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Sustainable production strategies to increase the commercialization of tara in Peru

Estrategias de producción sostenible para incrementar la comercialización de tara en Perú

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Abstract

Tara (Caesalpinia spinosa) is a native Peruvian plant that grows in the dry forests of the inter-Andean valleys. It is considered a relevant opportunity for eco-business in the country due to its high efficiency of use and versatility in various industries. This study aims to characterize the production and commercialization of tara by producers located in the Sonche River Valley, in the province of Chachapoyas, in order to provide some opportunities for implementing sustainable tara production strategies to increase its production. The results indicate that tara production activity is being developed in a precarious manner, since production per hectare is below average and there is inefficient use of spaces suitable for cultivation; the production units also have organizational deficiencies such as lack of leverage, little training on sustainability issues and neglect in the harvesting process. These deficiencies are invaluable opportunities to implement strategies such as the practice of sustainable crops, the use of improved varieties, and education, research and development regarding tara production.

Keywords: Tara *(Caesalpinia spinosa)*, production strategies, sustainability

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Resumen

La tara (Caesalpinia spinosa), es una planta nativa oriunda del Perú, la cual crece en los bosques secos de los valles interandinos. Está considerada como una oportunidad relevante para la realización de econegocios en el país debido a su alta eficiencia de uso y su versatilidad en diversas industrias. El presente estudio plantea caracterizar la producción y comercialización de tara de los productores situados en el Valle del Río Sonche, de la provincia de Chachapoyas para, posteriormente, brindar algunas oportunidades de implementación de estrategias de producción sostenible de la tara a fin de incrementar su producción. Los resultados señalan que la actividad productiva de la tara viene siendo desarrollada de manera precaria, puesto que presenta una producción por hectárea menor a la media y una utilización ineficiente de los espacios aptos para el cultivo; así también las unidades productoras cuentan con deficiencias organizacionales como la falta de apalancamiento, escasa capacitación en temas de sostenibilidad y descuido en los procesos de recolección. Estas deficiencias resultan oportunidades invaluables para implementar estrategias como la práctica de cultivos sostenibles, el uso de variedades mejoras y la educación, investigación y desarrollo respecto a la producción de tara.

Palabras clave: Tara *(Caesalpinia spinosa)*, estrategias de producción, sostenibilidad

Introduction

Tara is a non-timber forest product (NTFP) and its exploitation is an eco-business alternative for Peru's socioeconomic development (Villena Velásquez and Seminario, 2021). However, its growth occurs in the dry forests of the inter-Andean valleys; as mentioned by Cordero (2016), this tropical ecosystem is endangered due to anthropological factors that include unsustainable management regimes and overexploitation of commercially valuable species.

Tara is a species of high productive efficiency and multiple productive purposes; since it is used for both fruits and pods, where exquisite tannins are obtained in substances, considered the best in the world, used in the fur industry, pharmaceutical industry, chemical industry and paint industry; also tara gum is highly required in the food industry , for its moisturizing and protective qualities (Diaz and Vargas, 2021 ; Mukherjee et al., 2023).

Sustainable production involves managing natural resources and agricultural practices in a way that meets present needs without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

Sustainable production in the agribusiness sector is a growing concern around the world. Agribusinesses play a vital role in the production of food, raw materials and energy, but can also have a significant impact on the environment and local communities. Sustainable production seeks to address these challenges by ensuring

that agriculture and agribusiness are economically viable, socially responsible and environmentally friendly.

In the agribusiness sector, the pursuit of economically, environmentally and socially responsible practices remains a priority. These agribusinesses play an essential role in the production of food and raw materials, making sustainability a critical objective.

The principles of sustainable production in agribusiness imply its economic, social and environmental viability. Sustainable production seeks long-term profitability, promoting efficiency in resource management and the adoption of sustainable technologies (Pretty, 2008). It also involves considering the welfare of agricultural workers, local communities, and human rights. Equity and social justice are essential elements (Tittonell and Giller, 2013). Finally, it focuses on reducing environmental impact through the sustainable management of soil, water and biodiversity (Vanlauwe et al., 2014).

Various tools and practices mentioned below are used to make sustainable production possible. Conservation agriculture: promotes reduced tillage, cover crops and integrated pest management to improve soil health and water use efficiency (Hobbs and Govaerts, 2010). Organic agriculture and agroecology: these practices emphasize the prohibition of chemical pesticides and fertilizers, as well as the promotion of biodiversity and soil regeneration (Gattinger et al., 2012). Sustainability certifications: Certifications such as Fair Trade and Rainforest Alliance support sustainable practices in the supply chain (Bacon et al., 2012).

The benefits of sustainable production are understood as the differential advantages over non-sustainably produced crops. The benefits are diverse. Access to sustainable markets allows access to niche markets and consumers increasingly concerned about sustainability (D'Souza et al., 2016). Resilience to climate change is that sustainable production can help farmers adapt to changing climatic conditions and extreme events (Vermeulen et al., 2012). Finally, natural resource conservation contributes to biodiversity conservation, soil health and water availability (Lal, 2015).

Sustainable production in agribusiness is essential to address environmental, social and economic challenges in modern agriculture. The adoption of sustainable practices and consideration of sustainability principles benefits farmers, local communities and the environment, while providing market opportunities. Collaboration between the private sector, governments and civil society organizations is essential to promote sustainable agribusiness production.

Characterizing the Tara producing areas in Peru, from its consideration as a more profitable Peruvian agro-export product, is important because of its wide recognition and high world prices: Cajamarca (39.5%), Ayacucho (16.4%), La Libertad (12.5%), Huánuco (8.4%), Ancash (6.2%) and others (5.8%). However, Peru exports about 5,000 MT, and the world demand is 100,000 MT, a gap that must be covered with more production, highlighting that the most important export markets are the USA, Germany, Switzerland, Spain and Italy (Melo M. et al., 2013)..

Derivatives made from Tara seeds come to have high costs in the international market, for example, powdered Tara can cost more than US$ 820 MT in Peruvian ports, while the gum, which is obtained from Tara pulp has a domestic freight rate of US$ 6,600 MT and the foreign freight rate is more than US$ 10,000 thousand dollars MT, reason to increase with the production of these derivatives, in turn generating employment and greater profitability for producers (Bereche and Casas, 2017).

As mentioned by Chumán and Córdova (2019), tannins are currently of great economic importance, so they are being used in the industry of different products such as in the manufacture of adhesives, bioplastics and galvanized, as well as in the conservation of fishing gear due to its bactericidal and fungicidal condition; it is also used as malt substitutes to give body to beer and wine classifiers; with respect to the pharmaceutical industry, it has a wide therapeutic use; it is also used in cosmetology, metal protection, oil drilling, oil well maintenance, rubber industry and as part of paints due to its anticorrosive action; Oliva et al. (2015), refers that the use of Tara has a great food, medical and industrial potential, which is why the use of this product is essential.

The tara value chain in Peru involves several stages, from production and collection of pods to processing and marketing of tara gum. The main stages include production and cultivation, pod harvesting and processing, and processing and export. Tara is grown in agroforestry systems, which promotes sustainability and environmental conservation (Alercia et al., 2018). Tara pods are harvested by hand and processed to extract the gum (Makkar et al., 1997). Tara gum is processed into different grades and exported mainly to international markets (Zarate et al., 2017).

On the other hand, there are factors that impact on the commercialization of tara. The quality of tara gum is critical for its successful commercialization in international markets (Sharma et al., 2009). Organic and sustainable product certification can increase competitiveness in international markets (Cerda et al., 2017). International prices for tara gum are volatile and depend on industry demand (Cayotopa-Santos and Ubillus-Melitón, 2018). Access to financing and appropriate technology can improve the production and commercialization of tara (Antonelli and Ramón, 2016).

Tara marketing in Peru faces challenges related to quality, competition in international markets, and lack of access to technology. However, it also offers opportunities to promote sustainable practices, diversify products and access premium markets.

At the international level, there is literature to highlight regarding the production and trade of tara. Wang, et al (2022) conducted a study on the demand for tara in China. This study analyzes the demand for tara in China, the main consumer market of this plant worldwide. The results indicate that the demand for tara in China is growing steadily, driven by increased consumption of processed foods, leather manufacturing and biofuel production.

Garcia, et al (2022) showed three new tara varieties had significantly higher yields than traditional commercial varieties. The average yield of the new varieties was 2.5 tons per hectare, while the average yield of the traditional commercial varieties was 1.5 tons per hectare. The study also showed that the new tara varieties could be harvested three

times a year. The first harvest was in the months of May-June, the second harvest in the months of October-November and the third harvest in the months of January-February.

In addition, Gonzales-Pech, et al (2021), review the main aspects of sustainable tara production, including the use of sustainable agricultural practices, waste management and organic certification. It is concluded that sustainable tara production is possible and can contribute to improve the profitability of producers and environmental conservation.

Pérez-Sánchez, et al (2020) analyze the strategies for the promotion of tara in Europe, the second largest consumer market of this plant worldwide. The results show that the promotion of tara in Europe should focus on the development of new products and applications, as well as on educating consumers about the benefits of this plant.

González-Pech, et al (2022) analyzed the potential of tara for biofuel production. The results indicate that tara is a potential source of biofuels, since it has a high carbohydrate content and a low lignin content.

In the Peruvian research field, there have also been important scientific studies on the topic of this research. Del Pozo, et al. (2023) studied the tara value chain in Peru, from production to marketing. They conclude that the tara value chain is complex and heterogeneous, and that it presents opportunities to improve productivity, competitiveness and sustainability.

Chávez, et al. (2022). examines strategies for the promotion of tara in Peru, with the objective of increasing domestic consumption and export of this product. They indicate that strategies for the promotion of tara should focus on the development of new products and applications, as well as on educating consumers about the benefits of this plant.

Garcia, et al (2021) review the main aspects of sustainable tara production in Peru, including the use of sustainable agricultural practices, waste management and organic certification. The results show that sustainable tara production is possible and can contribute to improved producer profitability and environmental conservation.

Gutiérrez, et al (2020), explore the tara market in Peru, with the objective of identifying trends and opportunities for this product. The results indicate that the tara market in Peru is growing steadily, driven by increased demand for processed foods, leather manufacturing and biofuel production.

This research seeks to propose various strategies in favor of sustainable production of tara, in order to have a positive impact on its commercialization. For this purpose, a characteristic analysis of the agricultural and marketing activity of tara producers in the province of Chachapoyas, Peru, will be carried out in order to propose strategies that are specifically adjusted to the population under study.

Materials and methods

This research was based on a descriptive-propositional research design that combines elements of descriptive research, which seeks to analyze the current situation of tara production in Chachapoyas, and propositional research, which aims to propose sustainable production strategies. The study is cross-sectional, as the primary data correspond to the study period 2023.

The study population consisted of farmers dedicated to the cultivation of tara in the province of Chachapoyas. Given the small population (50 farmers), it was decided to consider the total population in the study.

Data collection will be carried out through a combination of qualitative and quantitative methods: Structured surveys were conducted with agricultural producers in Chachapoyas. These interviews will provide a deeper understanding of the current situation and possible sustainable production strategies; in addition, various proposals collected from bibliographic sources were studied qualitatively and then filtered according to their level of adaptability to the context of the study population.

Based on the results of the descriptive research and in consultation with the available literature, sustainable production strategies were proposed. These strategies will be designed to address the identified challenges and promote sustainable agricultural practices in tara production in Chachapoyas.

Informed consent was obtained from all participants in the interviews and surveys. The confidentiality of the data collected was guaranteed, and the ethical norms and procedures established by the research institution were followed.

Results

Figure 1 shows the distribution of uncultivated hectares owned by farmers. Of these, 53.3% have areas between 3 to 6 ha that are not used agriculturally; on the other hand, Figure 2 shows the distribution of areas with tara crops; in general there is a fairly homogeneous distribution in the ranges of 0 to 1, 1 to 2, 2 to 3, 3 to 4 and 4 to 5 hectares, but 26.7% of crops with areas of 1 to 2 hectares predominate.

Figure 1. Hectares owned without cultivation

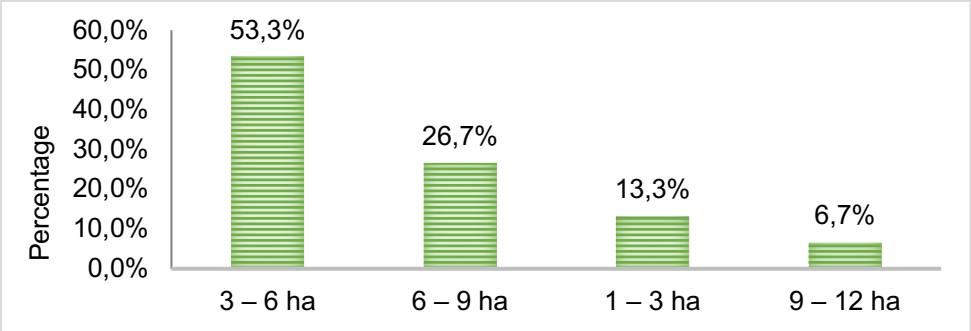
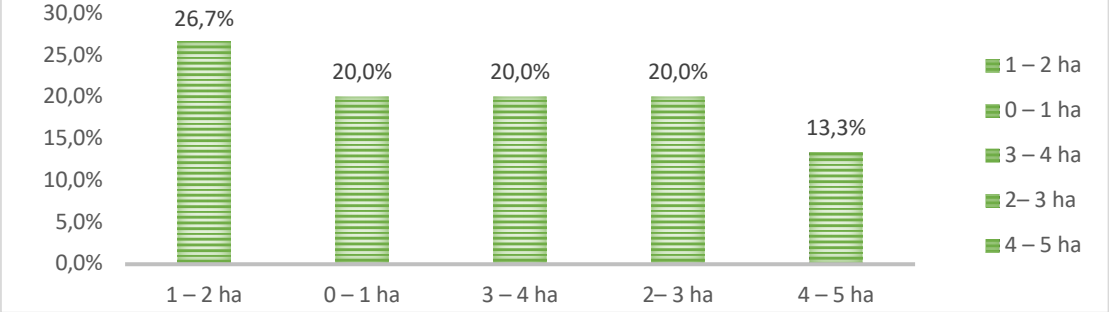


Figure 2. Hectares with wild or cultivated tara seedlings.



Regarding production and harvesting processes, Figure 6 shows that 86.7% of crops yield two harvests per year; also, 40% of farmers have a range of production per harvest of between 2 to 3 tons; most producers (66.7%) indicate that they are indifferent to the care in harvesting the tara fruit; finally, there is a high willingness (66.7%) to improve the quality of the crop.

Figure 3. Harvesting

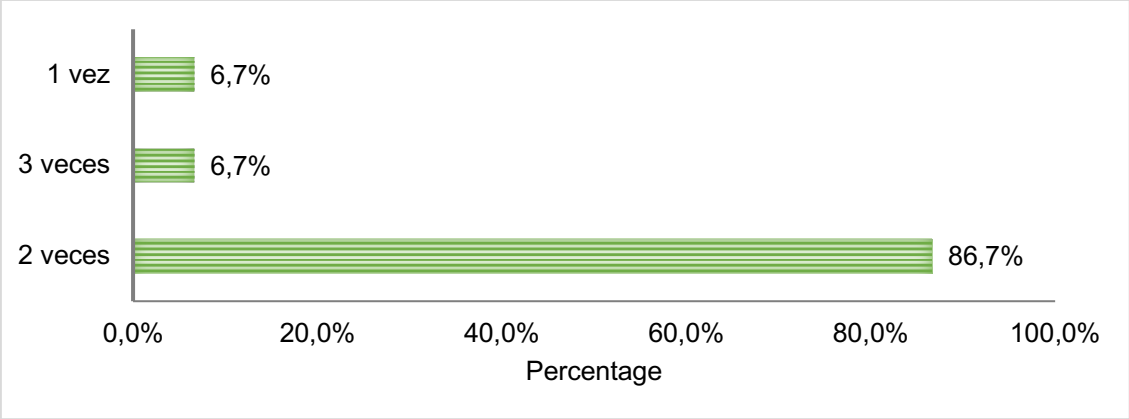


Figure 4. Crop production per crop

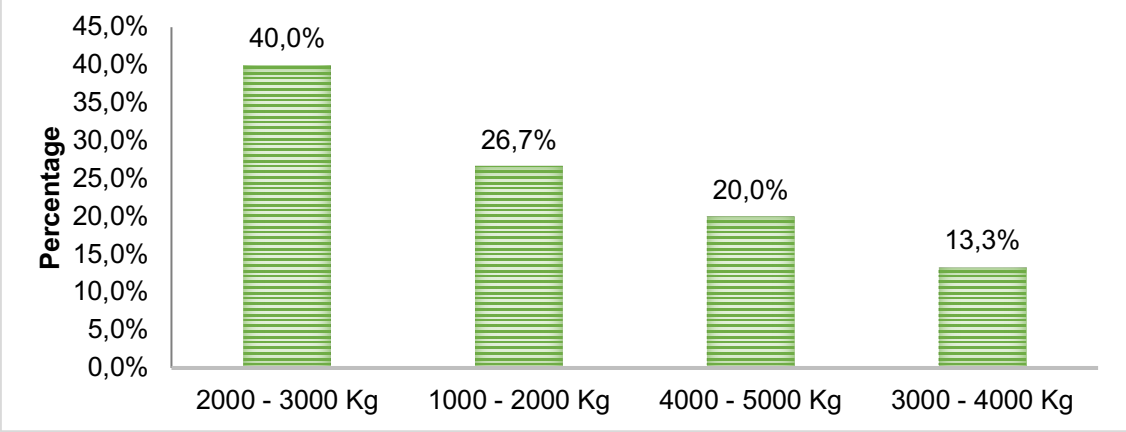


Figure 5. Care with the plant when harvesting the fruit.

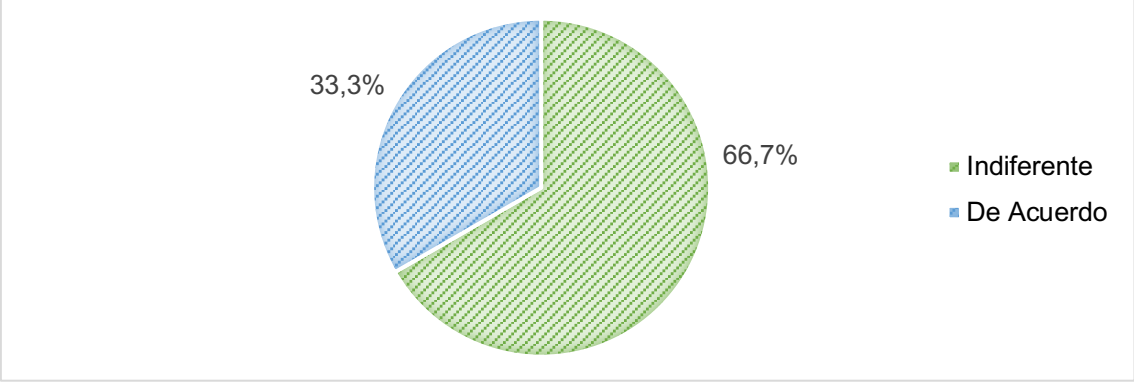
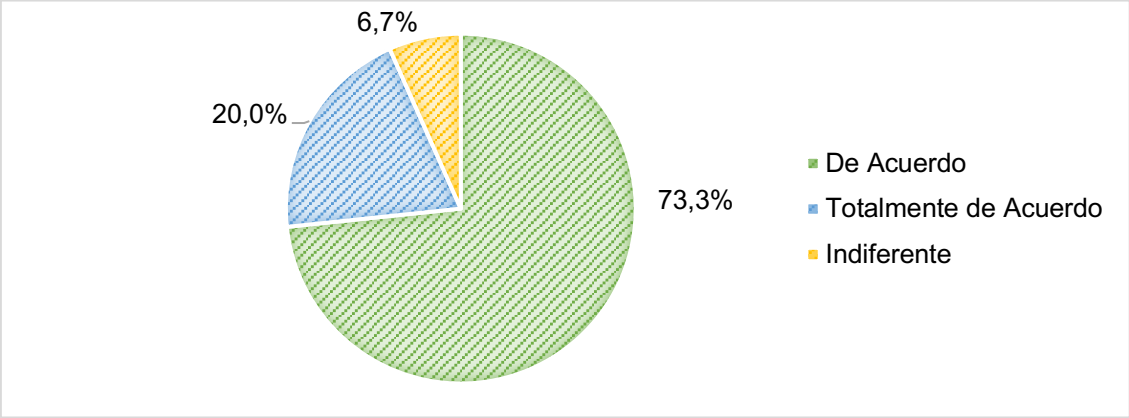


Figure 6. Willingness to improve the quality of the product it offers



The following figure shows that organic fertilizers are sometimes used in most of the crops (66.7%). Finally, 46.7% do not participate in environmental awareness and reforestation training.

Figure 7. Organic fertilizers on your seedlings

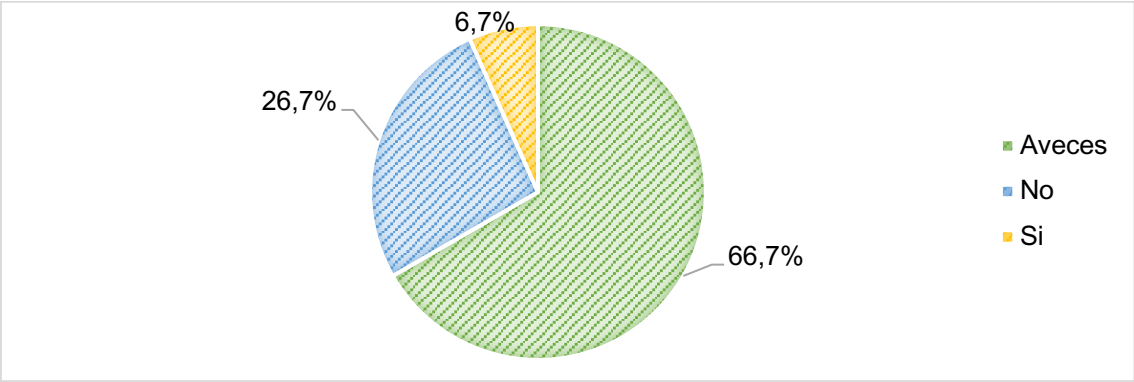
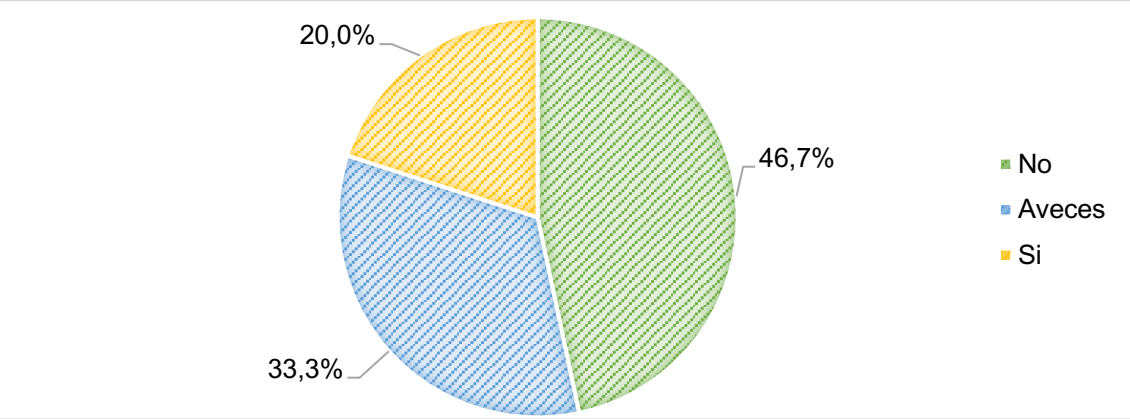


Figure 8. Participates in environmental awareness and reforestation trainings



The following is a review of internal organizational issues. 66.7% of farmers do not use financing for their productive activity. Likewise, 66.7% believe that an association will allow them to increase their productivity.

Figure 9. Financing for its cultivation

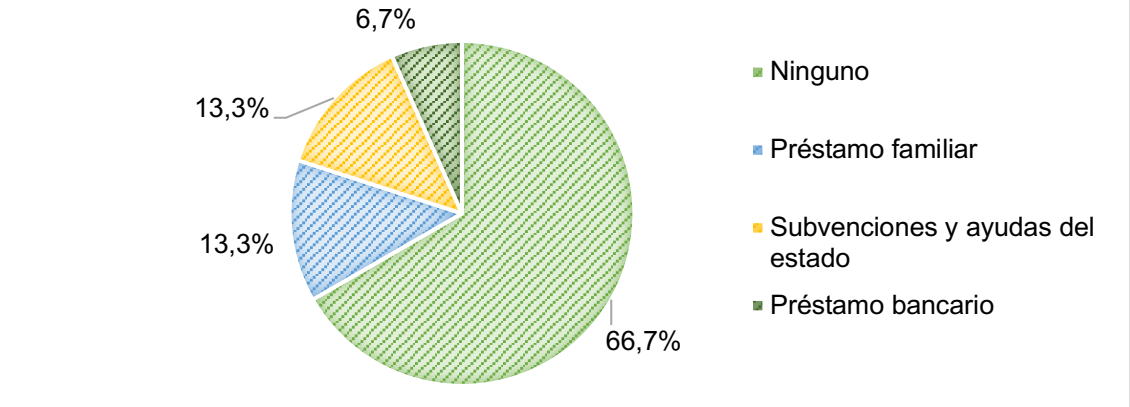
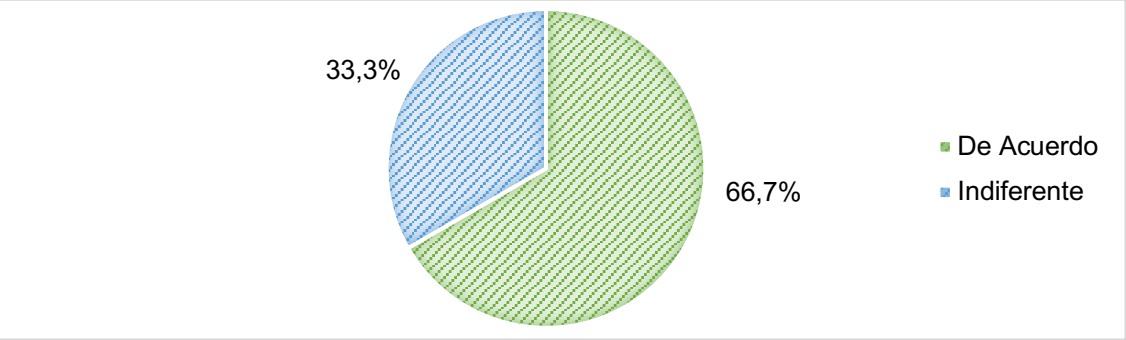


Figure 10. Do you believe that partnership will allow you to increase your productivity?



Regarding marketing aspects, 46% of the farmers sell their production to stockpilers or wholesalers. All marketing is done under the presentation of tare in fruit (100%).

Figure 11. To whom you sell your production

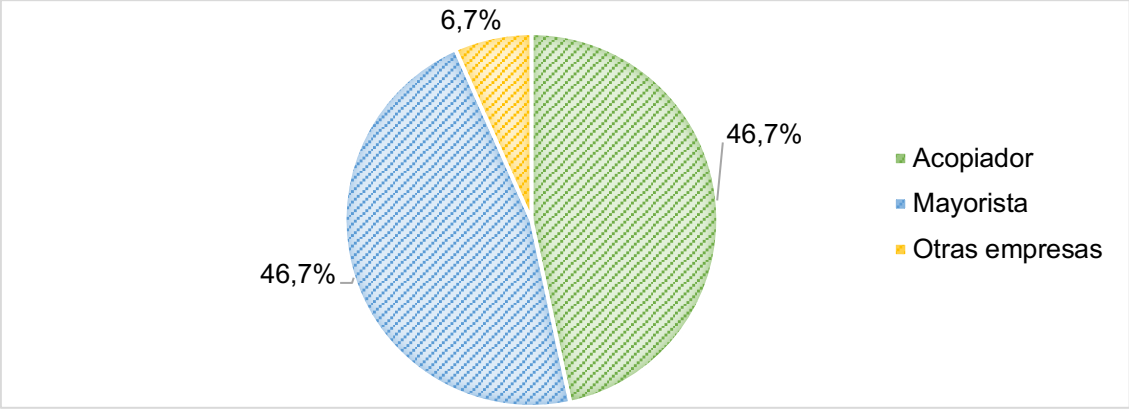
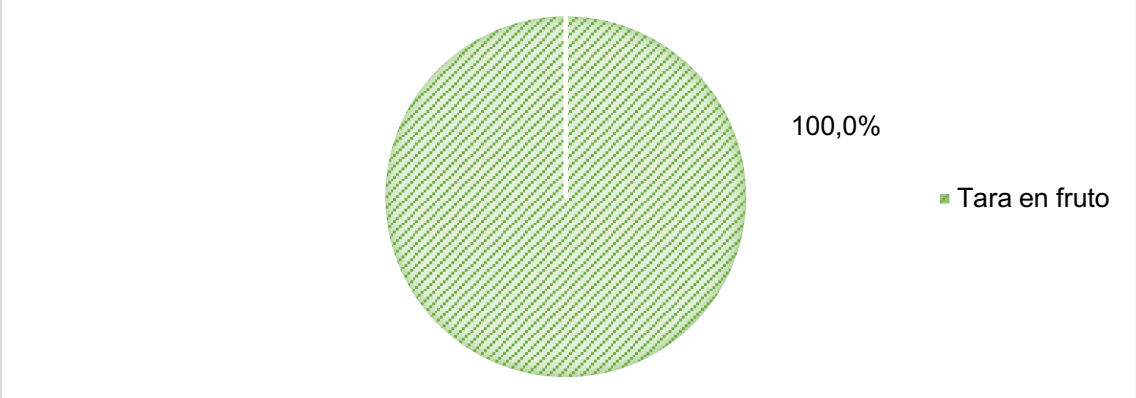


Figure 12. Presentation that sells the production



Regarding the use of marketing strategies in the commercialization of tara, 86.7% do not carry out market research for the distribution of their products; 66.7% do not use marketing techniques; and 86.7% do not use marketing to commercialize their products.

Figure 13. Performs some type of market research for the distribution of its products to its customers.

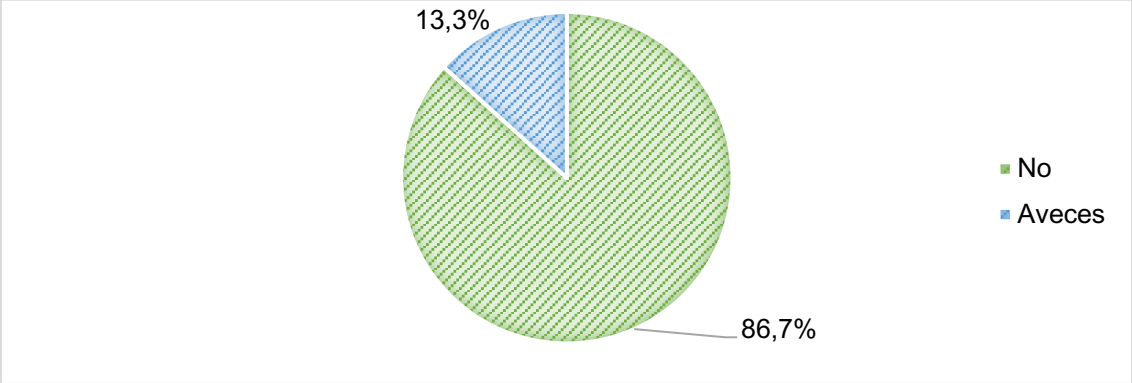


Figure 14. Performs marketing techniques for its product

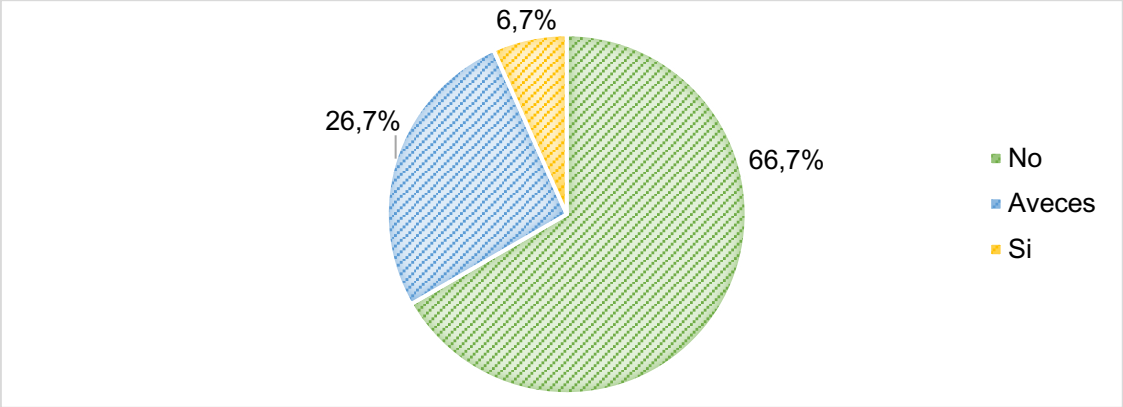
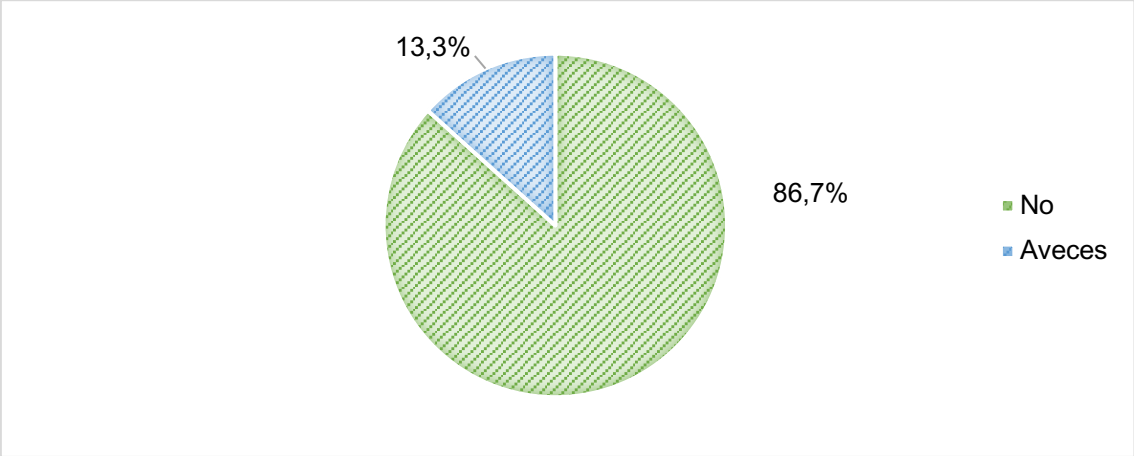


Figure 15. Use of marketing to market your product



Conclusions

In the province of Chachapoyas, the production of tara offers important opportunities for improvement in different aspects. In terms of production, there are potentially between 196.85 and 340.2 hectares in the possession of tara producers that have not yet been cultivated. Considering that the area currently destined to the cultivation of tara is between 89.95 and 139.95 ha; in terms of surface area, production has an average growth opportunity of 133.6%. It is noteworthy that the average yield of tara is 1.2 tons per hectare, which is lower than the average of 1.5 tons per hectare for traditional species, while it rises to 2.5 tons per hectare for improved species (Garcia et al, 2022).

In terms of harvest frequency, the findings reveal that they are within the standards of traditional tara species, being harvested twice a year. Current scientific development has generated new tara species, which can be harvested with a frequency of up to three times per year (García et al, 2022), which would imply a potential increase in tara production by 49.85%.

Combining the aforementioned aspects: increase of cultivated area and introduction of new species that allow a yield of 2.5 tons per hectare and an annual frequency of three

harvests; the production potential would be 2876 tons of tara per year (current: 276.88 tons per year), which represents an improvement of 938% with respect to the current productive situation.

Harvesting processes are vital for production efficiency. Currently, most producers are indifferent to care in the tare harvesting phase, which possibly explains the low average yield in Chachapoyas province. However, there is a willingness on the part of most producers to improve the quality of the crop, which is an important indicator for the success of the implementation of policies in favor of increasing tara production.

Regarding sustainability, there are also important opportunities: the lack of regular use of organic fertilizers implies that the productive efficiency of arable areas can be improved with the regular and adequate use of different organic fertilizers. Also, increasing participation in training on environmental awareness and reforestation is essential to improve the profitability of producers (Gonzales-Pech et al, 2021).

At the organizational level, the degree of financial leverage has an opportunity within the producer units. Using financing makes it possible for producers to grow significantly, as long as investments are made and appropriate measures are implemented for the sustainable development of the tara. Most of the producers consider that belonging to an association can increase their productivity, which also creates opportunities for collective organizations in favor of increasing productivity and commercialization of tara.

Regarding commercialization, the tara does not present major transformation to be sold, all the production is sold in fruit. Also, almost all of the production is sold to the tara stockpilers and wholesalers. This implies a relatively low bargaining power for farmers due to the asymmetries in the composition of the market structure.

Marketing strategies for the commercialization of tara are incipient: no market studies are carried out to distribute it, thus, it can be determined that the decisions taken in these production units are not optimal. As part of the marketing techniques, most of them do not develop strategies or actions to optimize the marketing processes.

At a general characterization level, it is important to recognize that tara producers in the province of Chachapoyas are characterized by low productive efficiency.

It is important to highlight that the creation of business organizations will possibly help farmers to overcome the major limitations that hinder their development, since producers without an organization are less likely to be adequately inserted in the commercialization of Tara (Cotrina, 2019). The above is an important point in traceability; from production, collection, processing and successful marketing of the product; organizations are a key point for the success of production and marketing of Tara, where it improves the income of the associates, reduces production costs and mainly frames them with a market approach. Thus, farmers are likely to become strategic partners for the organization and thus improve their quality of life (De La Oliva and Gonzales, 2010).

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