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Research Article

Food Security In Small-Scale Agriculture: Implementation Of Safety And Value-Added Strategies, Teapa, Tabasco

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ABSTRACT

The present study aims to analyze food safety practices and value-added strategies in small-scale agricultural production, as well as to identify challenges and opportunities for improving the quality and competitiveness of agricultural products. It adopts a mixed-methods approach and exploratory design, using a non-probabilistic sample of 155 producers from selected localities. Data analysis using SPSS revealed that 59.40% are male and 40.60% are female; 23% are aged 31-40, 2.6% are aged 18-20, and 74.40% are over 40 years old. 53.50% have 1-5 years of farming experience, and 46.50% have more than 5 years. Additionally, 92.90% work on areas of 1-5 hectares, while 7.10% have larger areas. 60% do not implement food safety measures, while 40% do, and 40% add value to their production. Despite the importance of these practices, many face challenges in adopting them

Keywords: Food self-sufficiency, Strategies, Food safety, Agricultural production, Added value.

Introduction

Currently, in Mexico, food security of safe agricultural products has gained great relevance, both in the field of public policies and in the initiatives of civil society organizations, this represents a challenge for the federal, state and municipal governments, which must implement these policies and one of the sustainable proposals seeks to address two main problems. According to the Ministry of Welfare (2020), it is necessary to address rural poverty and environmental degradation to revitalize rural areas, regenerate the social fabric, and reactivate the economy. These actions will contribute to the social well-being of farmers by promoting food self-sufficiency.

On the other hand, safety and value-added in small-scale agricultural production are critical to ensuring product quality and the economic sustainability of farmers (Smith & Jones, 2020; López, 2018).

That is why the research work explored two key aspects: safety and value-added strategies in the context of small-scale agriculture in the Arcadio Zentella, Nicolás Bravo, Villa Juan Aldama, and Colorado (Benito Juárez) localities of Teapa, Tabasco (González & Martínez, 2019).

However, producers in the aforementioned localities face numerous challenges to achieve safety and added value in agricultural production, and these are: lack of knowledge, training, limited access to technology, economic restrictions, complex regulations, market access difficulties, insufficient infrastructure, logistical problems, and competition (Clark, 2017; Fernández, 2018; Garcia & Patel, 2021; Hernández, 2020; Johnson et al., 2016; Martínez, 2019; Pérez & Ramírez, 2017; Rodríguez & Torres, 2015),

Within this framework, the Risk Sharing Trust (2018) describes that food safety seeks to guarantee food safety through processes necessary for *operations* and continuous improvement standards, on the other hand, the FAO (2023) mentions that the quality of agricultural products begins with food safety and is essential for the

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health and well-being of people, similarly , Martínez (2021) comments that "adding value to agricultural products increases their economic value and improves their quality and safety" (p. 89), likewise, "technology and innovation play a key role in adding value to agricultural products, allowing the development of new products, the improvement of production processes and the expansion of markets, which benefits both producers and consumers" (Fernández, 2019, p. 77) and on the other hand, "the certification and labeling of agricultural products as safe and of high quality are effective tools to differentiate products in the market, increasing their competitiveness and attracting consumers who are aware of health and quality" (Pérez, 2018, p. 102) and Rodríguez and López (2020) highlight that the implementation of good agricultural practices is crucial to maintain food safety at all stages of the agricultural production process.

In this sense, the research was carried out through the objective of analyzing food safety practices and value-added strategies in small-scale agricultural production, as well as identifying challenges and opportunities to improve the quality and competitiveness of agricultural products, allowing to find answers to the problems that producers have. and that do not allow them to comply with safety and added value in the agricultural production they grow in the localities mentioned above.

It is necessary to emphasize that the producers of the four localities referred to are registered and grouped in the Community Care Centers of the Sembrando Vida program "is an initiative of the government of Mexico to combat rural poverty and environmental degradation, seeks to improve the quality of life of rural inhabitants through the creation of jobs and the implementation of sustainable agricultural practices" Government of Mexico (2019), On the other hand, this program provides benefits of training in sustainable agricultural techniques and forest management, which empowers farmers and improves their skills, as well as crop diversification and a focus on sustainable agriculture that help improve the food security of communities, but it is not enough to comply one hundred percent with the implementation of safety and value-added strategies for agricultural production.

Methodology

To carry out this research, a mixed approach of exploratory scope was used, including planning, action, observation and reflection of the particular cases of agricultural producers from Colorado (Benito Juárez), Arcadio Zentella, Juan Aldama, from the municipality of Teapa, Tabasco Hernández-Sampieri, R. & Mendoza, C (2018a), 56 rural localities of the municipality of Teapa were determined as population. Tabasco (INEGI, 2019) and four locations are selected through the non-probabilistic method called intentional or convenience sampling Hernández (2021) describes "it is a non-probabilistic and non-random sampling technique used to create samples according to the ease of access, the availability of people to be part of the sample".

In the qualitative phase, 40 semi-structured interviews were conducted with selected farmers, community leaders, and agricultural experts, through in-depth interviews valuable information was collected about current agricultural practices, the challenges they face, and their motivations for adopting new practices. Farmers expressed a variety of challenges, including a lack of resources and knowledge about safe practices. However, those that have implemented value-added strategies reported significant benefits, such as increased profitability and sustainability. In addition, the importance of community networks and the support of cooperatives for the adoption of these practices was highlighted.

Subsequently, in the quantitative phase, a survey was designed and applied in a scheduled manner to 155 producers in the selected localities, the non-probabilistic method called intentional or convenience sampling was used to guarantee the representativeness of the sample. Data were collected through face-to-face surveys, with the aim of obtaining quantifiable information on: general farmer data, current agricultural practices, production systems, food safety knowledge and practices, strategies used to add value to agricultural products, perception of barriers, and facilitators for the implementation of new strategies.

Finally, the data collected through the survey were captured and analyzed using the statistical software SPSS (Statistical Package for the Social Sciences). This tool allowed processing and organizing the information efficiently, facilitating the identification of patterns, trends and significant relationships between the variables studied.

Results

According to the instruments applied, a diagnosis of the current situation presented by small producers in the four localities studied was obtained, identifying aspects of good agricultural practices and safety, core aspects to generate added value to the products obtained from the field.

The main results obtained are presented below .

❖ Study locations.

Table 1 *Respondent's Location*

Localidad	N	%
Arcadio Zentella	61	39.4%
Nicolas Bravo	31	20.0%
Colorado (Benito Juárez)	48	31.0%
Villa Juan Aldama	15	9.7%
	155.00	100.0%

Note. Number of respondents by locality.

According to the data in table 1, the locality that registered the highest participation of small producers was Arcadio Zentella, making up 39.4% of the total respondents, in second place is Colorado (Benito Juárez) representing 31% of the participating subjects, in third position is Nicolás Bravo with 20% and finally Villa Juan Aldama with 9.7% participation.

❖ Safety.

Table 2 ***Types of crops in the localities***

		Respuestas	
		N	Porcentaje
Cultivo_importantes	Árboles maderables	93	11.5%
	Cacao	83	10.2%
	Canela	41	5.1%
	Plátano	79	9.7%
	Pimienta	47	5.8%
	Achiote	39	4.8%
	Maíz	70	8.6%
	Yuca	49	6.0%
	Naranja	20	2.5%
	Rambután	15	1.8%
	Limón	22	2.7%
	Frijol	24	3.0%
	Guanabana	29	3.6%
	Aguacate	18	2.2%
	Calabaza	30	3.7%
	Coco	10	1.2%
	Chayote	7	0.9%
	Mango	6	0.7%
	Chinin	15	1.8%
	Zapote	8	1.0%
	Melón	11	1.4%
	Piña	7	0.9%
	Chile	7	0.9%
	Pitahaya	6	0.7%
	Malanga	25	3.1%
	Pepino	9	1.1%
	Otros	41	5.1%

Note. Main crops of the localities of Arcadio Zentella. Colorado (Benito Juárez), Nicolás Bravo and Villa Juan Aldama.

As can be seen in the table, small producers indicated that they had a wide variety of agricultural products , highlighting the cultivation of timber trees, cocoa and bananas, continuing in order of importance the cultivation of pepper, cinnamon and cassava.
When asked by the producers under what criteria they selected these crops, 33.1% chose them based on the food base of the region as they considered them indispensable, 30.3% chose them for good productivity and high yield in production, 17.7% did so for the good market price, 14.3% chose them for the easy adaptation of the crop to the climatic conditions and 4.6% because they require little water.

However, crops present a series of problems and challenges that affect their yield. Table 3 describes the most frequent problems.

Table 3 *Production Difficulties*

		Respuestas	
		N	Porcentaje
Problema_proceso_prod[a]	Control del proceso productivo	16	5.7%
	Apoyo económico insuficiente	33	11.7%
	Altos costos de materia prima en insumos	23	8.1%
	Insuficiencia de mano de obra como apoyo para la producción y cultivo	26	9.2%
	Problemas climáticos	87	30.7%
	Plagas y enfermedades	78	27.6%
	Falta capacitación agrícola	14	4.9%
	No respondió	6	2.1%
Total			100.0%

Note. Main difficulties in the development of production.

The table provides the most outstanding problems faced by producers, with climate change being the most common as it was mentioned by 30.7% of the participants, this due to the extreme changes that have been experienced in recent years with long periods of drought followed by torrential rainy seasons; the second factor that affects them the most with 27.8% is diseases. especially those that occur in banana and cocoa cultivation, and pests (these are described in Table 4). Finally, there is the economic aspect, since 11.7% consider that the income obtained from the activity and the support received by the government are not enough to maintain production.

Returning to the topic of pests, the following table identifies those with the highest incidence in the study localities.

Table 4 *Frequent Pests in Production*

		Respuestas	
		N	Porcentaje
Nombre_plaga[a]	Pulgón	21	7.6%
	Mosquita blanca	50	18.1%
	Picudo	25	9.0%
	Araña roja	12	4.3%
	Gallina Ciega	12	4.3%
	Moscas de las frutas	26	9.4%
	Minadores de hojas	43	15.5%
	Otro	88	31.8%
Total			100.0%

Note. Main pests that affect the development of production in the study localities.

According to the small producers, in table 4 it can be seen that the most common pest that affects crops is the whitefly, followed by leaf miners, fruit flies, the weevil and to a lesser extent the red spider mite and the blind hen. It should be noted that in the Other category, which appears with 31.8%, respondents consider animals typical of the region as pests, among which field rats, birds and opossums can be mentioned as those that cause the greatest damage to crops.

Faced with this situation, the participants were asked about the types of controls used to combat pests and diseases, the answers shown are shown in the table below.

Table 5 *Frequent Pest Control Mechanisms in Production*

		Respuestas	
		N	Porcentaje
Control_plaga[a]	Control cultural (podas, preparación de terreno, limpieza de campo, etc.)	118	59.3%
	Control físico (temperatura, fuego, etc.)	3	1.5%
	Control mecánico	3	1.5%
	Control genético (variedades resistentes)	4	2.0%
	Control biológico	11	5.5%
	Control etológico (trampas)	4	2.0%
	Control químico (plaguicidas)	50	25.1%
	Control legal (normas legales sobre control de plagas)	4	2.0%
	No respondió	2	1.0%
Total			100.0%

Note. Main controls used by small producers in the four study localities.

Taking into consideration the information collected in Table 5, it can be concluded that the control that is most practiced is cultural, that is, it is the knowledge received by generations of producers and the accumulated experience of the producers; The second most commonly used practice is the application of chemical products, the choice and use of which is also subject to the recommendation of other producers.
Analyzing this last aspect, people were asked if they kept good agricultural practices, defined by Vásquez (2020) as a set of actions or practices carried out to reduce the danger caused by the use of chemical products and that are aimed at obtaining safe products, improving the condition of the worker (health and well-being) and protecting the environment.
The first aspect that was addressed was the safety of the products, for which the existing knowledge about the chemical products was inquired with the producers. The results are shown in Table 6.

Table 6 *Knowledge of Pesticide Use*

¿Conoce los tipos de plaguicidas que se aplican a los cultivos?	N	%
Si	95	61.3%
No	23	14.8%
Ninguno	35	22.6%
No repondió	2	1.3%
Total	155	100%

Note. Knowledge of the producer about the use of pesticides used on crops.

According to Table 6, 61.3% of the producers have knowledge about the pesticides they use, 14.8% do not know the composition of the pesticides and their administration, and 22.6% prefer not to use them.
The second aspect of good practices is worker safety, and the proportion of producers who have the basic protection to handle and apply pesticides is shown below.

Table 7 *Use of Protective Implements*

Uso implementos de protección	N	%
Si	77	49.7%
No	34	21.9%
Ninguno	44	28.4%
Total	155	100%

Note. Frequency of small producers using protective implements in the application of pesticides.

Of the 100% of the producers, 49.7% commented that they use protective equipment, consisting of gloves, boots, use of a shirt with long sleeves, hat and face mask, as well as keeping their equipment calibrated (spray pump). 21.9% do not use protection or only some of the elements mentioned above; Finally, 28.4% did not answer about the use of protection.
Finally, the analysis of the frequency of training of producers on crop safety is presented below.

Table 8 *Crop Safety Training*

Frecuencia de capacitación	N	%
Frecuentemente	76	49.0%
Pocas veces	46	29.7%
Casi nunca	29	18.7%
Otros	1	0.6%
No respondió	3	1.9%
Total	155	100%

Note. Frequency of training on food safety issues.

In this regard, it can be seen that 49% declare that they have frequent training on the subject of crop safety, this is mainly given by government personnel, which in previous years was taught by personnel of the Ministry of Agriculture and currently this activity is carried out by technicians of the Sembrando Vida program. 29.7% have received training rarely and 18.7% have almost never taken it.

Discussion.

Food safety has become an international security issue , since according to the World Health Organization (2023) 1 in 10 people in the world get sick from eating contaminated food, causing the death of 420,000 inhabitants per year.
Aspects such as safety and good agricultural practices are not only regulatory guides that are reaching mandatory levels in the countries, but also represent an opportunity for agricultural producers to generate added value by providing security and certainty about their production processes, harvesting and post-harvest management, as well as contributing to minimize damage to crops caused by pests. weeds and diseases, estimated between 30% and 40% losses (García, 2024).
At this point, the participation of small producers from the study localities of Juan Aldama, Colorado (Benito Juárez), Arcadio Zentella and Nicolás Bravo are still unrelated to the use of these safety practices since, according to the information obtained in the study, the issues of good agricultural practices and knowledge of the Post-harvest management continues to be carried out in a traditional way, attending only some indications on the care of the crops, leaving unattended aspects of personal care and post-harvest management. This situation can be understood from the aspect of training, which the participants reported receiving infrequently, with the government being their main instructor, and although they follow the indications, they do not consider it feasible to invest in tools, clothing and adaptations to the spaces to store agricultural products.

Conclusion.

Today, food safety and quality play a vital role in the food security of countries. According to the FAO (2023b), more than 600 million cases of diseases generated by harmful food are detected in the world. These impacts not only weaken public health, but also fracture production chains and generate shortages in markets, generating an increase in prices and contributing to the already existing problem of food insufficiency.
That is why organizations such as the FAO and the World Health Organization (WHO) have generated a series of standards and policies that help regulate the issue, getting large producing companies to comply with these guidelines and worry about training and obtaining quality certifications in the production and handling of food. especially the so-called fresh ones such as fruits, vegetables and meat.
However, these advances have not been achieved at all levels of the production scale, since an important segment made up of small and medium-sized producers and the United States of America and the United States of America and the United States of America (NASDAQ) have not been able to meet these safety and quality standards.
For Hoffman and Jones (2021), food safety in low- and middle-income countries is usually a challenge because they are made up of small farms, many of them with subsistence agriculture in which the marketing of products is done through informal markets, making it less visible to comply with health regulations.
These conditions characterize the localities of Arcadio Zentella. Nicolás Bravo, Colorado, Benito Juárez and Villa Juan Aldama, where this reality, together with the high variety of crops they have, make the production insignificant in the market, being largely destined for self-consumption, and the little surplus is sold to acquaintances, coyotes or resellers who monopolize the production.
This situation generates the existence of few incentives not only to continue with agricultural activity, causing many producers to continue cultivating just to comply with food safety standards and good practices, reducing their chances of entering markets where they can obtain better remuneration for their crops.
In accordance with this reality, it is necessary for the different government agencies to achieve greater coordination in the establishment of awareness and teaching programs on safety and good agricultural practices aimed specifically at small producers, in which the role they play in the safety and health of their families and other people in the community is highlighted.country, achieving the recognition of the connection between agriculture, health, environment and economy, because only through multisectoral collaboration will the strengthening of food security be achieved, not only in our country but in the world.

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