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VIABILITY OF AMARANTH SEED IN THE DIETARY PATTERN THROUGH CONSUMPTION PROMOTION

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Abstract: The human body needs nutrients to perform its functions, the factors that influence the viability of nutrients are digestion, absorption, distribution of the nutrient through the bloodstream.

The viability of food is the degree to which the nutrients in food are absorbed by the body. However, the amount we consume of a nutrient is not always the amount that the body actually uses, although food covers a biological need, but social, cultural and economic factors influence the acquired dietary pattern. That pattern has been influenced by the globalization of different cultures, foods and types of diets. At an international level, the food industry has proposed including amaranth in various products due to its high nutritional content. That is why the objective of this article was to identify what the cultivation of amaranth represents for producing families and how they incorporate it into their dietary pattern. The methodology is qualitative, with a Participatory Action Research (PAR) approach with a descriptive scope through participant observation. Results show that the main utility they give to the cultivation of amaranth is 91% for food, they consider it a crop with high nutritional value 97% and that has allowed them to adopt it for their diet and this way they promote its consumption and production.

Keywords: Nutritional properties, proximal composition, consumption

INTRODUCTION

VIABILITY

Talking about food viability consists of having various possibilities of proposing, designing or producing our own foods with the aim that our body absorbs the greatest number of nutrients.

The factors that influence the viability of nutrients are digestion, absorption,

distribution in the bloodstream and in specific tissues of the body and in liquids in which it is expected to perform its function. The benefits of consuming certain foods will allow you to enrich the use of other nutrients and for this, combinations are important (Troxler and Ragan, 2023). For example:

Foods that are rich in:	Viability	Nutrient used
Vitamin B6	Greater absorption	Calcium
Fat (Brussels sprout broccoli, zucchini, among others)	Greater absorption	Lutein
Iron (spinach) combined with vitamin C	Greater absorption	Iron

Table 1. Important combinations for nutrient utilization, information adapted from Troxler and Ragan (2023)

It is very important to identify that negative combinations prevent or reduce the viability of certain nutrients, as well as the consumption of certain vitamins and minerals, and hence the importance of food supplements. However, the diet or structure to satisfy food needs is considered by society itself to be known as a dietary pattern and this in turn is modified by the habits, customs, needs and preferences of individuals.

FOOD PATTERN

The eating pattern or diet is the structure of what a society considers appropriate to satisfy its dietary needs under a certain historical moment (Santos, 2014). The modification of this pattern is influenced by the preferences, habits, customs, needs of the individual and the productive, commercial structure, generation and distribution of income.

According to Santos (2014), in the case of Mexico during the period 1999-2006 it presented the greatest growth in overweight and obesity internationally, problems that still persist. Based on this, consumer organizations took up the issue and considered suing the

companies that produce processed foods. Some companies took up the initiative of identifying individual and family choice as the main causes of obesity, both interventions being assumed by the Mexican government.

The debate promoted by civil organizations began to question, emphasizing that the problem of obesity must be considered as a problem of family culture and lack of exercise and not of companies. Where the arguments were that in Mexican families mothers are the “culprit” of obesity due to the food they provide to their children daily and that the habits of food consumption and physical activity depend on them Santos (2014). Derived Following this, in January 2010 the federal government signed with the Mexican Council of the Consumer Products Industry, A.C. (ConMéxico) an agreement on voluntary measures to improve the production and marketing of processed foods. The month following that The former president of Coparmex and senator Jorge Ocejo himself proposed the term “low nutritional value” instead of “junk food” who mentioned that “there are no good products, but only good or bad eating habits.”

Given this situation, it is considered urgent to carry out research on food, as a result of the fact that, in recent years, Mexico has faced challenges in terms of food security, epidemiological transition towards degenerative diseases in a context of malnutrition and poverty, a central problem in the fight against junk foods, the depletion of natural resources and international pressure on the price of main foods.

In this sense, Localized Agri-Food Systems (SIAL) are made up of local, public institutions, decentralized government agencies, non-governmental organizations, rural development groups and associations and play a very important role in the construction of collective alliances, actions

and projects. common issues related to agri-food and rural development issues with the purpose of proposing alternatives to support proposals for solutions to rural poverty and food security problems. Other organizations that participate are the rural social enterprises ESRS who work before the extensionist vision of the food industry and the power of advertising for processed and junk food (Hernández et al., 2020). On the other hand, they seek to promote the consumption of culturally differentiated foods, where traditional production practices and conservation of food origin are resumed; these indicators will give the consumer reliability of quality and safety of the products (Sanz, 2002). Some communities and companies aim to protect agri-food heritage and various studies have shown that amaranth has nutritional values, contained in the seed, plant and leaves that surpass some commonly consumed cereals (De Jesús Contreras et al., 2017), the rescue of local production and consumption of amaranth can address the problem of malnutrition (obesity or malnutrition) and food security, where the agricultural activity of this crop is reactivated (Martínez, 2016). Hence the importance of highlighting amaranth as a crop with high nutritional value.

NUTRITIONAL PROPERTIES

Studies have identified nutritional properties in the amaranth crop. Helps maintain health, does not contain gluten for those who are intolerant to this component. The chemical composition (moisture, protein, fat, fiber, ash, carbohydrates) of amaranth seed presents a higher nutritional value than other common grains in the Mexican diet Valdés et al, Broekaert, Sánchez, Sani, Edwards and Barba de la Rosa (2007), (table 1).

Component	Amaranth	Spinach
Humidity	86.9	90.7
Protein	3.5	3.2
Calcium	0.262	0.093
Match	0.067	0.0519
Iron	0.0039	0.0031
Vitamin A	6100	8100
Ascorbic acid	0.080	0.051

Table 2. Proximal composition of amaranth and spinach leaves, taken from Paredes, Valdés et al, Broekaert, Sánchez, Sani, Edwards and Barba de la Rosa (2007)

Component	Amaranth	Corn	Rice	Wheat
Humidity	11.11	13.8	11.7	12.5
Protein	17.9	10.3	8.5	14.0
Fat	7.7	4.5	2.1	2.1
Fiber	2.2	2.3	0.9	2.6
Ashes	4.1	1.4	1.4	1.9
Carbohydrates	57.0	67.7	75.4	66.9

Table 3. Proximate composition of amaranth and main cereals, taken from Paredes, Valdés et al, Broekaert, Sánchez, Sani, Edwards and Barba de la Rosa (2007)

These nutritional properties position the amaranth crop with high agri-food potential.

PROMOTION OF CULTIVATION AND CONSUMPTION

It is considered important to promote the cultivation of amaranth, first the transition to agroecological agriculture, respecting the knowledge, skills and indigenous practices that have been maintained throughout different generations. Second, safeguard the amaranth seed as one of the most important foods of cultures from pre-Hispanic times to the present day in Mesoamerican and Mexican culture. Furthermore, it represents means of subsistence for families in some communities in Mexico. In this sense, this article hypothesizes that the massive promotion of amaranth cultivation among producers has a positive impact on its consumption and the

option of adopting it as a complementary economic activity (Figure 1)

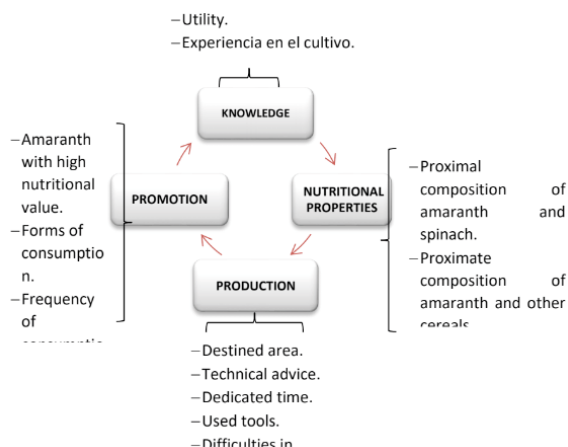
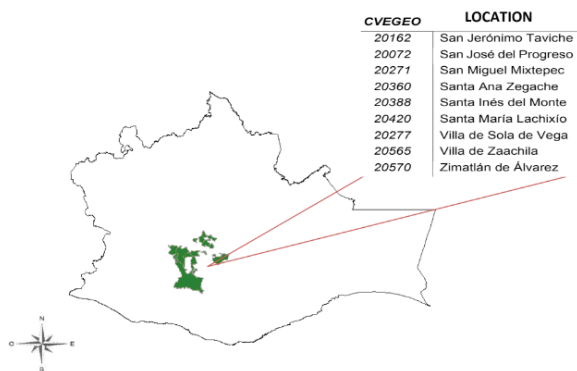


Figure 1. Theoretical methodological model. Knowledge, production, nutritional properties and promotion of amaranth cultivation. Source: Own elaboration, taken from De Jesús et al., 2017; Martínez, 2016, Paredes, Valdés et al, Broekaert, Sánchez, Sani, Edwards and Barba de la Rosa (2007).

MATERIALS AND METHODS

STUDY AREA

The unit of analysis was an intentional sample of 37 producers, the selection criteria were inclusion, producers who grow amaranth for self-consumption and income, and those who collaborate with Centéotl A.C. Distributed in nine locations (Santa Inés del Monte, San Jerónimo Taviche, San José del Progreso, San Miguel Mixtepec, Santa Ana Zegache, Zimatlán de Álvarez, Villa de Zaachila, Santa María Lachixío and Villa Sola de Vega) map 1.



Map 1. Localities of Valles Centrales and Sierra Sur de Oaxaca, own creation on digital map version 6.3.0

MATERIALS AND METHODS

The research design was qualitative, with a participatory research approach (John Durston, 2002). The type of research used was the participant observation method which allowed the effective study of the behavior of the producers. The data collection instruments were semi-structured interviews made up of 13 questions (items), the first 3 allowed us to know the knowledge variable, the next 5 the production variable, 2 the nutritional properties variable and 3 the promotion variable. The review of documentation, video recording and photographs, the data were recorded in Excel 2013 and after processing in the SPSS v statistical package. 25 in order to respond to the stated hypothesis, the frequency of statements with a percentage greater than 50 was identified according to the producer's perception.

RESULTS AND DISCUSSION

The data obtained from the applied interviews were analyzed with the IBM statistical package (SPSS) version 25, using the descriptive analysis method, frequencies.

KNOWLEDGE OF AMARANTH

The analysis of knowledge of amaranth cultivation was made up of three indicators: usefulness and experience in amaranth cultivation. According to the utility indicator, 94.5 percent grow it for food, in the cultivation experience indicator, 48.6 percent have been growing amaranth for between 5 to 10 years, in some cases it coincides with the beginning of the cultivation promotion strategy that In its beginnings, the Cénteotl A.C. Community Development Center was proposed. In relation to the third diffusion indicator, 100 percent agree and consider that the promotion of amaranth cultivation will help families and communities adopt them in their daily diet and as a complementary economic activity.

AMARANTH PRODUCTION

To analyze amaranth production, 5 items were considered: destined area, technical advice, time dedicated, tools used and difficulties in cultivation. For the first item, 91.8 percent allocate a land or plot of approximately one hectare, 81 percent consider that because it is a new crop, when cultivating it for the first time, technical advice is very important and they allocate around 6 to 8 hours to cultivation. and from there they are subsequently scheduled and organized as a family. 62 percent continue to use agricultural machinery and 43 percent have observed that the main difficulty in the crop is the pest but that so far they have managed to combat it.

NUTRITIONAL PROPERTIES

To analyze the nutritional properties of amaranth with respect to other common cereals in the Mexican diet, two items were considered: the proximal composition of amaranth and spinach and the proximal composition of amaranth and other cereals.

CONSUMER PROMOTION

The promotion variable in amaranth cultivation was made up of three items nutritional quality, forms of consumption and frequency. For the first item, 97.3 percent consider that the promotion of amaranth will have a greater impact when, given that this plant has a high nutritional value, 81 percent consider that it can be consumed in all available forms, cereal, flour, leaves or seeds, this is due to its easy preparation. The third item, 70 percent of whom recommend consuming it daily in any possible presentation.

In relation to the first variable knowledge, the results show that the main interest in adopting amaranth was to use it as food (94 percent), however, producers know amaranth thanks to the initiative promoted by the Centéotl Community Development Center A.C located in Zimatlán de Álvarez, Oaxaca, the producers who join the initiative have been cultivating amaranth for a maximum of 10 years (48 percent), due to this they gain experience in cultivation. In the case of Mexico, it is estimated that amaranth has been cultivated for seven thousand years, and was part of the food diet at the time of the conquest (SECRETARÍA DE RELACIONES EXTERIORES, 2023), during the conquest it was banned until it almost disappeared, but, this is one of the isolated areas that still prevails (Secretaría de Medio Ambiente y Recursos Naturales, 2018). This is why it is important to promote the cultivation and consumption of amaranth. On the other hand, it is interesting to mention that the difficulties that have been identified in crops are pests (43 percent), this is related to the fact that they use low or no inputs made from fossil energy and greater application of local inputs, that is, The conservation of natural resources and the environment is unknown or not implemented

(Sánchez et al., 2015), in this section it is considered important to promote and manage agroecological agriculture.

CONCLUSIONS

The knowledge about amaranth is that it is considered a crop with high nutritional potential. However, in the agricultural area it has been wasted as a food strategy.

Amaranth production has been very low in the study area due to lack of initiative and disorganization of producers, therefore, the technical support provided by the Centéotl Community Development Center has been crucial for the continuity of this crop.

On the other hand, according to the nutritional properties of the amaranth seed, it is considered viable to promote its incorporation into the daily diet. Likewise, the constant promotion of the consumption of amaranth in its different presentations (leaves, flour, seed) is proposed as a strategy.

Consumption promotion can be carried out using different methods, one of them is through utilization workshops from the seedling to the transformation into flour or incorporation into different foods.

The study made it possible to identify the knowledge, the production mechanism and the way of promoting amaranth consumption carried out by the producing families, resulting from this, the stated objective of this research is met. These families identify that the constant promotion of amaranth cultivation, as well as when they started, influences families to consume it and adopt it as a crop. In that sense, the hypothesis proposed is fulfilled where it is considered that the massive promotion of amaranth cultivation among producers has a positive impact on its consumption and the option of adopting it as a complementary economic activity.

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