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Participatory actions for Prunus persica L. production in family gardens

Acciones participativas para producción de Prunus persica L. en huertos familiares

Ações participativas para a produção de Prunus persica L. em hortas caseiras

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ABSTRACT

The research objective was to provide participatory actions by local actors for the production of Prunus persica L. (pêssego) in family orchards in the community of Surí, municipality of Guane. Three and six local stakeholders selected based on an intentional demonstration to discover their perception on the management and benefits of fruit trees. On the other hand,

a pre-germination treatment (mechanical scarification) was carried out on 50 seeds, of which 42 seedlings were obtained in a micro nursery, subsequently transplanted to family orchards and their height was measured weekly for a month. The methods used for research are: Participatory Rapid Assessment, scientific and participatory measurement and observation. An in-depth interview and questionnaire form used to collect data from two actors. The most important results are: oil from local stakeholders to produce the species; strong points and bottles for your production; high percentage of seed germination; Plant the plants at the ideal height for transplanting after 33 days; The medium growth after transplanting for the first time was more than 4.5 cm per week. Foram elaborated actions for the production and handling of the species. Overall, it is concluded that local interested parties demonstrate great interest in producing the species, although they will not be familiar with its management; The pre-germinative method of mechanical scarification used was efficient.

Keywords: Participatory actions, domestic gardens, Prunus persica, food sovereignty and security, nutritional education.

RESUMEN

La investigación centró su objetivo en proponer acciones participativas de los actores locales para la producción de *Prunus pérsica* (melocotón) en huertos familiares de la comunidad Surí, municipio Guane. Se seleccionaron 36 actores locales a partir de un muestreo intencional para conocer su percepción en cuanto al manejo y beneficio de este frutal. Por otra parte, se realizó tratamiento pre germinativo (escarificación mecánica) a cincuenta semillas, de las cuales se obtuvieron 42 plántulas en un micro vivero, posteriormente fueron trasplantadas en huertos familiares y se les realizó mediciones de altura semanalmente durante un mes. Los métodos utilizados para la investigación fueron: diagnóstico rápido participativo, medición y observación científica y participativa. La entrevista en profundidad y el cuestionario se utilizaron para recoger los datos a los actores. Los resultados más importantes fueron: aceptación de los actores locales para producir la especie; fortalezas y debilidades para su producción; alto porcentaje de germinación de las

semillas; las plantas alcanzaron la altura óptima para trasplantar a los 33 días; el crecimiento promedio después de trasplante durante el primer mes fue de 4,5 cm por semana. Se elaboraron acciones para la producción y manejo de la especie. De manera general, se concluye que los actores locales mostraron un marcado interés por producir la especie, aun cuando no conocen su manejo; el método de pre germinación por escarificación mecánica utilizado resultó eficiente.

Palabras clave: Acciones participativas, huertos familiares, *Prunus persica,* soberanía y seguridad alimentaria, educación nutricional.

RESUMO

A pesquisa centrou seu objetivo em propor ações participativas de atores locais para a produção de Prunus persica (pêssego) em pomares familiares da comunidade Surí, município de Guane. Foram selecionados 36 atores locais através de amostragem intencional para conhecer sua percepção em relação ao manejo e benefício desta fruteira. Por outro lado, foi realizado o tratamento pré-germinativo (escarificação mecânica) em cinquenta sementes, das quais 42 mudas foram obtidas em micro viveiro, posteriormente transplantadas para hortas familiares e medidas de altura foram realizadas semanalmente durante um mês. Os métodos utilizados para a pesquisa foram: diagnóstico rápido participativo, medição e observação científica e participativa. A entrevista em profundidade e o questionário foram utilizados para coletar dados dos atores. Os resultados mais importantes foram: aceitação dos atores locais para produzir a espécie; pontos fortes e fracos para a sua produção; alta porcentagem de germinação de sementes; As plantas atingiram a altura ideal para transplante após 33 dias; O crescimento médio após o transplante durante o primeiro mês foi de 4,5 cm por semana. Foram desenvolvidas ações para produção e manejo da espécie. De modo geral, conclui-se que os atores locais demonstraram um grande interesse em produzir a espécie, mesmo quando desconhecem o seu manejo; O método de escarificação mecânica pré-germinação utilizado foi eficiente.

Palavras-chave: Ações participativas, hortas familiares, Prunus persica, soberania e segurança alimentar, educação nutricional

INTRODUCTION

The global food system is going through a crisis of multiple dimensions (ecological, economic, social, among others) that make food security on the planet more worrying every day. Soil erosion, the depletion of aquifers, the loss of land for both agricultural and non-agricultural uses, the diversion of irrigation water to cities and population growth threaten the possibility of feeding humanity.

In addition to the above, the complex scenario on a national and international scale in which Cuba operates, generated by the intensification of the economic blockade, the loss of soil fertility, among others; They make food production more complicated every day, a situation that requires the improvement of the Cuban model of Food Security and Sovereignty and Nutritional Education from a participatory approach, applying creative alternatives with the use of endogenous resources.

According to Rodríguez *et al*. (2014) 76% of the agricultural areas of Cuba are unproductive soils and less precipitation is observed as a trend every day, for their part, Martínez *et al.* (2017) identified soil degradation as one of the five main environmental problems of Cuba, which has led the State leadership to draw up strategies that allow the production of various foods on said soils, hence they have emphasized the need to produce fruit trees in family gardens, agroecological farms and forestry farms. Other authors such as Díaz *et al.* (2021) refer that guaranteeing food security is a responsibility of the States, but at the same time, this requires research from multiple areas of knowledge, as well as coordinated efforts from different sectors and actors in society in the different dimensions of food security.

Santo and Goulão (2015) assured that the use and exploitation of fruit trees has been an important strategy for food consumption in rural communities during periods of extreme drought and food crisis, because many fruit trees do not require the use of fertilizers for

their production, which facilitates greater availability and accessibility, minimizing production and handling costs.

In Cuba there are several exotic species that contribute to the production of agricultural foods, among them is *Prunus persica*, a plant known as peach, a shrub that grows favorably in several tropical regions and allows one or more crops to be produced annually and is very attractive for food (Quevedo *et al*., 2017).

This species is native to Persia, what is currently known as Iran (Cárdenas and Fischer, 2013). The fruits contain a large amount of phytochemicals, specifically phenolic compounds, which can be considered a good source for medical and food applications. They can also be used as a natural source of antioxidants, with antihypertensive potential (Aguayo *et al.,* 2022).

The nutritional and medicinal properties of this plant make it classify among the twenty essential foods for a healthy life. Beneficial for anemia, cholesterol, the immune system, bone growth and nervous system tissues in children, gout and blood sugar control, among others. It is on the list of fruit species grown in urban agriculture in Cuba, given the country's food crisis (Rodríguez and Sánchez 2009).

The largest production volumes in Cuba have been located in Artemisa, Pinar del Río, Matanzas and Santi Spíritus and work is being done to extend it to the entire country, since its good adaptability has been proven, it has been found in other parts of the country in orchards relatives specifically in the province of Cienfuegos (García *et al.,* 2022) .

In the Guane I Popular Council of the Guane municipality, the species was identified in 23 patios, still insufficient to produce fruits that guarantee food for the residents of the municipality, but it is a reliable sample that adapts to these soils, which is why it is necessary look for alternatives that allow the production of this fruit tree and at the same time involve local actors.

The adoption of a participatory approach in the production of this fruit tree can turn the current situation into a favorable situation, which contributes to food production. The achievements in terms of participation in decision-making and benefits from working the land of segments linked to rural life, such as farmers, women and young people, are evident in the country (Acosta and Sánchez 2019).

According to Díaz-Canel *et al*. (2020) social participation must be promoted in the design and management of local food systems (SAL).

Due to the above, the research focuses its objective on: proposing participatory actions of local actors for the production of *Prunus persica* (peach) in family orchards of the Surí community, Guane municipality.

MATERIALS AND METHODS

Characterization of the study area

The community of Surí is located adjacent to the urban area of the Guane municipality, it has an area of 4.41 km ^{2} and a density of 328 inhabitants per km ^{2}. It limits to the North with the urban area of Guane, to the South with Isabel Rubio, to the East with the Molina Popular Council and to the West with Guane II. Its total population is 1,447 inhabitants. The homes are characterized by having patios, most of which have surface available to grow fruit trees.

Methods and techniques used

The analysis of the perception of local actors was carried out regarding the use, medicinal properties and production of postures and fruits of the *Prunus persica.* The strengths and weaknesses were identified to produce the species in the studied community.

Following the intentional sampling method, 36 people were interviewed. The inclusion criterion was based on people who had family gardens, with the possibility and willingness to plant at least one plant of the species, or who had the species in their garden.

The methods used for the perception analysis were the Participatory Rapid Diagnosis (RPD) according to Gómez *et al*. (2001), this is among the most used approaches to enable the direct participation of residents in the generation and analysis of the information collected. Scientific measurement and observation were also used; The techniques for collecting information were: in-depth interview and participant observation.

The evaluation of the perception of local actors was carried out through descriptive analysis, based on frequency distributions with a graph generator. The SPSS statistical package version 15.0, was used to process the information.

Seed pre-germination

50 seeds were selected from a five-year-old plant established in the study location, with good phenotypic characteristics and fruits weighing between 60 and 64 g.

To facilitate the process of extracting the seeds, they were left in the shade for a day at room temperature, which facilitated their drying, then the endocarp was ruptured with pliers (mechanical scarification), with the fundamental premise being that the seed would remain in perfect state. To accelerate germination, they were placed in a container with water for 48 hours, changing every 24 hours, which allowed the seeds to hydrate, then they were placed on a moistened absorbent paper napkin and placed in a container, then Daily observations were carried out for fifteen consecutive days; The napkin was always kept moist, but waterlogging was avoided to prevent seed rot. After germination, the seeds were sown in filled 10 x 25 cm polyethylene bags, leaving a space of one cm uncovered between the surface of the substrate used and the upper edge of the bag. The substrate was composed of soil and 50% bovine organic matter, well decomposed, with daily irrigation they remained for 33 days, until reaching heights between 20 and 23 cm, from there they were moved and planted in the family gardens. The bags were placed in the shade and were watered once a day, for this the criteria of Oliva *et al.* (2015).

Plantation

Subsequently, the planting was carried out in holes 30 cm deep and 35 cm wide so that the roots were distributed correctly. The plants were placed so that the root neck was covered and the soil from the garden was used in the background, with leaf litter residue. At the end, compaction was done with the feet so that the roots were well located. They were immediately watered to eliminate air cracks that could cause root dehydration. Once planted, weekly height measurements were carried out for a month. The first measurement was carried out on the day of transplanting and from then on it was carried out weekly.

RESULTS AND DISCUSSION

Of the 36 interviewed, 29 attribute economic importance to it, which represents 81%, it is worth noting that of these 12 actors did not know the species physically, only through references from others (Figure 1). Only seven do not attribute economic importance to it and also report ignorance of the management of the species and its nutritional and health properties. Therefore, it is necessary to promote the characteristics of the cultivation of the species that highlight its usefulness for the family, due to its nutritional, medicinal and economic values. In agreement with Dini *et al.* (2021) The peach tree is a crop of great economic and social importance and can contribute to people's nutrition and health.

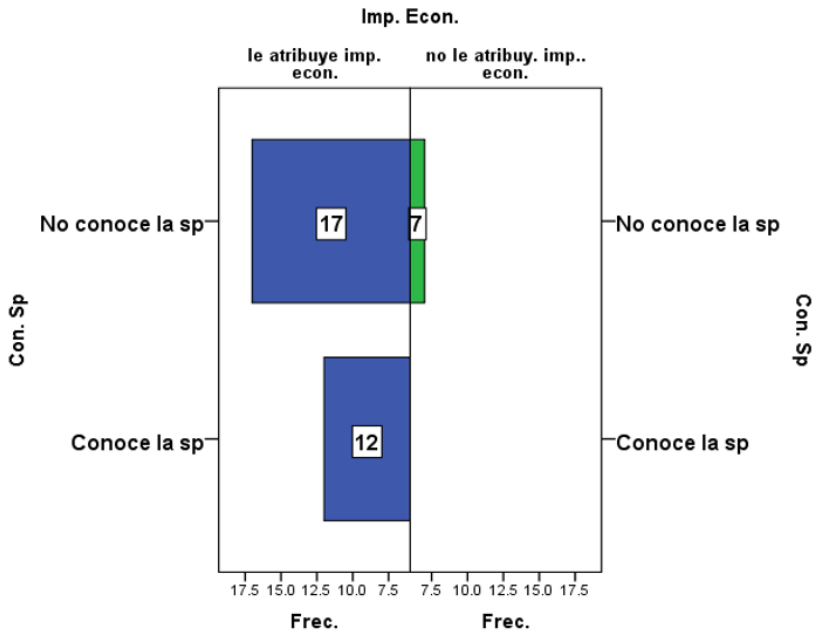

Figure 1. *- Frequency histogram that relates knowledge of the species to economic importance.*

Although the interviewees do not have the necessary knowledge about the production of this fruit tree, they contribute knowledge with their experiences of soil work and agricultural crops that are important for science. According to Mitjans (2012) the interaction of empirical knowledge and scientist in search of solutions to agricultural and forestry problems have great value, because the farmer has accumulated knowledge that can be theorized by agricultural scientists and at the same time, the latter have scientific theories that can be put into practice.

There is evidence that through the participation of actors and the dialogue of knowledge, governance in the municipalities has been contributed and has had a positive impact on the development of communities, sustainable use of natural resources and productions has been achieved. agricultural (Ortiz *et al.*, 2021).

Another element analyzed was the interest of those interviewed in planting the species in their family gardens, of which 97% (34 out 35) showed interest and stated that they were willing to buy the position and participate in a workshop held to learn about on production, including the 12 individuals who do not know this fruit tree (Figure 2). Therefore, it is

necessary to produce this species with the participation of these producers and hold workshops to socialize experiences, in which the benefits of the species and silvicultural management until its establishment are made known.

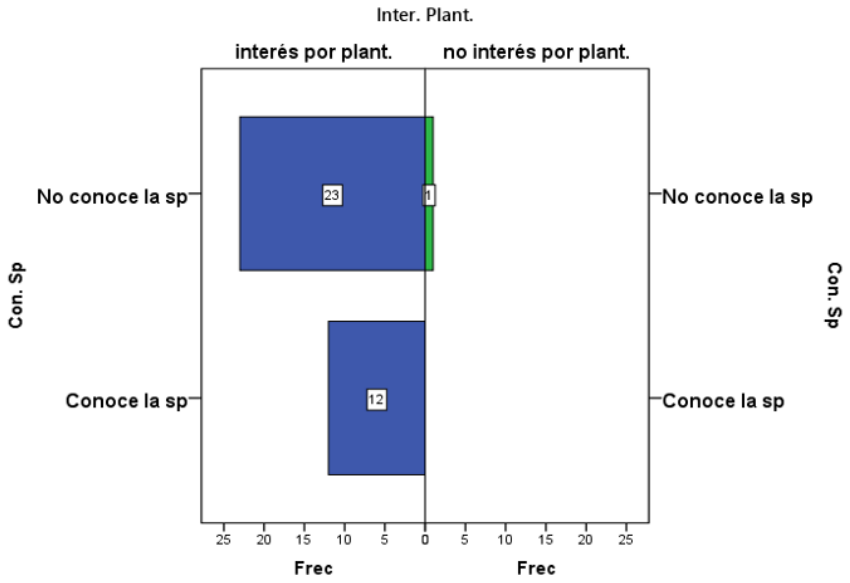

Figure 2. *- Frequency histogram that relates the interest in planting the species with the knowledge of local actors about the species*

Regarding the medicinal use of the plant, it was found that six of the interviewees attributed importance to the plant in this sense (Figure 3), three claiming that they have used it to lower blood pressure, two stated that they have solved digestive problems. with it and one who has used it when he has had kidney cramps and the pain has disappeared and his state of health has improved.

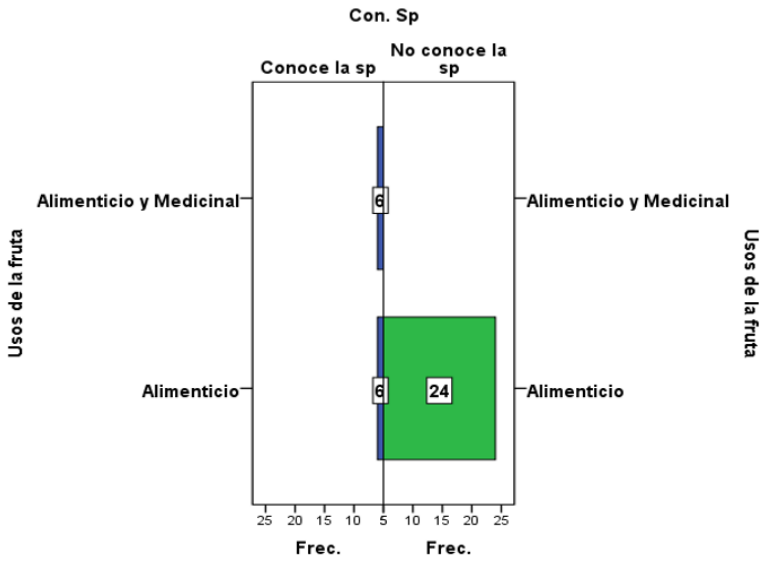

Figure 3. *- Frequency histogram that relates use to the knowledge of local actors about the species.*

The five local actors who have the species in production, aged between four and five years, stated that they have obtained good productions with estimates between 18.5 to 22.3 kg per plant in one year, at a rate of 297 to 357 fruits. by plants (Table 1). In this regard, Alvarado *et al.* (1999) obtained yields of 22.3 and 36 kg of fruit per tree, in El Salvador; in that case in extensive crops and with irrigation systems.

Table 1. *- Fruit production and weight per plant in the year*

Floors	Total Fruits/plant	Weight kg/plant
1	3. 4. 5	21.56
2	297	18.50
3	357	22.31
4	307	19,18
5	326	20.37
Total	**1632**	**102**

The producers claim that they have used the fruit to eat naturally, in juice, and that they have made homemade sweets, asserting that they are the same as the canned sweets that come in canned stores for marketing.

Strengths and weaknesses for *Prunus persica´s* production identified.

Strengths:

1. Motivation and interest of local actors in producing *Prunus persica.*
2. The actors attribute economic importance to the fruit.
3. Plants in the community that can serve as seed banks to begin the production of the species.
4. Agronomists in the community with knowledge to advise those interested in producing the species.
5. Space in family gardens for the production of the species.
6. Adequate edaphoclimatic and ecological conditions in the area for production.
7. Areas available for cultivation in orchards and state companies.
8. Studies carried out that show that *Prunus persica* has high potential for various uses (food, nutritional and medicinal).
9. Bibliography that demonstrates its easy adaptability to different soils.
10. Recognition of the need to produce fruit trees for food.
11. Availability of educational centers that can be promoters in the production of postures.
12. State interest in fruit production in family gardens.
13. Fruit tree programs directed by the State.

Weaknesses:

1. Limited knowledge of local actors about the management of the species.

2. There are no studies carried out regarding the production and processing of this fruit in the study community.

3. There are no projects aimed at the production of fruit trees in general or of this species in particular, which was confirmed in the fruit tree program.

4. Local actors do not know the nutritional, medicinal and economic values of the species.

Seed germination and laying production in micronursery

Once the pre-germinative treatment was carried out, the seeds began to germinate after eight days, first sprouting their radicle and then opening their cotyledons. Of the fifty seeds, 42 (84%) germinated, with the last germination occurring 17 days after being in the container with the moistened napkin.

Rapid growth between 4 and 5 cm was observed in each plant per week, during the first month after transplanting (Table 3, appendix).

A graphic representation of the average increase per week is shown in Figure 4, where it can be seen that it varied from 21.5 cm (average height at the time of transplant) to 40.1 cm (average height one month after transplant) (Table 2).

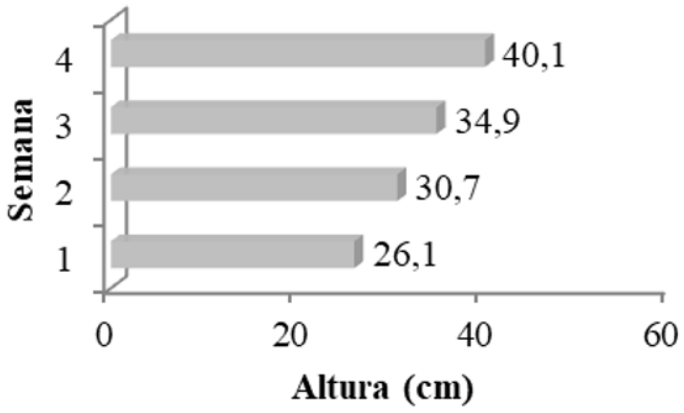

Figure 4. *Average height per week of the 42 seedlings Prunus persica that were planted in family gardens.*

Table 2. - *Proposal for participatory actions to promote Prunus production persica in the communities*

No	Action	Aim	Date	Participate	Responsible	Place
1	Develop community development projects for the production of P. persica.	Guarantee financing for the promotion, production and management of P. persica in the communities of the municipality.	Annual	Local actors, decision-makers and executors; as well as, professionals from the agricultural and forestry sciences of the territory involved and committed to the production of P. persica	Municipal group for local development	Centers and institutions of the territory where the projects are carried out
2	Identify the best shrubs in the different family gardens where the species has been found.	Create seed banks for the production of seedlings with the participation and consent of the residents.	Annual	Local decision-making and executing actors; as well as, professionals from the agricultural and forestry sciences of the territory involved and committed to the production of P. persica	Municipal group for local development	Family gardens where the species is found
3	Design and execute participatory workshops on the peculiarities for the production of the species.	Socialize, prepare and generate commitments with local actors, decision-makers and executors in the production of P. persica .	Quarterly	Municipal University Center and members of the Municipal Agrarian Extension System	Municipal group for local development	Municipal University Center and selected places in the communities for the workshops
4	Identify local actors willing to produce P. persica .	Select actors willing to create micronurseries and transplant seedlings produced in family gardens.	Monthly	Urban farm specialist for each community	Municipal group for local development	Communities where the actors for the production of the species are identified

5	Promote the production of the species in micronurseries built with resources available in the communities.	Promote the production of the species in micronurseries built with resources available in the communities.	Bimonthly	Specialist of the urban farm of each community, local actors selected for the production of P. persica, Municipal Directorate of MINAG	Municipal group for local development	Communities selected for the production of the species
6	Promote in communities and schools of different levels of education, the nutritional and medicinal values and the way of producing the species, launching contests related to the topic.	Promote in communities and schools of different levels of education, the nutritional and medicinal values and the way of producing the species, launching contests related to the topic.	Annual	Municipal University Center, municipal promotion and dissemination group	Municipal group for local development	Municipal University Center
7	Train local community actors, using participatory techniques, on the medicinal, nutritional and commercial importance; as well as, develop their skills for the production of this species with their own resources available in the communities.	Train local community actors, using participatory techniques, on the medicinal, nutritional and commercial importance; as well as, develop their skills for the production of this species with their own resources available in the communities.	Annual	Municipal University Center, experienced producers and new P. persica producers	Municipal group for local development	Municipal University Center
8	Include the production of P. persica in the municipality's development programs and strategies.	Contribute to the planning and monitoring of the production of the species at the local level, as part of the Food Sovereignty and Security Plan; as well as Nutritional Education.	Annual	Municipal University Center	Municipal group for local development	Municipal Government Headquarters

9	Involve teachers and students in research (diploma work or master's thesis) related to the cultivation of this species.	Have scientific knowledge resulting from research carried out in the territory of the municipality, which indicates good practices to follow to increase the performance and quality of the species during its production in the communities.	Annual	Municipal University Center	local development	Municipal University Center
10	Include in the territory's agricultural extension plans, actions with seedling producers in the micronurseries of the territory's communities.	Develop skills in producers for seed germination and seed production in community micronurseries , using more viable methods, already proven by science.	Monthly	Municipal Directorate of MINAG, Municipal ANAP and Municipal University Center	Municipal group for local development	Municipal University Center
eleven	Build micronurseries in the municipality's agroecological and agroforestry farms for the promotion and development of the species.	Use existing production scenarios with experience in the production of fruit trees that enhance, with their experiences, the sustainable production of seedlings of the species.	Quarterly	ANAP Municipal, Municipal Directorate of MINAG, local actors who work on agroecological and agroforestry farms in the municipality.	Municipal group for local development	Selected agroecological and agroforestry farms

CONCLUSIONS

There is limited knowledge about the production, management, economic and medicinal importance of *Prunus persica*; but there is a high interest among local actors in cultivating the species in their family gardens.

The procedures used in both pre-germination and germination were efficient, which is confirmed by the high percentage of seedlings achieved.

The results obtained in the production and number of fruits of the adult plants studied show that there is potential to produce the species, which constitutes an alternative to contribute to food production in the soil, climate and water conditions in the Guane´s municipality.

Appendix Table 3.

Table 3. *- Height increase per week after transplant*

Individual _	**Height (cm)**					
	Initial	Week 1	Week2	Week3	Week4	Increase
1	22.4	27.1	31.0	35.0	40.6	18.2
2	23.0	28.6	32.7	36.7	41.7	18.7
3	23.0	27, 8	32.3	36.3	41.3	18.3
4	23.2	28.1	33.0	37.6	42.6	19.4
5	23.0	27.3	32.1	36.1	41.1	18.1
6	23.1	27.4	32.0	36.3	43.1	20.1
7	19.0	24.1	29.1	33.1	39.1	20.1
8	19.1	24.3	28.3	32.3	37.3	18.2
9	18.2	23.1	27.1	31.1	36.1	17.9
10	18.6	23.2	28.0	32.4	37.4	18.8
eleven	21.0	26.1	30.1	34.1	39.1	18.1
12	21.3	26.0	29.9	33.9	38.9	17.6
13	23.0	28.0	32.1	36.1	41.1	18.1
14	23.3	28.0	32.9	36.9	41.9	18.9
fifteen	23.2	26.0	31.9	33.9	37.1	14.1
16	23.0	28.0	31.7	35.7	41.7	18.7
17	23.2	25.0	29.8	34.0	38.0	16.0
18	22.0	27.3	32.0	36.0	39.0	19.0
19	20.1	24.9	30.0	33.0	42.0	16.0
twenty	23.0	26.0	33.0	37.9	39.9	19.0
twenty-one	21.0	25.0	28.3	36.0	42.0	17.0
22	23.0	26.3	30.0	37.0	43.6	20.0

23	19.0	25.0	30.0	33.0	43.1	20.1
24	19.0	26.0	29.0	36.0	42.8	18.0
25	23.1	25.1	32.1	36.0	39.0	19.9
26	23.0	28.6	29.0	35.7	40.0	17.7
27	21.0	27.0	32.0	36.0	40.5	19.7
28	22.0	26.0	32.3	33.0	38.0	16.4
29	20.0	24.5	29.0	37.8	40.0	15.0
30	22.6	24.0	31.1	33.0	38.0	18.6
31	21.1	24.6	33.2	32.2	43.1	19.5
32	19.4	25.0	30.0	32.5	38.7	18.8
33	19.8	26.0	29.4	34.7	41.9	20.5
3. 4	19.8	24.8	28.7	32.0	39.9	20.9
35	22.0	28.0	28.6	32.0	42.0	16.8
36	21.0	25.7	29.9	37.7	39.0	17.9
37	19.7	28.0	30.0	37.8	37.0	17.8
38	23.7	28.1	33.0	33.9	43.2	17.9
39	23.5	24.1	31.0	36.0	38.7	18.0
40	21.5	27.0	33.6	32.0	39.9	19.9
41	20.1	28.0	29.0	36.0	38.6	18.0
42	22.3	27.0	32.0	37.9	37.0	17.0
Half	**21.5**	**26.1**	**30.7**	**34.9**	**40.1**	**18.3**

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