

ORIGINAL

Principles of environmental management and decision making in agricultural enterprises in the municipality of Colón

Principios de gestión ambiental y la toma de decisiones en las empresas agrarias del municipio Colón

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ABSTRACT

The livestock sector is now in a process of change and modernization where they are strengthening their environmental, social and cultural aspects, to become real profitable, comprehensive and very sustainable agricultural enterprises. In this way, the general objective of the research was to identify the principles of environmental management and decision-making in the agricultural companies of the municipality of Colón. Thus, a survey was conducted of seven agricultural producers distributed in different parishes of the municipality, and some direct observations to the field regarding the way in which each one manages its natural resources. It was evident that each producer in a very general way practise known sustainability actions of popular knowledge or empiricism, sudden and rapid changes in the loss of natural and agricultural biodiversity along with this time of pandemic that has awakened imagination by turning people into artists of the existing and exploiters of available resources. In addition, the vast majority of producers are already aware of turning their productive spaces into areas of socio-environmental equilibrium and that the decisions they make without thinking about the future can cause irreparable damage example with the water resource, soil, among others, and that negatively impact on their living environment. The implementation of an environmental management system in livestock companies will be directly influenced by a much broader and more comprehensive vision so as not to negatively impact their surroundings, similarly its competitive advantage will be crucial by the applicant need to form a form of human well-being linked to natural well-being.

Keywords: Environmental Management; Sustainability; Decision Making.

RESUMEN

El sector ganadero se encuentra ahora en un proceso de cambio y modernización donde están fortaleciendo sus aspectos ambientales, sociales y culturales, para convertirse en verdaderas empresas agropecuarias rentables, integrales y muy sostenibles. De esta manera, el objetivo general de la investigación fue identificar los principios de la gestión ambiental y la toma de decisiones en las empresas agrarias del municipio Colón. Así se realizó una encuesta a siete productores agropecuarios distribuidos en diferentes parroquias del municipio, y algunas observaciones directas a campo respecto a la forma en que cada uno maneja sus recursos naturales. Se evidenció que cada productor en una forma muy general practican acciones de sostenibilidad conocidos de los saberes populares o empirismo, los cambios repentinos y rápidos de pérdida de

biodiversidad natural y agrícola junto a esta época de pandemia que ha despertado la imaginación convirtiendo a las personas en artistas de lo existente y aprovechadores de recursos disponibles. Adicionalmente, en su gran mayoría los productores son ya conscientes de convertir sus espacios productivos en zonas de equilibrio socio ambiental y que las decisiones que toman sin pensar a futuro pueden provocar daños irreparables ejemplo con el recurso agua, suelo entre otros, y que impactan negativamente en su entorno vivencial. La implementación de un sistema de gestión ambiental en empresas ganaderas estará directamente influenciada por una visión mucho más amplia e integral para no impactar negativamente sobre sus alrededores, de igual manera su ventaja competitiva será crucial por la demandante necesidad de formar una forma de bienestar humano ligado al bienestar natural.

Palabras clave: Gestión Ambiental; Sostenibilidad; Toma de Decisión.

INTRODUCTION

The livestock sector is undergoing change and modernization, strengthening its environmental, social, and cultural aspects to become profitable, comprehensive, and highly sustainable agricultural enterprises. The research is being conducted in the municipality of Colón in the state of Zulia, which is characterized by its large production of meat, milk, fresh fruits, oilseeds, and cocoa, among other products.

Thus, according to Fernández A⁽¹⁾ “The municipality’s economy revolves around agricultural activity, which constitutes the basic sector of development. The largest area is used for dual-purpose livestock production: milk and meat, the former in greater proportion; the same is true of banana production in the parish of Urribarrí and in El Morality, where other crops such as oil palm, oranges, grapefruit, cassava, and chili peppers, among others, also stand out”.

Field practices were always managed in such a way that the clearing, burning, and drainage of watercourses or reservoirs would give way to livestock farming or large areas of monoculture, which over time have led to low soil fertility, air and water pollution, and other socio-environmental problems, including climate change, which is now exacerbated by the COVID-19 pandemic.

Similarly, Romero L⁽²⁾ reported in 1995 that the description of the southern Lake region as rich land with high productive potential should be put into perspective and placed in a context where the area is characterized comprehensively and not only from the point of view of a single factor, such as soil fertility or several factors considered in isolation.

For example, this factor of “fertility” should not continue to be treated as the central data since it is more of a process that is highly susceptible to modification by anthropic factors.^(3,4,5)

The agricultural sector, for the most part, feels alien to these effects and realities. Given the close link between its activities and the environment and the abuse of natural resources, it is essential that agricultural enterprises, regardless of their size, seek to minimize the adverse impact they may cause through sustainable management of forest heritage and natural resources and by promoting conservation in the consumption of water and energy, which are their main areas of activity. A comprehensive response to this challenge for agricultural companies is the implementation of an Environmental Management System aimed at sustainable agrarian management, making it a balanced and efficient process.^(6,7,8,9)

With this implementation, an environmental management system becomes a continuous cycle of energy flow systems in line with internal needs and further promotes the rational use of natural resources. This is where profitability grows thanks to the agro-biodiversity drive that the company becomes, depending less on its base production and having continuous flows of raw materials, food, and other inputs, all for a better quality of life for the population, nature, and the environment.^(10,11,12)

Bermúdez C⁽³⁾ notes that “ISO 14000 establishes the principles, tools, and techniques to support the development of a company with its environmental management system. This standard provides many ways and tools to establish an environmental management system (EMS) and highlights the importance of working by both the internal and external environment”.

The principles and guidelines for effective environmental management planning could form the basis for designing an efficient and sustainable agricultural model.^(14,15,16) There is still a long way to go, but on this new track, the race winners will not be the fastest or in the majority. What will determine victory will be a profound change in our behavior, combined with a widespread love for our human, physical, and spiritual nature.^(17,18,19)

We can see that the challenges posed by the sustainable development approach involve significant economic, productive, social, cultural, political, and scientific efforts and even a change in the individual conception of what everyday life should be.^(20,21,22) In other words, it is necessary to integrate various disciplines and accumulated knowledge into a holistic conception of environmental problems, which means that to solve any of them, it is required to use all of humanity’s capacities, from the purely rational (traditional positivist view)

to the sensitive and intuitive (humanistic view).^(23,24,25,26) It is therefore considered necessary to identify the principles of environmental management as a starting point for research and decision-making in agricultural enterprises in the municipality of Colón, given their influence on natural resource management.

What are the principles of environmental management considered in agricultural enterprises?

Objective

To identify the principles of environmental management and decision-making in agricultural enterprises in the municipality of Colón.

METHOD

The methodological framework is an aspect of the research project in which a set of techniques, procedures, instruments, and materials used by the researcher(s) to collect the necessary information are conceived and described in detail. Therefore, the methodological elements used for this research on environmental management and decision-making in agricultural companies in the municipality of Colón are mentioned below.

Nature of the research

The thesis was developed from a positivist paradigm with a quantitative approach. In this regard, Ramos⁽⁴⁾ mentions that “positivism affirms that reality is absolute and measurable, and the relationship between the researcher and the phenomenon under study must be controlled since it should not influence the conduct of the study”. The “positivist paradigm is described as quantitative, empirical-analytical, rationalist, systematic, managerial, and scientific-technological”.

On another note, Martínez⁽⁵⁾ mentions that “the only acceptable knowledge is scientific knowledge that obeys certain unique methodological principles. Among its most notable features is its quantitative nature, which ensures the precision and rigor science requires”.

Type of Research

The type of research carried out was descriptive. According to Márquez O⁽⁶⁾, one of the characteristics of explanatory research is that the variables cannot be manipulated when conducting the study since the facts observed involve events that have taken place at a specific time and in a particular place. “It is important to note that the description is not only of facts or phenomena, but can also refer to aspects such as people’s opinions, points of view, attitudes, practices that prevail in certain communities, and ongoing processes”.

Research design

According to Gallardo E⁽⁷⁾, descriptive studies select a series of topics and measure them independently to describe what is being investigated.

This is also field research in that its purpose is to investigate social phenomena to understand a hypothesis or discover unknown relationships between the facts examined. That is why the design of this research is field research, which “consists of collecting data directly from the subjects under investigation, or from the reality where the events occur (primary data)...”; “through direct observation, interviews, or other techniques. It can also be carried out at an exploratory, descriptive, and explanatory level”.

Study population

According to Galán M⁽⁸⁾: once the researcher has specified the problem, they develop an appropriate study design and select the instruments for collecting data. They then choose the elements from which the data will be collected. This corresponds to sampling, which consists of selecting elements from a population from which specific factors are to be measured.

Rosario et al.⁽⁹⁾ note that population is “that set of entities that share common characteristics. Entities can be individuals, objects, things, animals, bacteria, families, farms, stores, households, employees, among others “. According to Arias F⁽¹⁰⁾, it is a “finite or infinite set of elements with common characteristics for which the research conclusions will be extensive. The problem delimits it and the objectives of the study”.

That is why, for this research, the population was finite and included seven (7) agricultural producers located in different parishes, reflecting varied management practices on their farms due to their different living areas, thus opening up experiential possibilities for each ecological niche. Their ages range from 34 to 81 years old, and they have chosen to observe very traditional approaches alongside modern ones in managing their production units.

Data collection techniques and instruments

In principle, a data collection instrument is any resource the researcher can use to approach phenomena and extract information from them.^(27,28,29) Thus, according to Arias F⁽¹⁰⁾, “Data” collection techniques are the different ways or means of obtaining information. Examples of techniques include direct observation, surveys

in their two forms (interviews or questionnaires), document analysis, content analysis, etc.”.

Therefore, the study analyzes and describes working methods based on how producers interpret the relationship between agricultural production and the biological and conservationist link in the areas comprising their farms and surroundings. The information was collected through observation, supported by perhaps the most common data collection tool, the questionnaire, consisting of a series of closed and structured questions, which were answered by the producer on aspects of general and experiential anecdotal records of the site of interest. The producer responded to these questions on general aspects and experiences from anecdotal records of the site of interest.

Validity of the instrument

Validity is a construct inherent to research from a positivist perspective. It provides the instruments and information collected with the accuracy and consistency necessary to make generalizations about the findings derived from the analysis of the variables under study.⁽¹¹⁾

For his part, Chiner E⁽¹²⁾ states that “It “is the most important quality of a measuring instrument. An instrument may be reliable but not valid; but if it is valid, it must also be reliable”.

Based on this, teachers with extensive experience in environmental management strategies and research methodologies were considered when evaluating experts, judges, and/or expert opinions.

Data processing and analysis techniques

In this case, it is necessary to specify, according to Arias⁽¹⁰⁾, that data processing and analysis techniques are where “the”different operations to which the data obtained will be subjected are processed: classification, recording, tabulation, and coding, if applicable.” In this research process and for the structuring of the database, criteria with the same characteristics were grouped, thereby establishing the percentages corresponding to the responses obtained. Finally, each was graphed for each item designed in the questionnaire. Each graph was created using Microsoft Word, and the results were divided into circles with their respective percentages. Finally, each one could be interpreted by highlighting each resulting alternative in color.

RESULTS

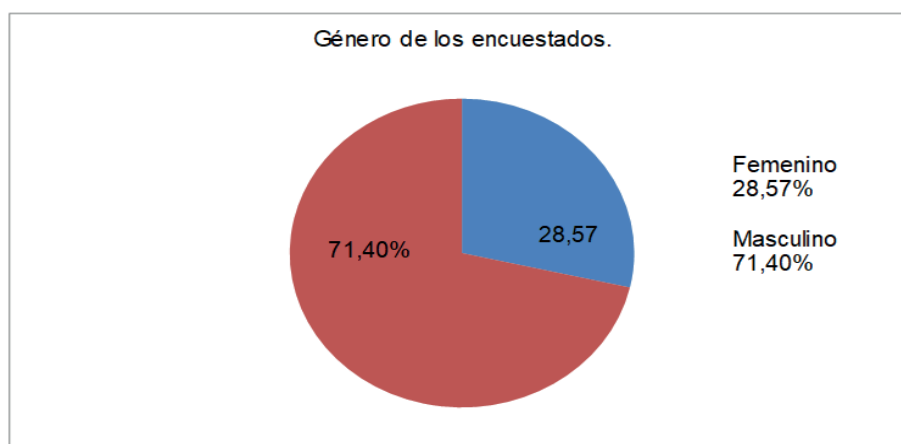


Figure 1. Gender of producers surveyed

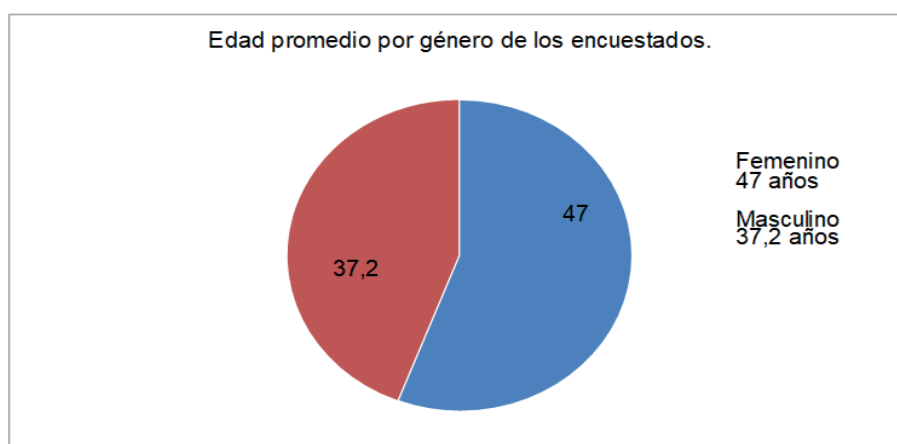


Figure 2. Average age by gender of producers surveyed



Figure 3. Occupation or profession of the producer surveyed

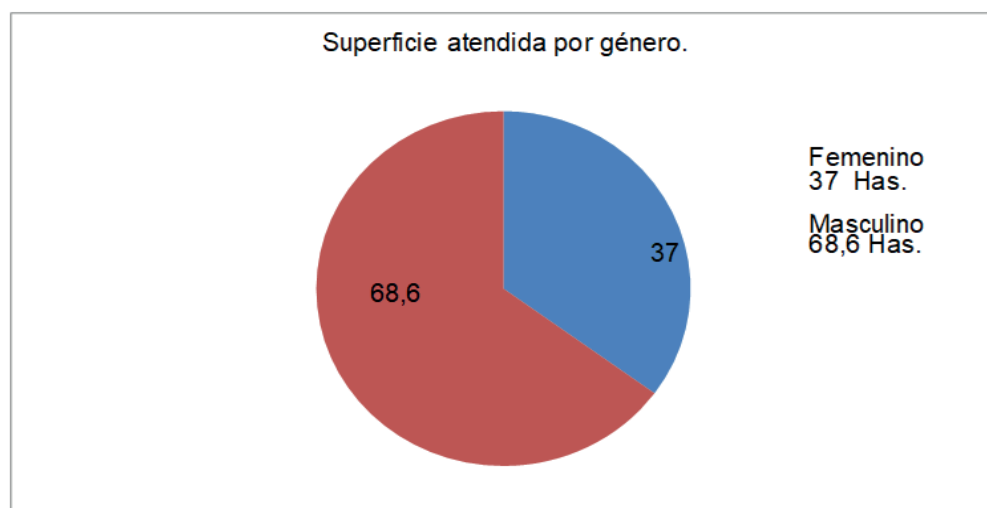


Figure 4. Area served by gender

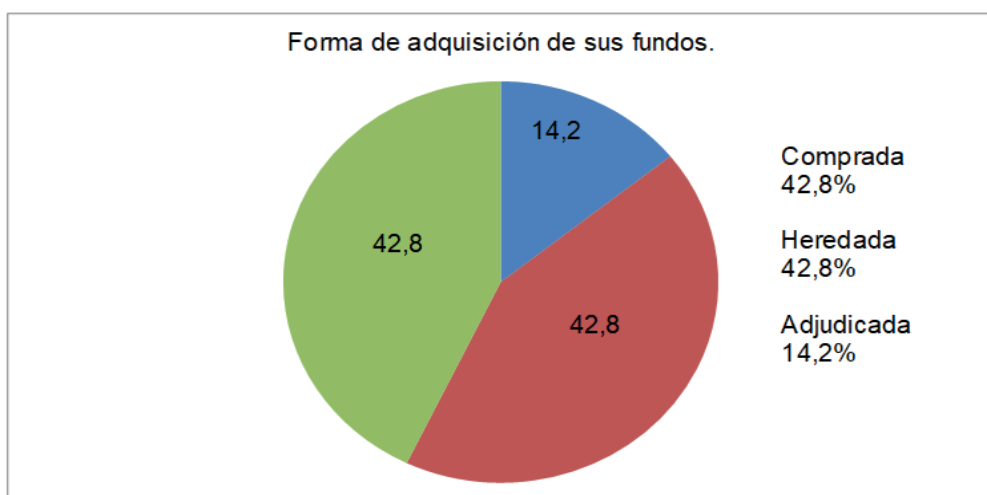


Figure 5. Form of acquisition of funds

With similar knowledge gained through experience and empiricism transferred from their farming families, they carry out their daily practices alongside their staff with continuous links to their activities (figures 6 to 9).

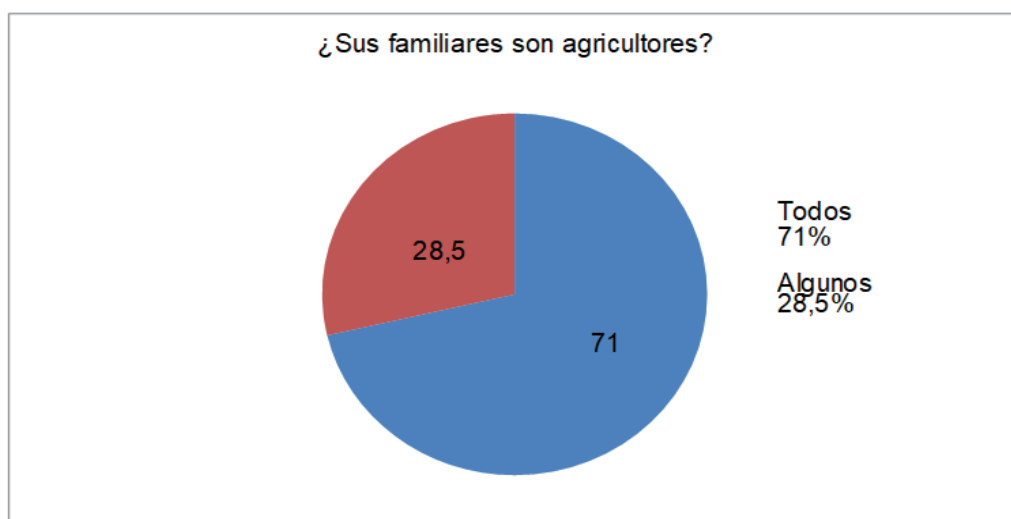


Figure 6. Occupation or profession of each producer's family members



Figure 7. Producers with experience in agricultural activities

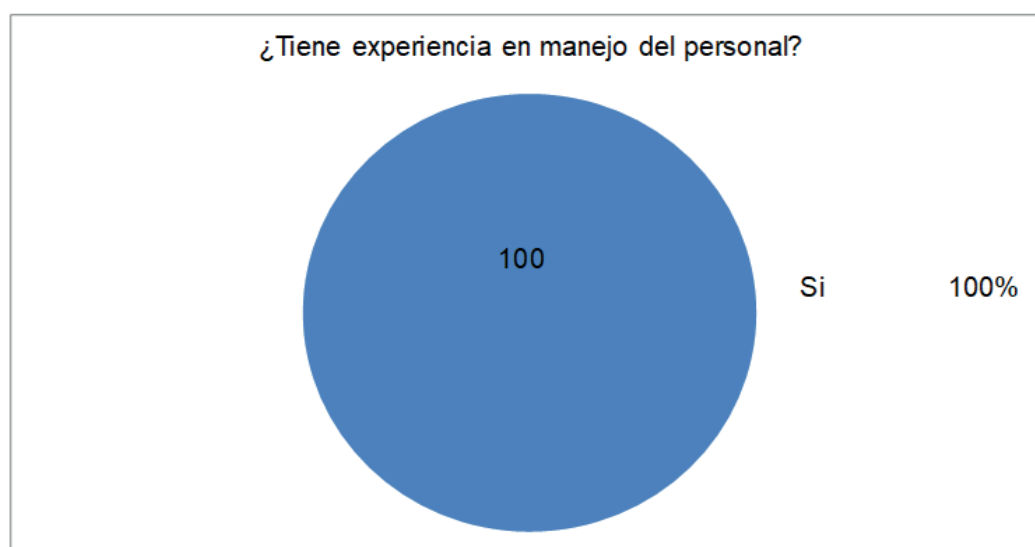


Figure 8. Percentage of producers with experience in personnel management



Figure 9. Location of producer's residence

Figures 10 to 13 show the fact that they like the countryside and are interested in continuing to learn more about production, accompanied once again by their experiential link, the issue of respect for life and environmental conservation, which is reflected in the opinions in figures 14 to 23. This is a point that supports the possible safe application of environmental management methods within the farms studied.



Figure 10. Constant interest in training among producers

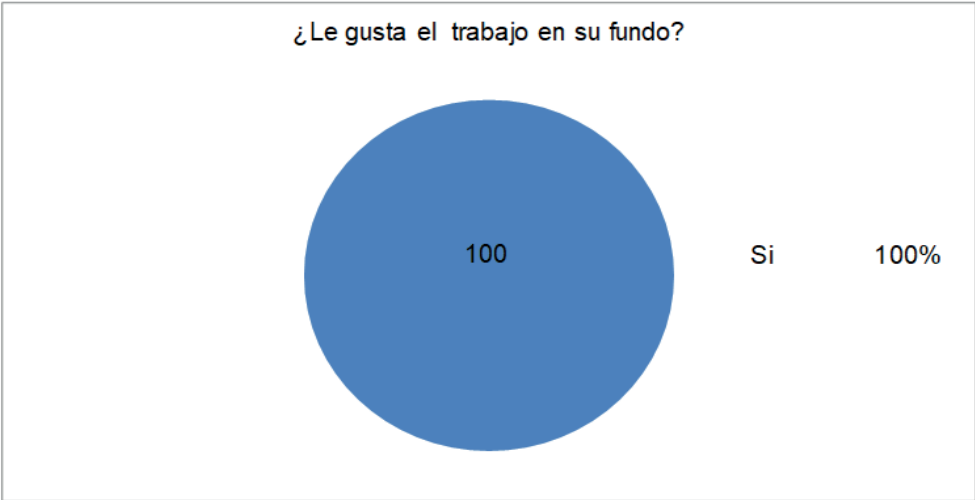


Figure 11. Producer interest in working on their farm

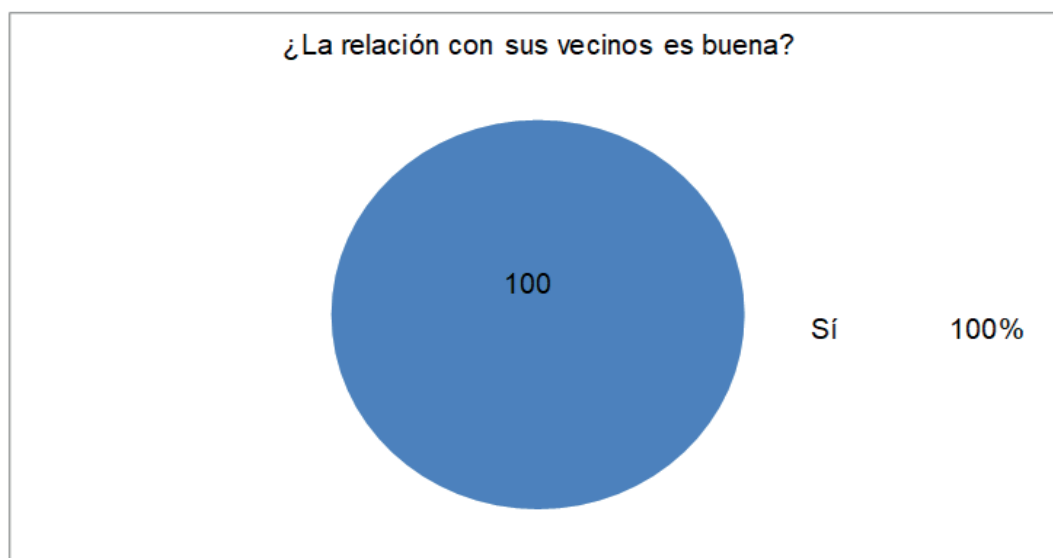


Figure 12. Intrapersonal relationships with neighbors



Figure 13. Labor relations with staff



Figure 14. Animal management on the farm

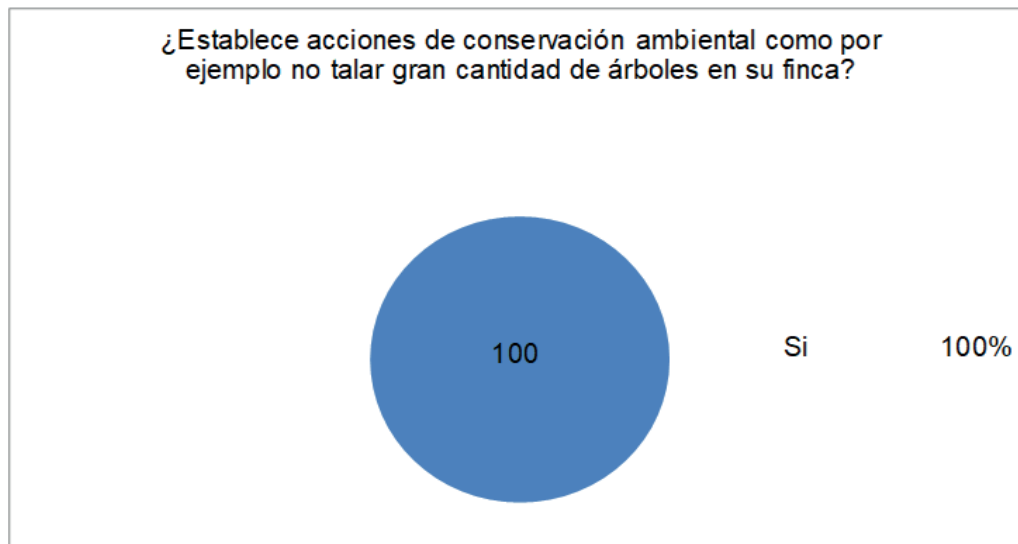


Figure 15. Implementation of environmental conservation actions

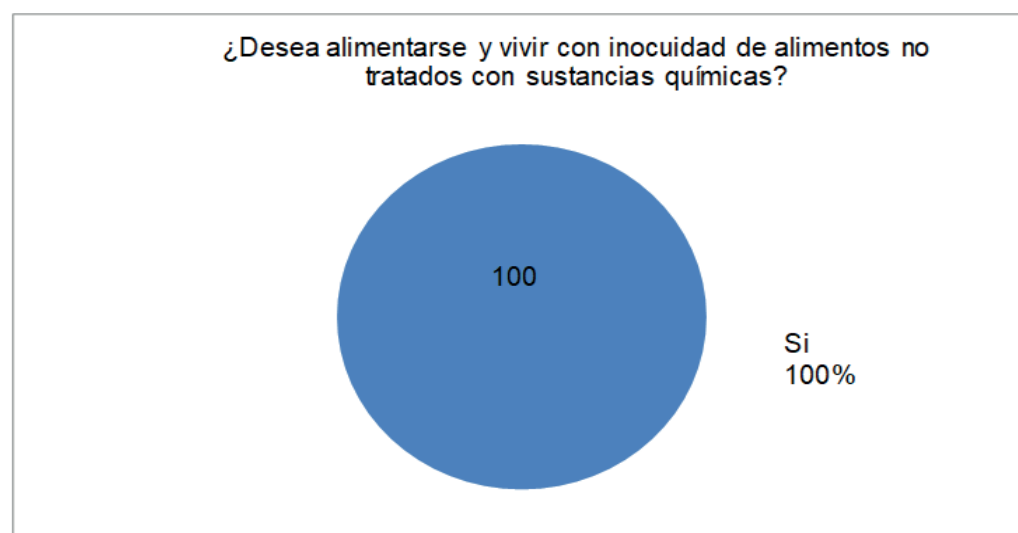


Figure 16. Percentage of producers who want to obtain healthy food

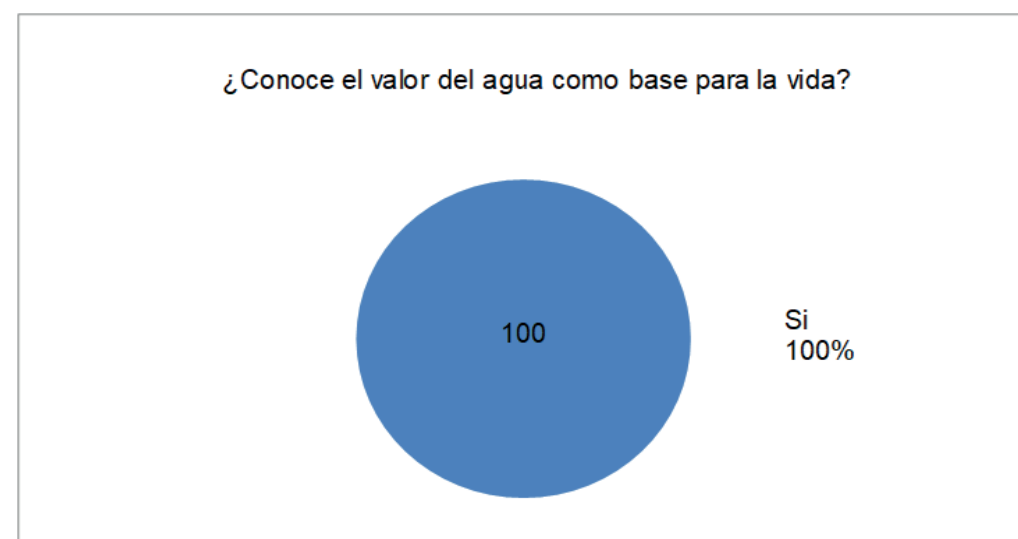


Figure 17. Knowledge of the value of natural resources: water

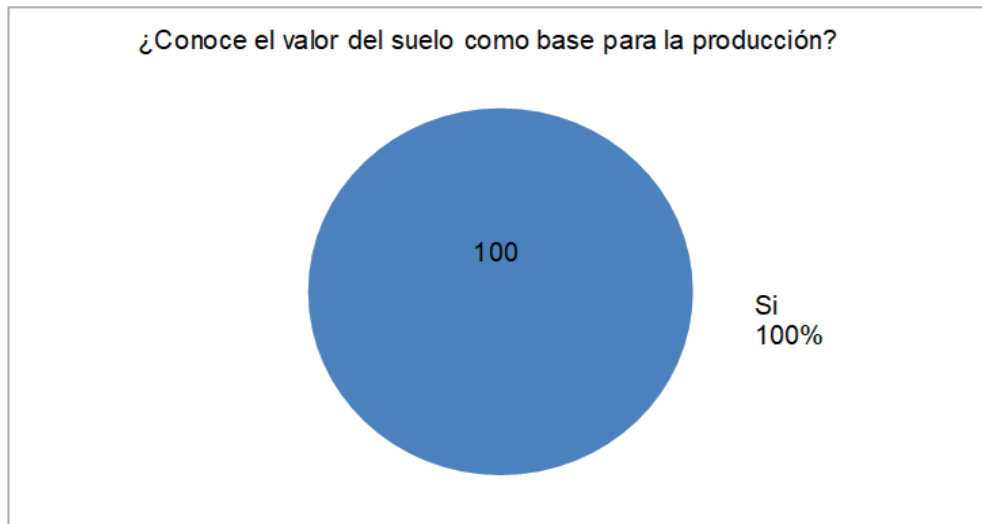


Figure 18. Knowledge of land value as a basis for production

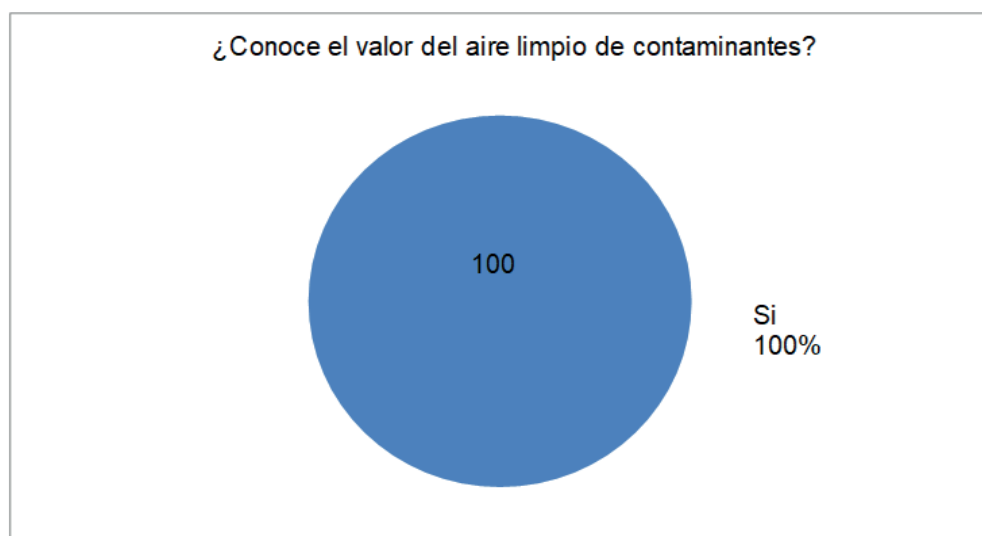


Figure 19. Awareness of the value of clean air free of pollutants



Figure 20. Percentage of producers wishing to apply regenerative livestock farming practices

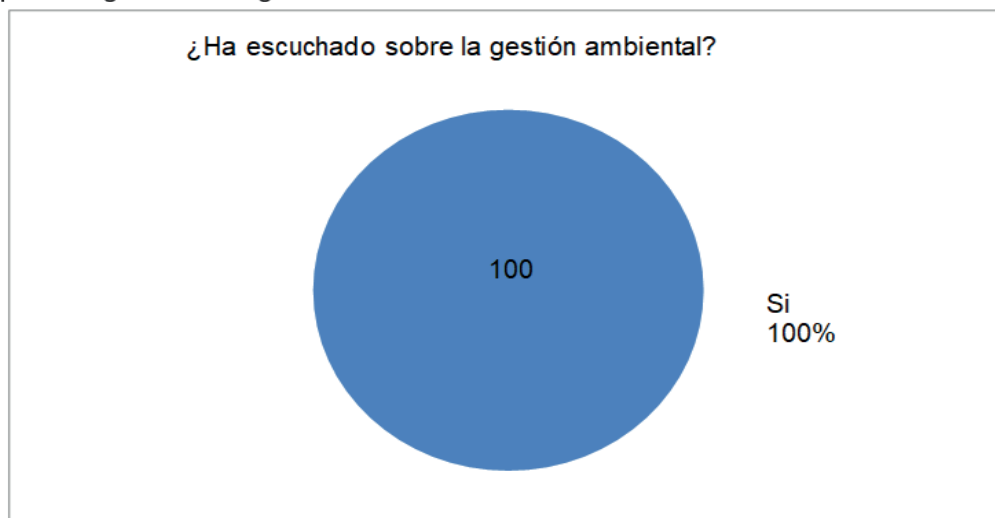


Figure 21. Percentage of producers with knowledge of environmental management

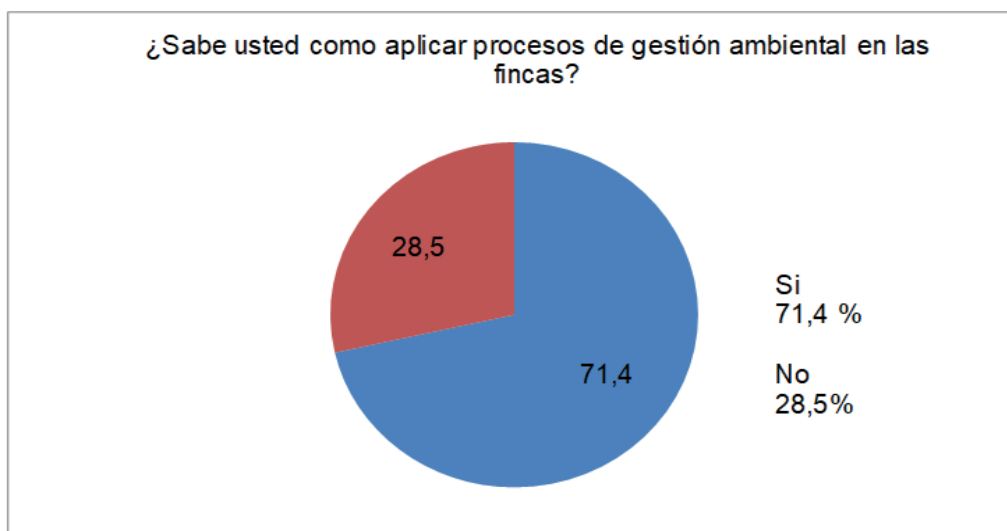


Figure 22. Percentage of producers with knowledge of environmental management processes

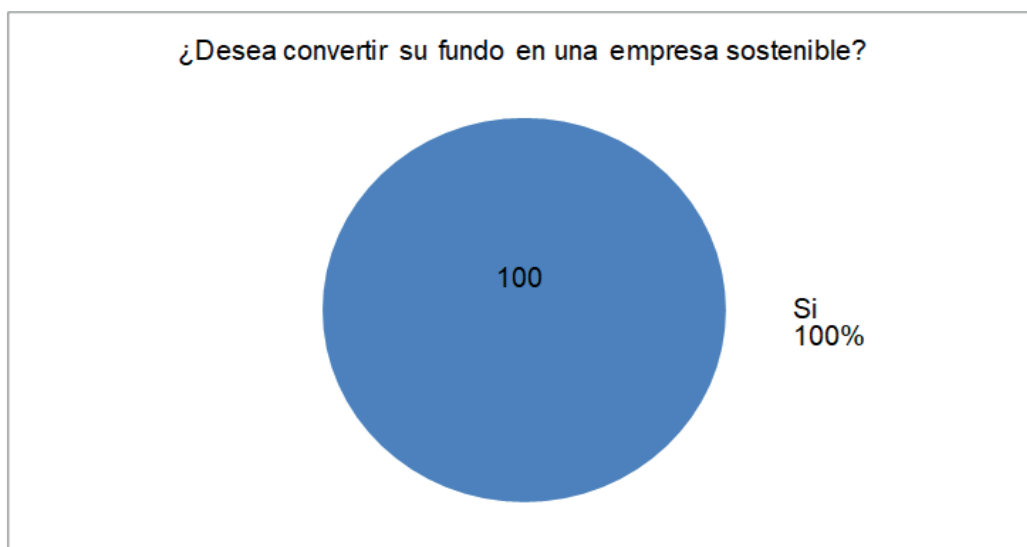


Figure 23. Percentage of producers wishing to convert their farms into sustainable enterprises

From figure 24 to 30, opinions on sustainability, climate change mitigation, and fair decision-making within funds begin to gain strength, involving objectives two and four of the research in the basic application of agroecology.

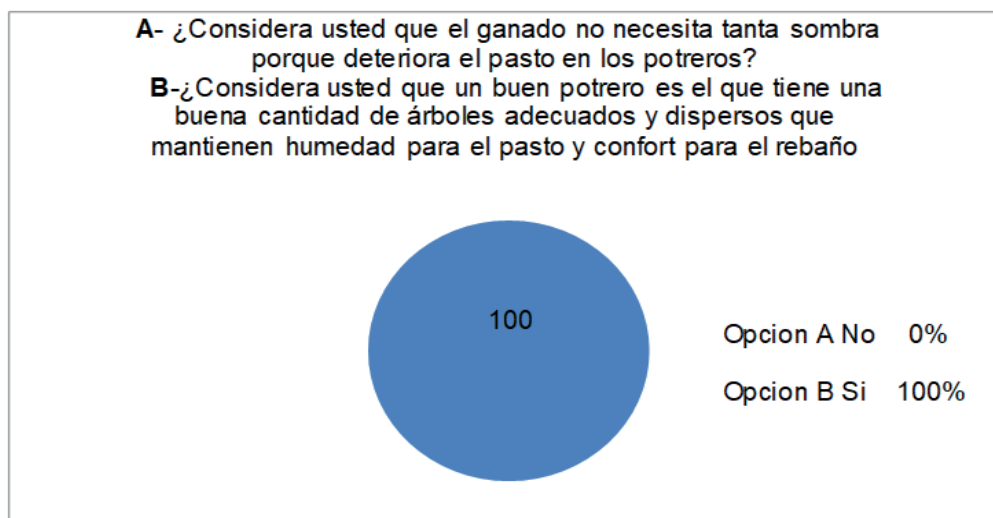


Figure 24. Environmental practices applied and natural resource management, such as trees

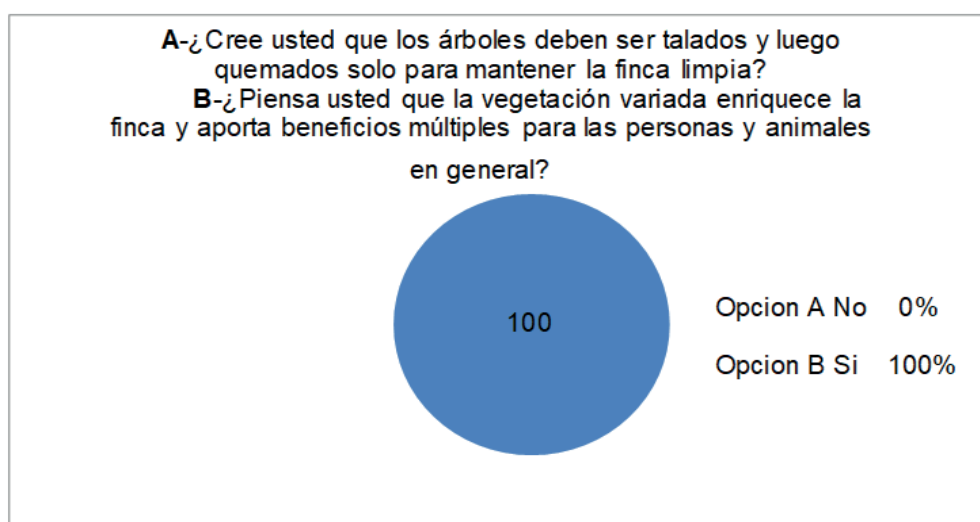


Figure 25. Natural resource management and tree distribution on the farm

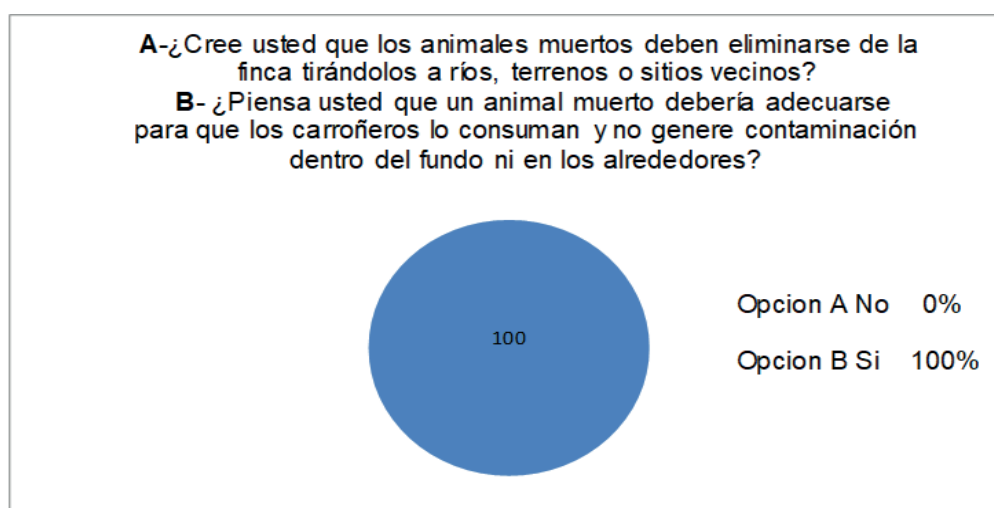


Figure 26. Location of animal unit after death

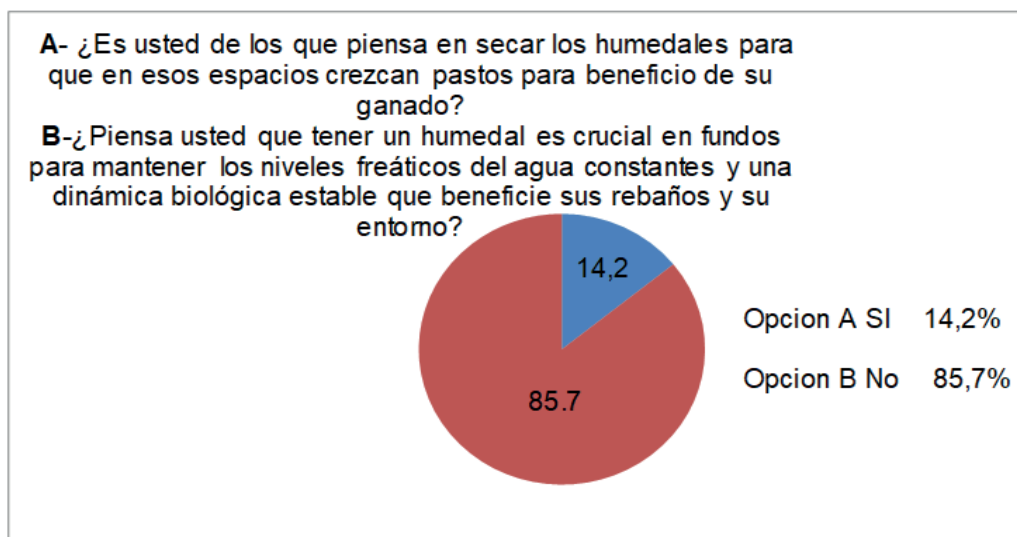


Figure 27. Natural resource management: wetlands

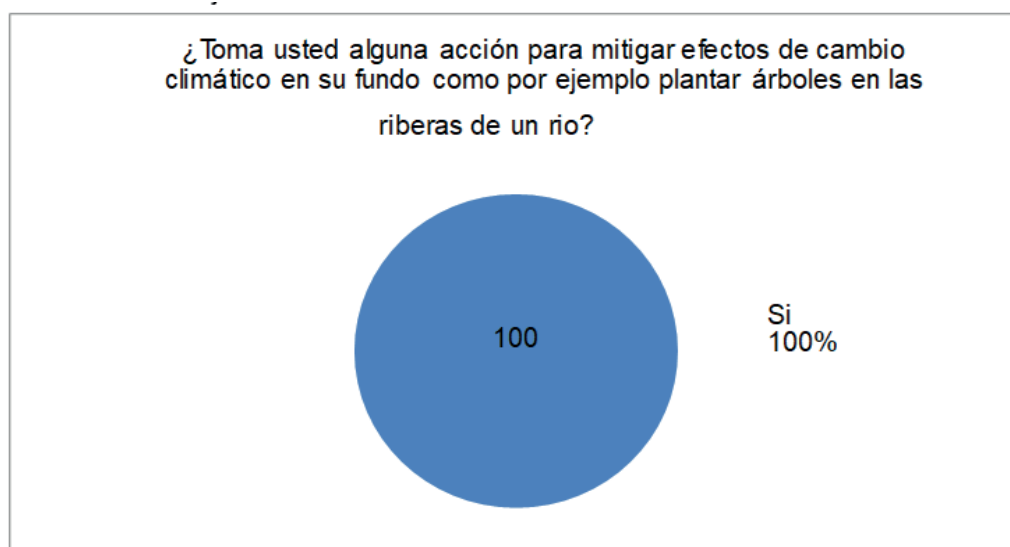


Figure 28. Decision-making to mitigate the effects of climate change

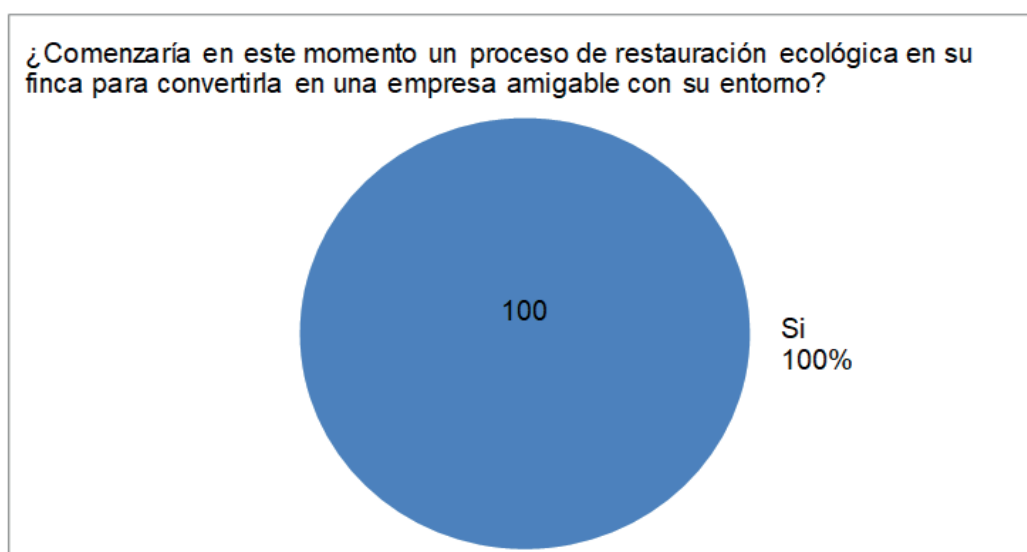


Figure 29. Percentage of producers wishing to carry out ecological restoration

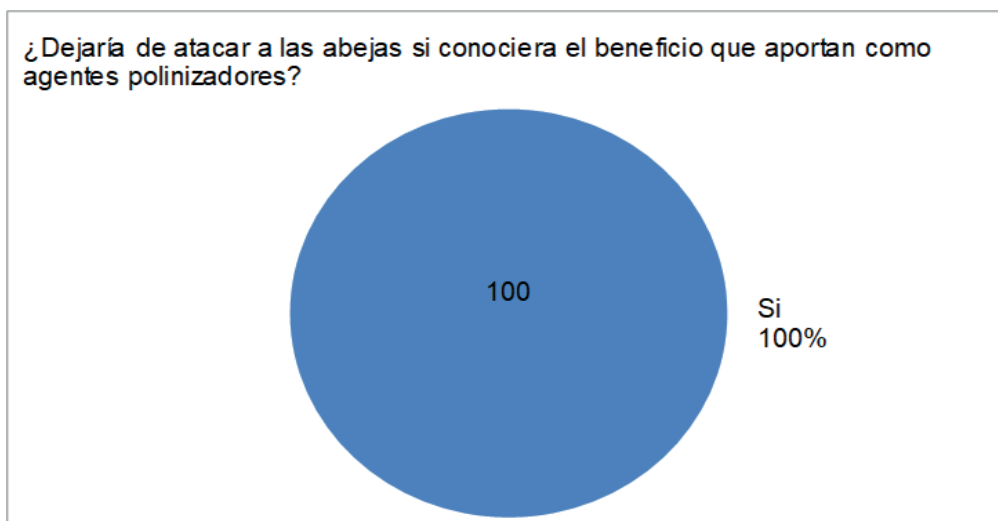


Figure 30. Management of pollinating agents

Opinions then appear on corporate responsibility and civic awareness in figures 31 to 33, with 34 stating that they have an acceptable understanding of energy saving in the case of water.

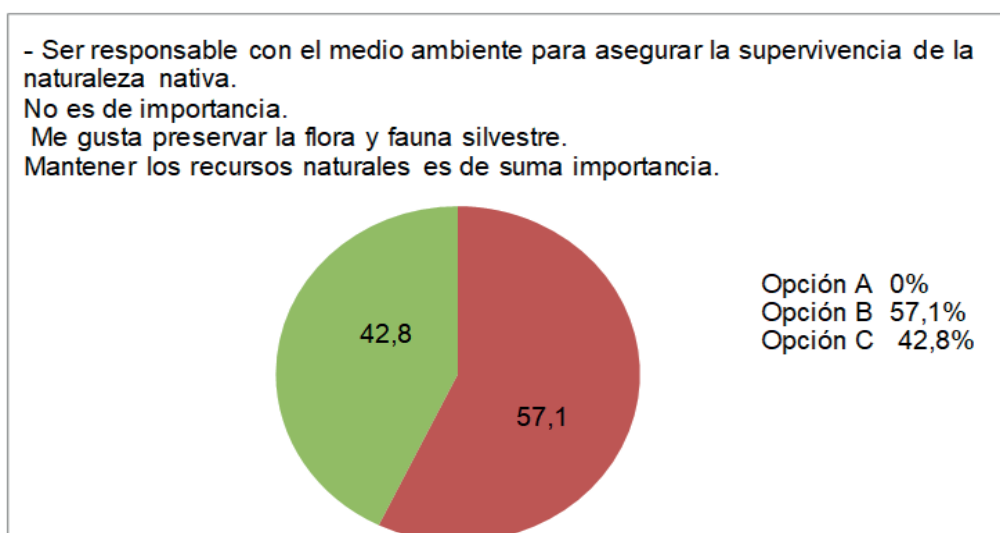


Figure 31. Percentage of producers with a sense of responsibility towards the environment

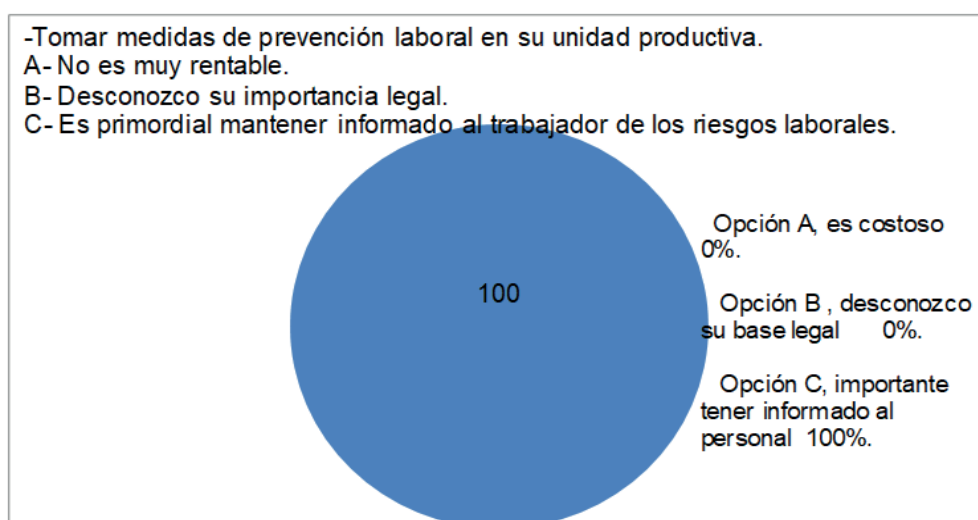


Figure 32. Occupational safety measures taken in the production unit or agricultural enterprise

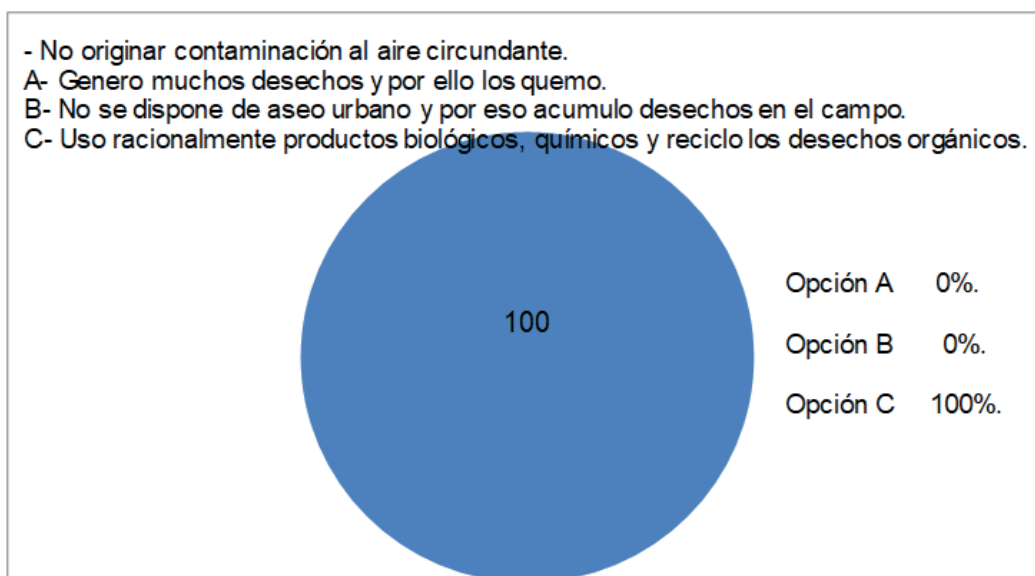


Figure 33. Air pollution management

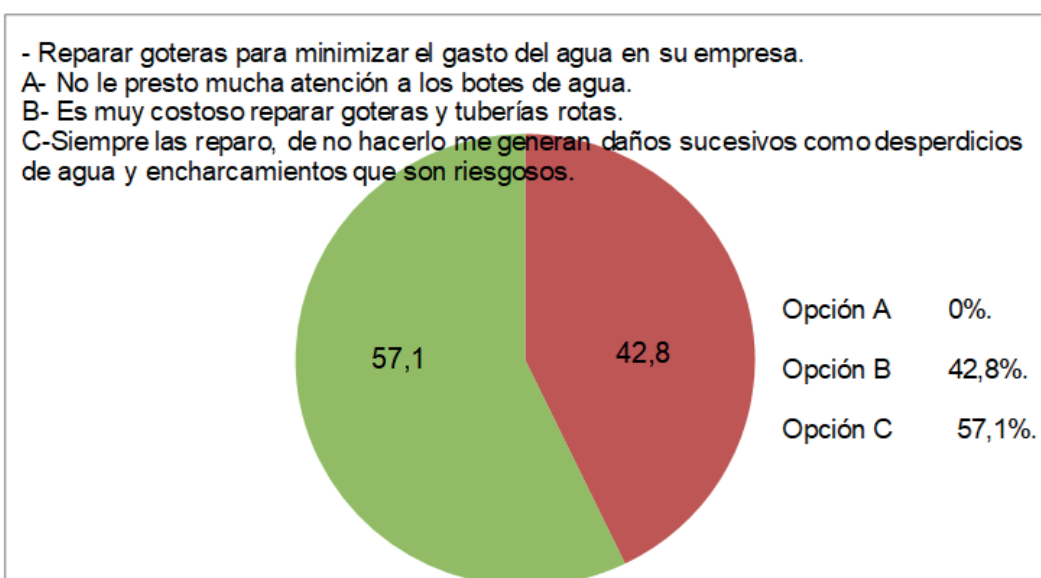


Figure 34. Rational water use



Figure 35. Production indicators that agricultural business owners wish to improve

In figure 35, they express their desire to improve their production indices by training their personnel and incorporating more viable alternatives for environmentally friendly production and rational management of natural resources.

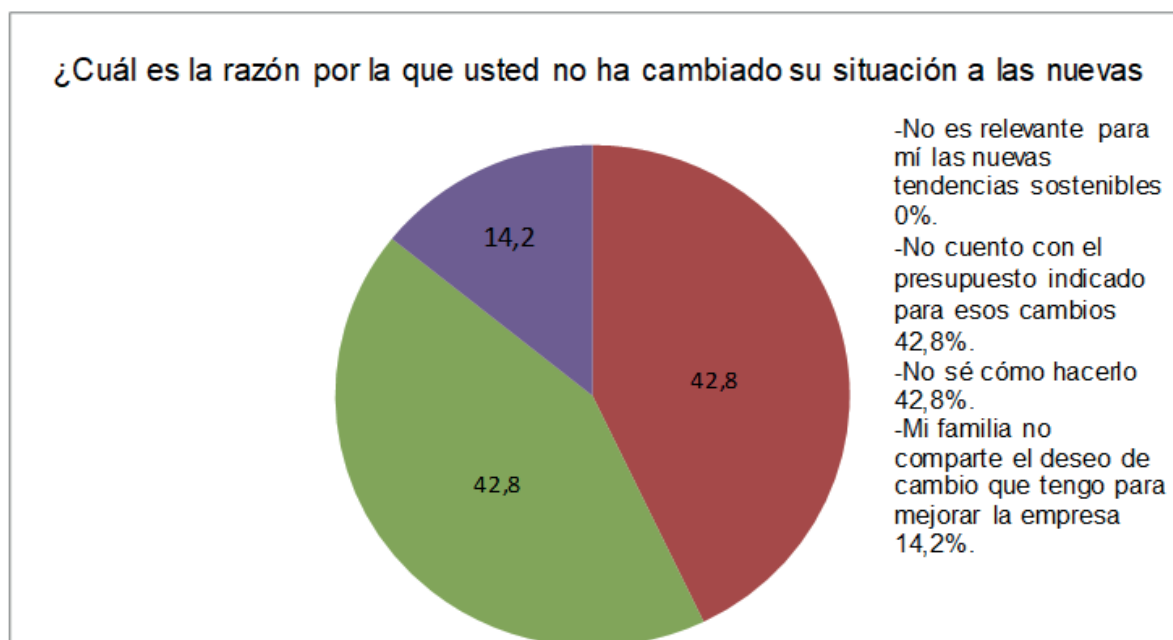


Figure 36. Reason for switching to new agroecological trends

Figure 36 shows that producers need accurate support to change their production style, but they mention that they do not have the necessary economic resources for such a change. However, with the right advice, they will not need a large contribution or expenditure; they will only see part of a medium- and long-term investment when applying regeneration methods in their fields.



Figure 37. Social empathy of producers with their community

From figure 37 to 45, producers express varying degrees of social empathy, social responsibility, work ethic, and forms of community agricultural support. The current reality has made producers more sensitive to changes in social rankings and how they are perceived in their communities.



Figure 38. Percentage of producers participating in community actions



Figure 39. Percentage of producers participating in political actions

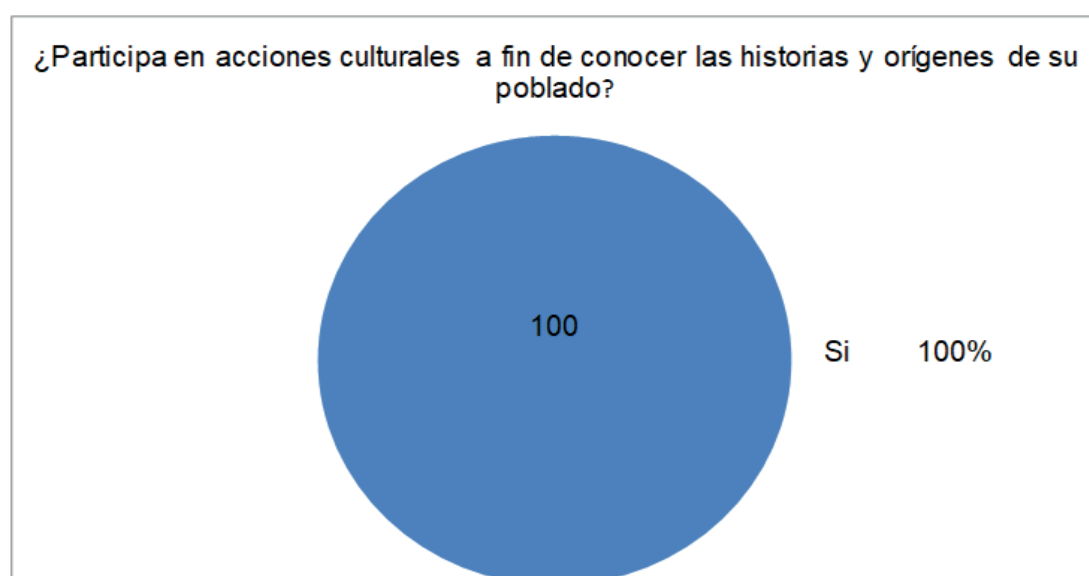


Figure 40. Percentage of producers participating in cultural activities

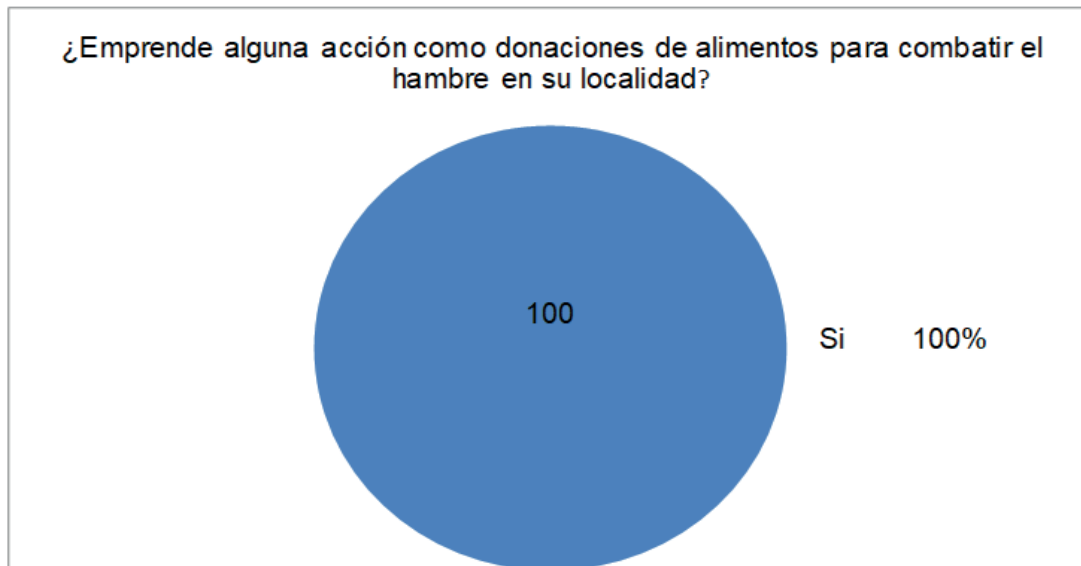


Figure 41. Percentage of producers donating food

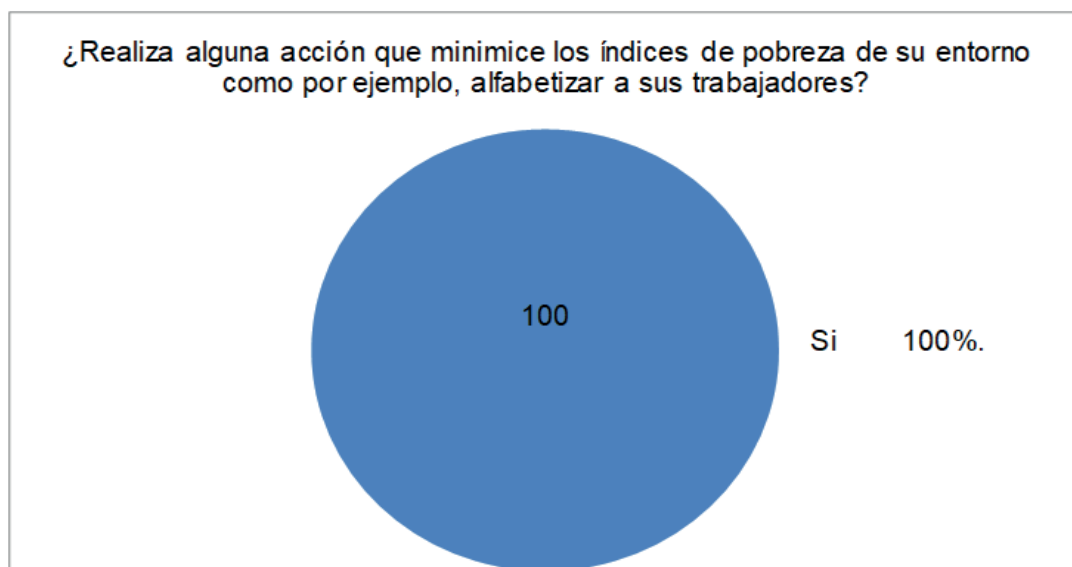


Figure 42. Percentage of producers taking action to minimize poverty rates

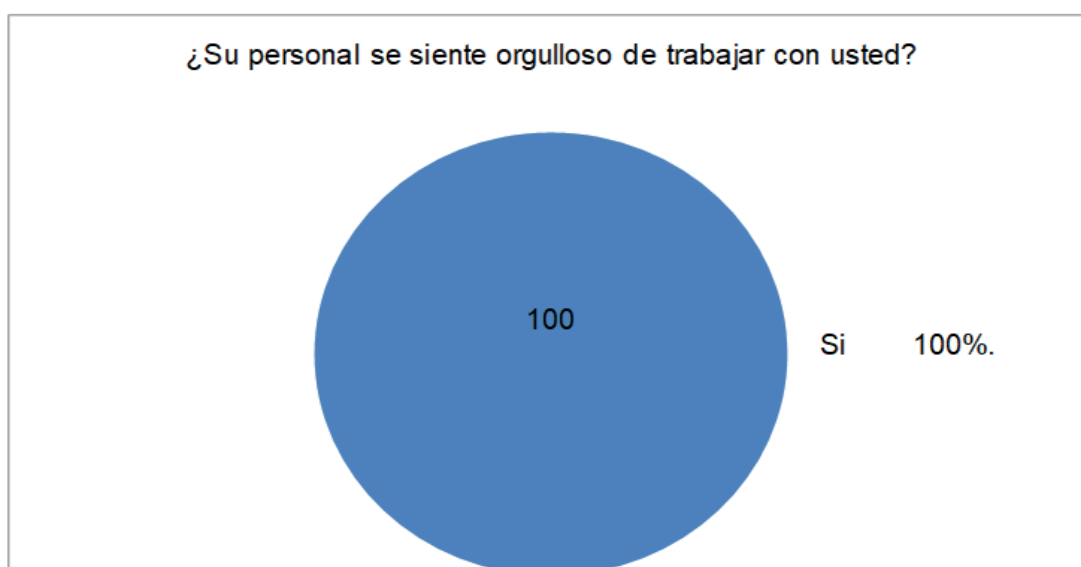


Figure 43. Job satisfaction of personnel toward the owner of the agricultural enterprise

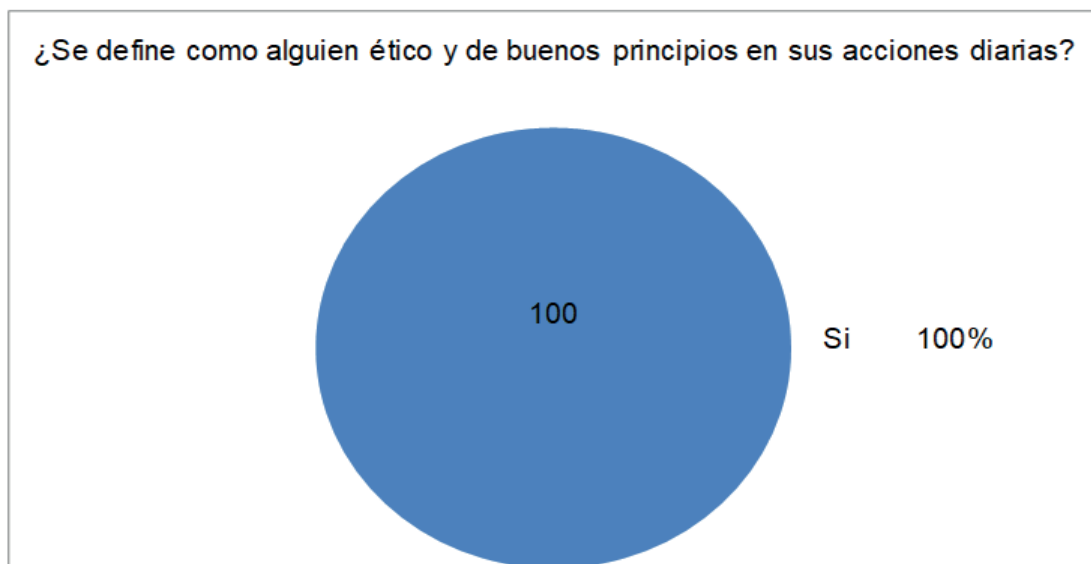


Figure 44. Ethics and good principles in the daily actions of agricultural business owners

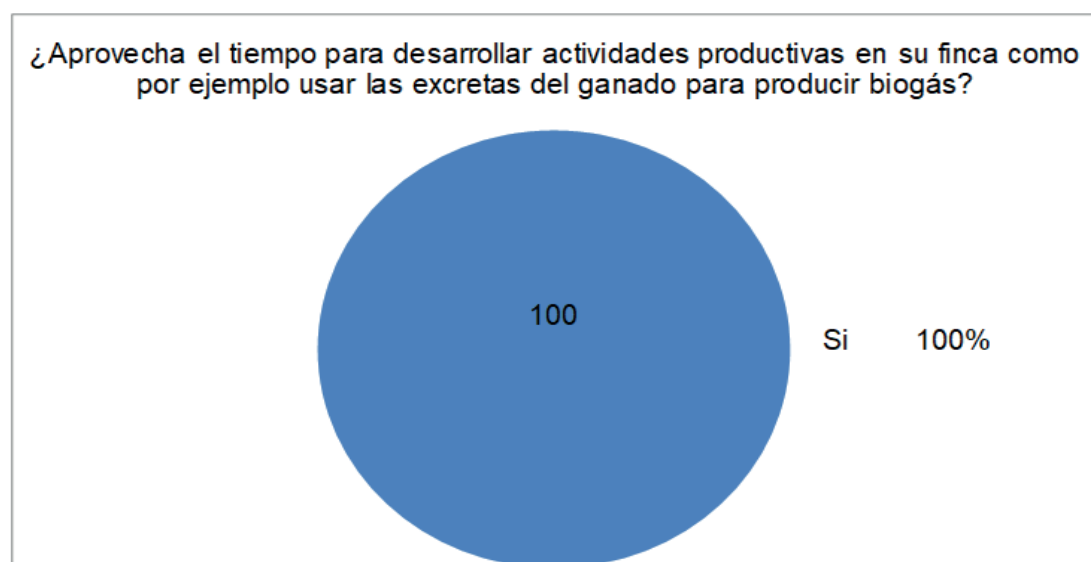


Figure 45. Solid waste management from livestock and environmental practices

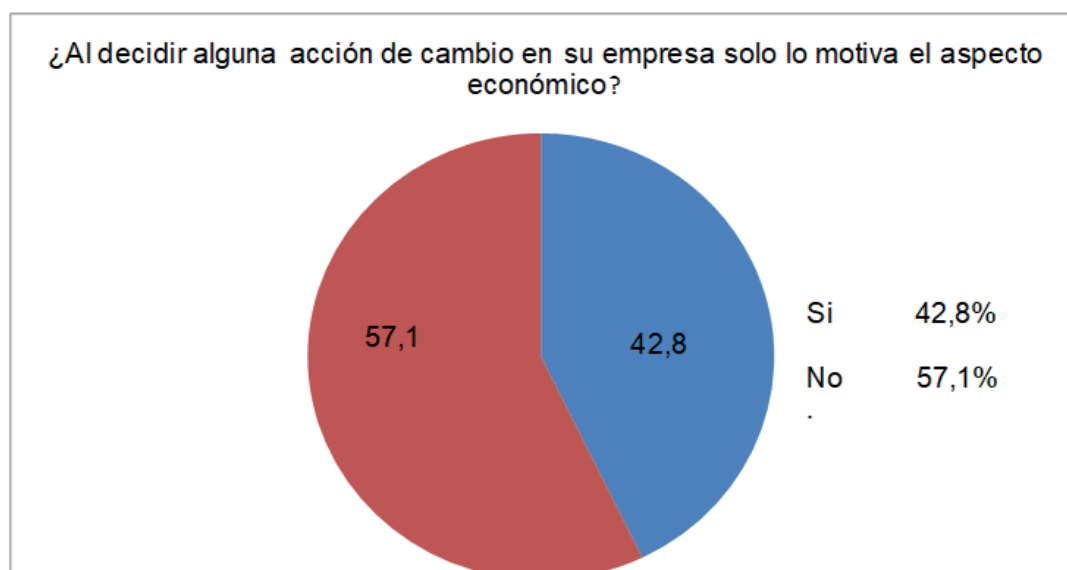


Figure 46. Motivation to implement a change in their agricultural enterprise

Figures 46 to 50 reflect flexibility in decision-making to manage their businesses without causing harm or disruption to themselves, their companions, or their assets. They seek alternatives and involve workers in the process.



Figure 47. Flexibility in decision-making

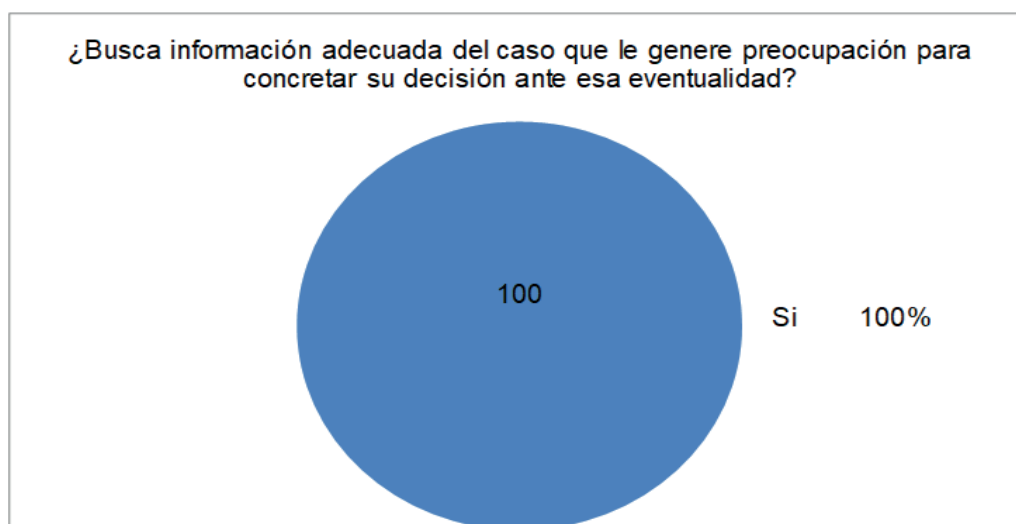


Figure 48. Search for adequate information to make a decision in the event of a certain eventuality

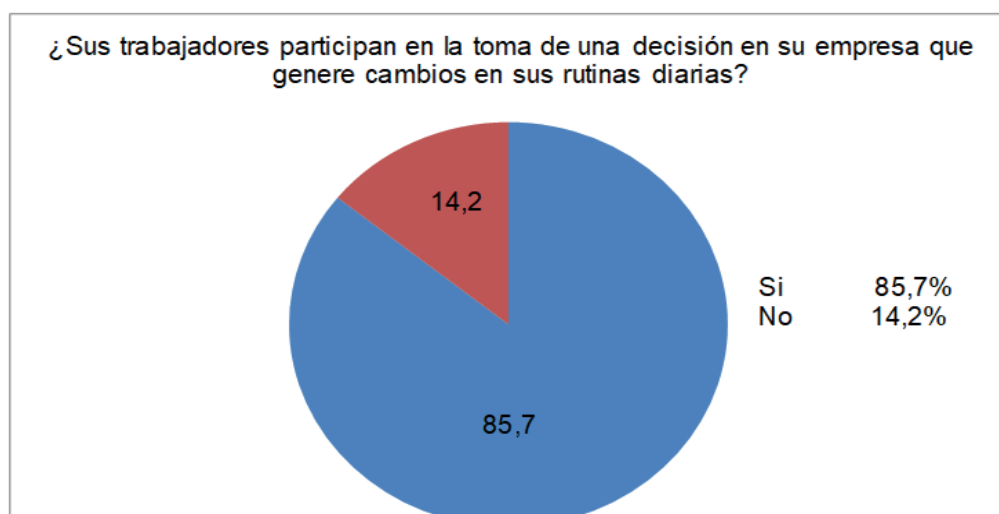


Figure 49. Participation of personnel in decision-making in agricultural enterprises



Figure 50. Overall positive image of the agricultural company within the community



Figure 51. Hiring of qualified, certified, and specialized personnel to improve the production system in the agricultural enterprise

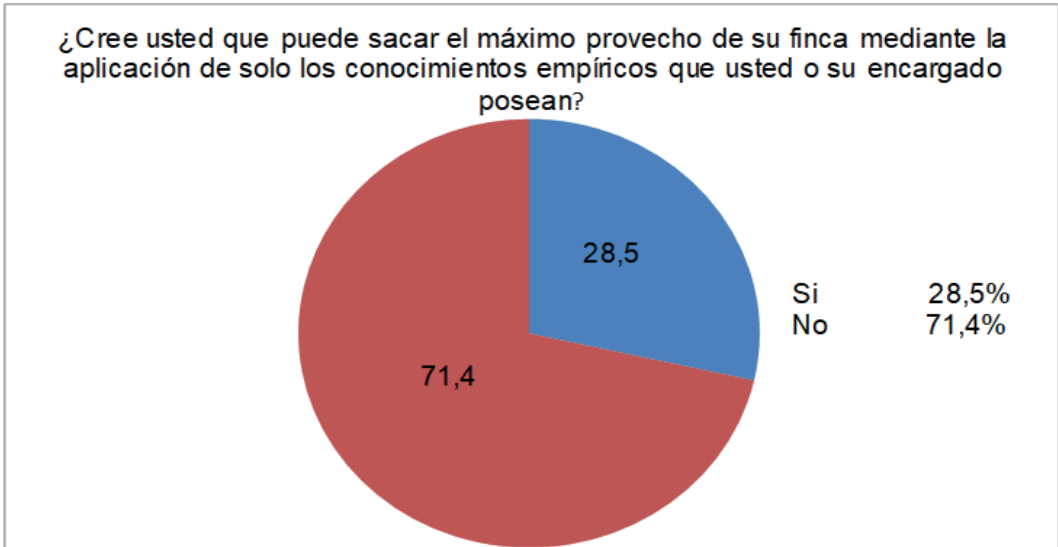


Figure 52. Percentage of producers applying empirical knowledge

From figures 51 to 57, producers express different points of view on the shift from traditional to healthy practices, seen as environmental management practices aimed at achieving a balanced life, logically combining ancestral knowledge with modern agricultural science.

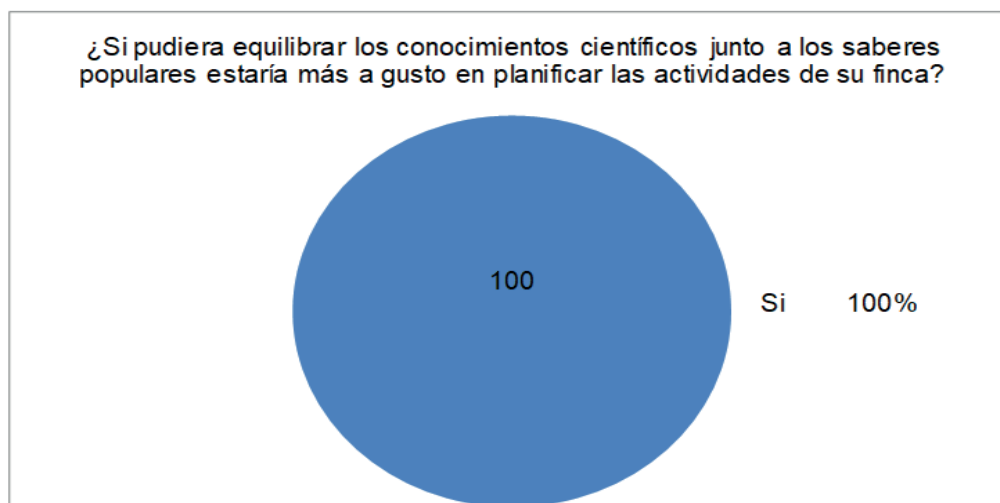


Figure 53. Percentage of producers who report planning their activities using scientific knowledge and traditional knowledge



Figure 54. Interest of producers in producing organic food for commercial purposes and for their own consumption

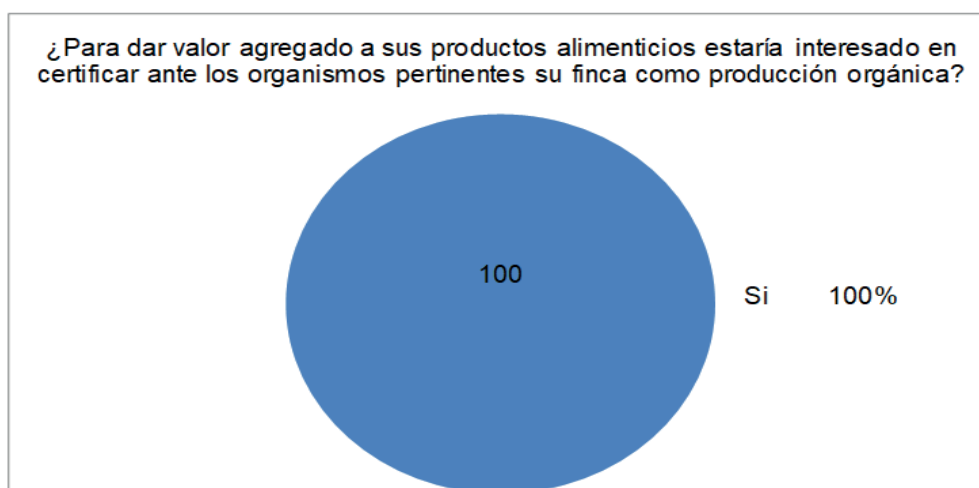


Figure 55. Interest of producers in certifying their organic products to give them added value



Figure 56. Percentage of producers interested in requesting an environmental impact study of their agricultural enterprise in order to understand the reality of their production system

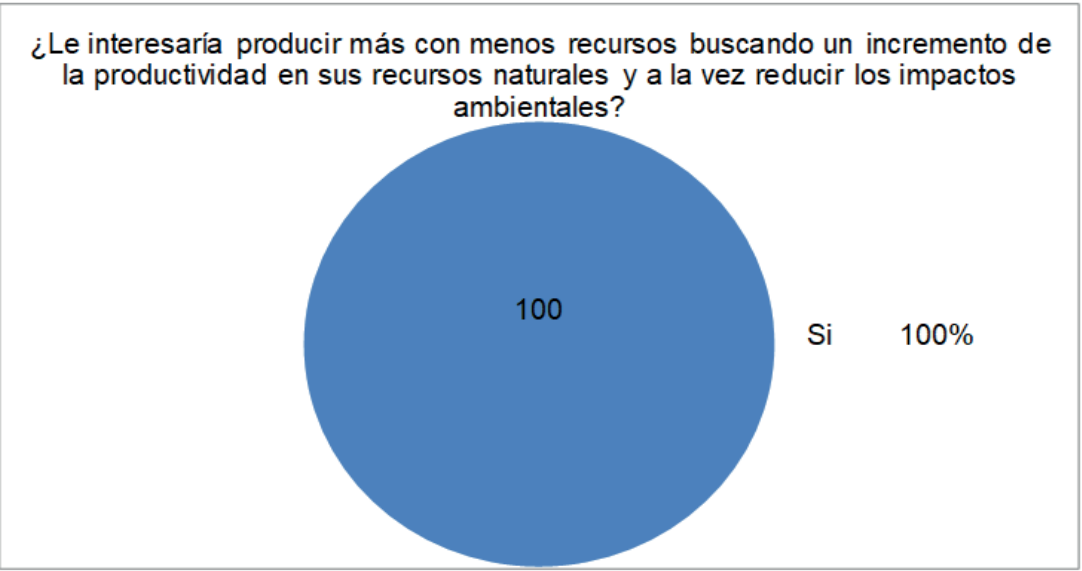


Figure 57. Percentage of producers interested in increasing their productivity in natural resources and reducing environmental impacts

CONCLUSIONS

The question is whether productive activities can adapt to the five most serious and complex conditions we face: climate change, biodiversity loss, the energy crisis, water scarcity, and environmental pollution. To do this, it is necessary to have a thorough understanding of the physical and natural elements of the land to identify its strengths and weaknesses, which can then be turned into strengths to shape practices that mitigate the conditions above.

Converting energy cycles into sustainable actions on farms would mimic the natural dynamics of the elements that compose them. A key example of this model is native tree stands, due to their multipurpose attributes and biodiversity, their potential to develop food and service systems characterized by better use of available resources and minimized external inputs, and the formation of microclimates to mitigate heat effects. These are fundamental elements in production units, reducing the environmental impact of traditional livestock farming.

The decision-making processes involve workers who can provide important details about daily applications and experiences to identify details that could improve or hinder the flow of action.

The decisive change to adapt to environmental management offers advantages to the corporate image,

workers, and neighbors who are proud to embark on green certification, eco-efficiency, and socio-ecological balance, which are established global trends and models of healthy living.

RECOMMENDATIONS

- To establish the beginning of a sustainable course, they must thoroughly diagnose the property to carry out a biological inventory that includes the fauna and flora composition, along with sampling of the soil, surface water, and groundwater, among other things. In addition, the company describes its production system by diagramming its energy flow.
- Producers will be able to use the results of their assessments to formulate simple strategies that benefit their production and their social environment, unifying criteria of professionalism, science, and popular knowledge.
- Now, to be flexible enough to transform their company's entire structure and thus respond to strategic changes and challenges in the organic market, they must position themselves with decisions that are fair to the agroecological reality that the research encompasses.
- The malleability of our biological diversity is the greatest strength and opportunity for achieving this. It allows us to solve agri-food problems in many ways by including more and more promising species for previously unimaginable uses, such as medicines, multivitamin juices, and easily digestible starches, among other special features. The sustainable use of our genetic resources must be the key to the responses to the significant social and environmental problems we face as a society.

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CONFLICT OF INTEREST

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