed fields (10), which affected the bean yield in that municipality to a considerable extent.

In parallel, the COVID -19 pandemic emerged on March 11, 2020 in Cuba and affected the entire movement and production of the country until 2022, which increased the financial deficit and strengthened the limitations of fuel and other inputs, there are real limitations in the country that prevent supplying the demand for seeds, Among them, the purchase of inputs (fertilizers and pesticides) necessary for the production of different crops, as well as the limitations on imports of parts, pieces and aggregates for the repair of machinery, harvesters and other agricultural implements (11). Therefore, it is necessary to encourage local production as an alternative that allows, in addition, to bring it closer to the places of consumption, for which, the existing local seed system must be prioritized, which is the safe variant to achieve self-sufficiency of seeds for the territory.

On the other hand, seed production was mainly based on plots of a farmer with high culture and dedication in seed production, which in the year 2021 was very delicate and this caused a decrease in the areas and quality of the seed produced. More than two years ago, there has been an increase in the prices of the crop due to the decrease in its existence in the market, this price deformation has affected the interest in producing seed.

It is working on the multiplication of 19 varieties of common beans that will allow us to appropriate materials with better behavior and respond to the demands of entities and producers in Báguanos municipality. Two biodiversity fairs and a tasting workshop have been held, which has motivated producers to experiment in the field.

This initiative has achieved greater interaction between local actors and visualizes the importance of the PMG's operation in the territories. This initiative makes it easier for producers to contract and purchase seed, which means greater access to quality seed.

Some other advantages of the experiences related to seed production are that the producers participate and contribute their experience to the seed strategy and feel ownership of the entire process, the seed produced responds to a real demand in the municipality and the superior results benefit the population.

Local certification includes the criteria of the farmers, which benefits their interest and obligation to be part of the certification committee, it is important that the entire process of production, processing, storage and sale is carried out in the municipality, achieving the complete cycle in the locality.

In general, all forms of agricultural production are benefited and the quantities that each one needs to plant in the territory are offered.

For those who produce beans in rainfed conditions, which represent more than 90 % in Báguanos, this local system allows farmers to obtain the seed in time, form and quantity needed after the rains have a better use of soil moisture. The results obtained in the present work are aligned with what was expressed by some authors (6) where it was stated, in the face of the culture of converting everything into merchandise that can be bought and sold, which is impregnated in all the requirements of life, the spaces of creation and communal organization are restricted; the proposal of self-production of seeds is something more than "resistance" to the economic model, it is the production of new forms of relationship between human beings and with the environment. In another locality in western Cuba, there are some similar examples that demonstrate the usefulness and effectiveness of local seed production (12,13) published several examples in a group of countries where the usefulness of local seed systems is observed, where in Cuba in 10 municipalities have developed pilot Local Seed Certification Committees, the committees integrate representatives of the peasantry and research and state certification personnel working at the municipal level. They are successfully using the adjusted Costa Rican bean seed protocol, and have adapted it for use with other crops

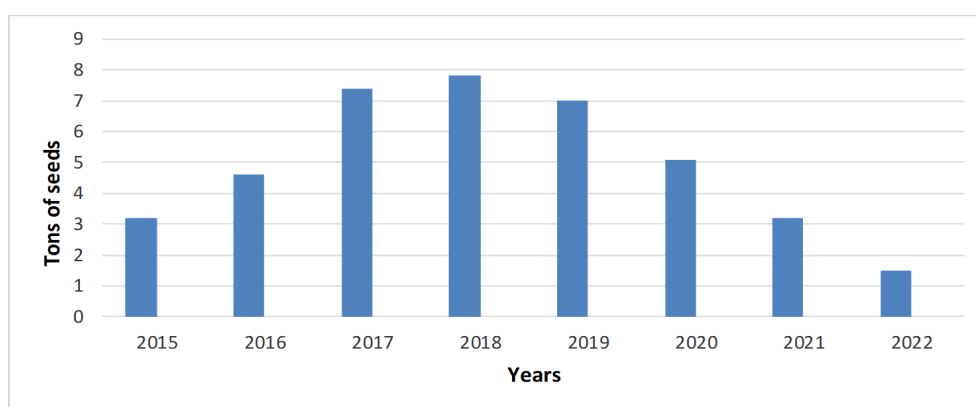


Figure 2. Production of local certified bean seed in Báguanos



such as rice. SeedChange supports a national methodology for local seed certification.

Other advantages of the local seed system observed in Báguanos: producers have greater access to quality seed; fuel savings are achieved in seed purchase procedures. It facilitates the procedures for contracting and marketing seed. Increases crop diversity according to demand. Seed is obtained in a timely manner. It is very important to take advantage of soil moisture in areas that are cultivated under rainfed conditions, because the seed is dispatched within hours after its request. The cost of the seed is reduced and greater added value is possible with the inoculation of fixative bacteria according to the request. Fuel costs for seed transportation are greatly reduced. This experience has much to do with the role of the Circular Economy in Resilient Management Systems (14) where the Circular Economy is one of the proposals with greater adoption at a global level. By recovering the foundations of nature and attaching its principles to natural rhythms, it is possible to recognize that the future of organizations is their incorporation. In this dynamic world, those entrepreneurs and decision makers who adapt their Management Systems to the Circular Economy logic are destined to have strong, resilient and competitive projects.

Challenges are imposed, being essential to achieve the maximum activation of certified seed production to those obtained in 2018, produce common bean seed with greater precision, according to customer demand, it will be beneficial to increase the number of varieties to be used according to the selective results in the diversity fairs that have been executed. The category of common bean seed is definitively changed from controlled to certify.

Include the local system of certified common bean seed production as a higher priority in the municipal development strategy. It is valid for the immediate future to consider other species for inclusion in the local seed system.

## CONCLUSIONS

1. With the creation of multi-stakeholder management platforms, a local seed development strategy was designed and implemented with the integration of the different municipal stakeholders, with an effective and rapid impact on food production.
2. The contributions of the local common bean seed system in the municipality have gradually increased, with values of up to 7.8 t in 2018.
3. With the implementation of this system it is possible to obtain part of the diversified and quality seed demanded by producers in the Báguanos municipality.

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