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PROMOTION OF AMARANTH (AMARANTHUS HYPOCHONDRIACUS) CULTIVATION AS AN ANCESTRAL FOOD SYSTEM THROUGH THE SOCIAL AND SOLIDARITY ECONOMY IN THE CENTRAL VALLEYS OF OAXACA

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ABSTRACT

For centuries, amaranth cultivation has been lost, and its potential as a food with high nutritional value has been unknown. In this sense, there are companies and associations organized around common property assets, and their collective form of production seeks to generate goods and services under the principles of a social and solidarity economy that impact the revaluation of nutritionally rich ancestral crops, such as amaranth. Currently, one of INAES' strategies is to promote the Nodes for the Social and Solidarity Economy (NODESS) with the goal of integrating alliance networks made up of at least three actors: educational institutions, government, and civil society. This research is being developed with the participation of the Technological Institute of the Oaxaca Valley, the municipality of Cuilapam de Guerrero, the Centéotl A.C. Development Center, Amaranto de Mesoamérica, and the Commissariat of Communal Assets. The objective is to promote the responsible production and consumption of staple crops through participatory workshops with farmers, civil society, and government institutions. The methodology used is PAR, which allows the community to engage and develop its own theories and solutions. Data collection instruments included field visits, demonstration plot design, and participatory workshops. Among the main results were the acceptance of the participating stakeholders in adopting amaranth cultivation and the awakening of families' interest in

consuming amaranth products. However, influencing consumption habits for continued use, the population mentions that technical support or motivation is required to cultivate it consistently.

KEYWORDS: Nutritional Crops, Social and Solidarity Economy, Food System.

1. INTRODUCTION

A proposal from the social and solidarity economy is the production and supply of food network systems associated with fair trade, solidarity purchasing and collective supply. Its purpose is sustainable production of nutritious basic foods originating in rural areas, including fruits, grains, vegetables, beverages, among others, which in addition to being nutritious are in a socio-cultural and environmental system to be transformed into food for self-consumption and the surplus for sale. In this sense, it proposes the rescue of traditional agricultural production systems, and amaranth is considered an ancestral crop of indigenous peoples of Mesoamerica. (ONU, 2014)(Toledo, 2012)(Martínez, 2016)

The cultivation of Amaranth (specifically Amaranthus hypochondriacus and other species of the genus) has historically been part of the traditional agricultural and food systems of Mesoamerica. However, in recent decades its production has been drastically reduced, and with it knowledge about its nutritional potential and its role in local food systems has been lost. In a context marked by food insecurity, loss of agricultural biodiversity and vulnerability to climate change, amaranth reappears as a promising alternative: a resilient plant, adaptable to marginal soils or adverse conditions, and with high nutritional value, which makes it an ideal candidate to strengthen the food sovereignty of rural communities (Segura-Jiménez et al., 2025).

In parallel, production models based on the Social and Solidarity Economy (SSE) offer a structural framework that promotes the revaluation of ancestral crops, orienting production towards cooperative, sustainable, inclusive and culturally significant practices. In rural contexts, SSE can articulate the production, transformation, and marketing of nutritious foods with social justice, community strengthening, and empowerment of local producers (Hernández, 2023).

Recent studies on amaranth highlight other relevant advantages: its high nutritional value – high in protein, minerals, fibre, bioactive compounds such as antioxidants – and its versatility as a pseudocereal resistant to drought or poor soils. This positions it as a strategic option to diversify crops and contribute to sustainable and resilient food systems.

In light of this background, the present research is inserted in an effort to rescue the agronomic, nutritional and cultural amaranth in the Central Valleys of Oaxaca, through a collective approach supported by the SSE. Through a participatory methodology (PAR), combining field visits, establishment of a demonstration plot and workshops with farmers, civil society and institutions, the aim is to analyse the feasibility of reactivating amaranth cultivation, as well as its potential to promote healthier, more sovereign food linked to the territory.

This approach aspires to question the hegemony of cash crops, rescue ancestral agri-food traditions and promote production-consumption based on solidarity, equity, environmental sustainability and community well-being.

In view of this, the objective of this research is to promote the responsible production and consumption of basic crops through participatory workshops with farmers, civil society and government institutions. To this end, a documentary review is carried out on the cultural importance of the crop, field visits to the study communities and the establishment of a demonstration plot.

2. LITERATURE REVIEW

2.1. Amaranthus Amaranth

Plants of the genus Amaranthus, which are commonly known as amaranth, alegría, quelite, quintonil or bledo, have been recured in archaeological contexts with more than 5,000 years, for example, the dry caves of the Tehuacán Valley, Puebla, when hunter-gatherers began the process of domestication of corn (Mangelsdorf et al., 1967; Montúfar, 2016). Some archaeological seeds of amaranth were found in the pre-Hispanic sediments of the subsoil of Tlatelolco, in certain buildings in the Historic Center of Mexico City: National Palace, National Museum of Cultures, Metropolitan Cathedral and Templo Mayor of Tenochtitlan, mainly (Montúfar, 2016). The revaluation of amaranth is linked to the description of its nutritional quality and particularly to the search for vegetable products rich in protein, without the fat of animal sources; a family of five people who plant an area of between 25 and 30 m2 with amaranth is assured of protein consumption for one year (Vargas & Del Valle, 2016). According to the National Commission for the Knowledge and Use of Biodiversity, the food and religious importance of amaranth was similar to corn, beans, chili, pumpkin and along with these other products, they were tributed from different provinces to the Aztec empire.

Its cultivation in Mexico was severely punished by the Spaniards for its religious use. Different plants that in Mexico we know as amaranths, alegrías, bledos, quelites or quintoniles, belong to the genus Amaranthus of the Amaranthacea family. This family comprises about 65 genera and 900 species of

herbs distributed in tropical and subtropical areas of the world and few in temperate zones. The genus Amaranthus, which in Greek means "imperishable", includes about 70 species, of which 40 correspond to 60% native to the American Continent and the rest of Australia, Africa, Asia and Europe. These can grow from a few centimeters to about 3 meters in cultivated variants. (Biodiversidad Mexicana, 2020)

2.2. Morphological Characteristics

The morphological, agronomic and adaptation characteristics of native amaranth populations have not been sufficiently evaluated.

The studies carried out (Subía, et al., 2012) have been on descriptive variables; leaf length, maximum leaf width, leaf area, flowering days, panicle days, stem diameter, plant height, panicle length and yield on the other hand agronomic variables; days of flowering and height and plant yield. They were carried out in 32 amaranth populations of various green, brown and purple colors from south-central producing states of Mexico (Mexico City, Mexico, Guerrero, Michoacán, Morelos and Tlaxcala). Within the results, 60% showed phenotypic heterogeneity within the population. Some populations hold promise for large crops because of their agronomic characteristics, but selection and purification are required. These differences are related to the origin of the population, where those of Tlaxcala, DF and the State of Mexico presented higher yields and some individual populations are potentially useful for their agronomic value. (Subía et al., 2012)

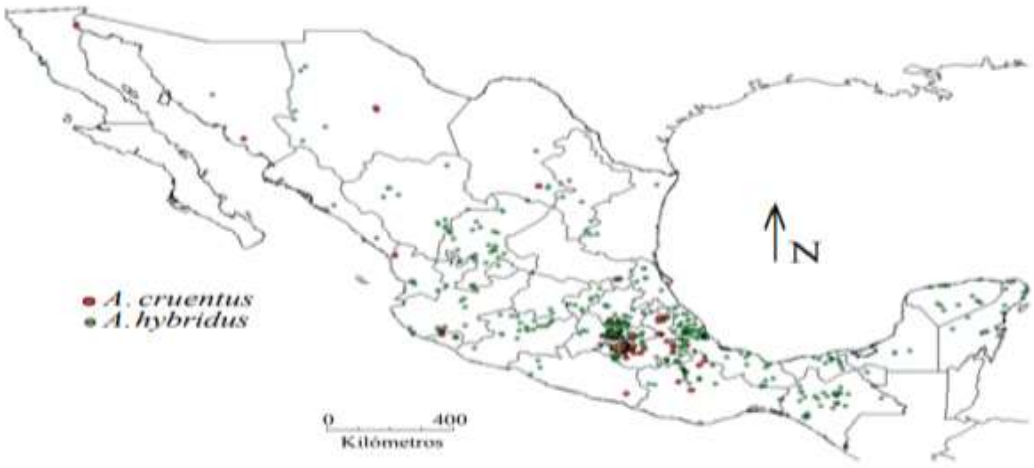
2.3. Germplasm

The classification of breeds of Mexican amaranth species provides alternatives for systematics, conservation, management and management of germplasm for crop improvement. The search for amaranth grains in Mexico originated in 1982 by foreign missions from the United States, from that moment on the collection of germplasm and genetic variability began. Currently, the collection is of genotypes of A. hypochondriacus and A. cruentus distributed in the country for production.(Espitia , 2018)

The races of each species were described according to their use and the place where they were grown, the amaranth A. hypochondriacus has five races (Aztec, Mercado, Mixteca, Nepal and Espinosa), A. cruentus has three races (African, Guatemalan and Mexican) and A. caudatus has three races (South American, Edulis and Ornamental). However, there are no morphological characterization studies to distinguish races, because in Mexico only mixed grain and with other plants are sold in agricultural plots, especially the Mercado and Mexican breeds.

2.4. Geographical Distribution

After the conquest in Mexico, amaranth was outlawed and thanks to the fact that some indigenous people continued to cultivate in inaccessible areas, it was preserved to this day. The crop is currently carried out in small regions of Mexico, which have persisted over the years. The main producing areas are: Tulyehualco, Mexico City, Amilcingo and Huazulco, Morelos; San Miguel del Milagro, Cuapiaxtla, Tlaxcala; Huaquechula, Santiago Tecla, San Juan Amecac, Tochimilco and Tochimizolco, Puebla. Plantings have recently begun in the area of Tehuacán, Puebla, and in Guanajuato, Querétaro, Oaxaca and San Luis Potosí (Espitia R. E., 2012).



Map 1: Geographical Distribution of A. Cruentus and A. Hybridus in Mexico.

Amaranth has been consumed since pre-Hispanic times and was recently recognized as Intangible

Cultural Heritage. In Mexico City it has been an ancient cultural symbol, especially in the town of Santiago Tulyehualco. What is declared intangible cultural heritage is not only the seed, but all the culture and historical memory that is behind its cultivation. All the knowledge that is preserved to have transformed amaranth into an exquisite sweet (Jornada, 2016)

Thus, this crop has been conserved and is important in traditional agriculture, however, some variants run the risk of disappearing due to their limited cultivation, sustained by few farmers and these are elderly, according to the National Commission for the Knowledge and Use of Biodiversity. International interest has favored greater attention to its cultivation. Knowledge, collection, characterization, and improvement in Mexico has been promoted since the 1980s and has continued, although not in a sustained manner. There are also initiatives by civil society and the private sector to promote its cultivation, dissemination and commercialization.

2.5. Nutritional Properties

Amaranth is characterized by its chemical composition and nutritional value superior to other grains. The FAO (1997) considers it as a crop with the same amount of nutrients and productive capacity as soybeans. However, the yield is low due to a lack of resources for adequate agronomic management, in addition to the scarce information on the presence and control of pests and diseases that can cause great economic losses to producers, elements that are considered conditioning factors for amaranth not to be considered a basic and strategic crop (FAO, 1997).

The nutrients contained in amaranth seed are; protein between 14 and 17 % (Paredes, 1994), antimicrobial peptides, protease inhibitors, (Valdés, 1993) (Broekaert, 1992) lectins and antioxidant compounds. (Sánchez, 2004)(Sani H A, 2004). Studies have identified that amaranth proteins contain peptides with antihypertensive and anticancer actions. Antioxidant lipids and strengtheners for the immune system, in addition, globulins (11S) rich in lysine and sulfur amino acids essential for excellent nutrition. (Edwards, 2007)(Barba De La Rosa A P, 2007)(Paredes, 1994) The chemical composition (moisture, protein, fat, fiber, ashes, carbohydrates) of the seeds has a higher nutritional value compared to other grains (Table 1).

Table 1: Proximal Composition of Amaranth and Main Cereals.

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 2: Proximal Composition of Amaranth and Spinach Leaves.

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

As a result of the above, amaranth cultivation is considered an alternative for production and consumption in marginalized communities in the country. Firstly, it can be grown in rainfed conditions and secondly, cultivation with a higher source of plant-based protein. (Barrales D J S, 2010)

That they can face an industrial food system that has turned food into products that we do not know how it was produced or what impacts it generates on the environment or society. In a society where ultra-processed food and consumerism predominate (Pasquier, 2025).

3. MATERIALS AND METHODS

The methodology used was a research process based on a system of discussion, inquiry and analysis where the community participates and works with the group of cooperating actors, this methodology was useful for the organization, training and proposal of solution of the productive problem, in addition to the possibility for the community to have the possibility of developing its internal capacities.

(CEPAL, 2002)

On the other hand, the methodological basis of the research was strategic planning that allows the development of activities for the fulfillment of objectives and goals.

Planning is a technique of institutional analysis and intervention, whose foundations are based on the knowledge of organizational studies and its application contributes to structuring and coordinating the set of tasks and resources that are mobilized to achieve the objectives. Planning is conceived as the process of designing, and articulating the actions and resources necessary to obtain results in a given period of time.

The planning level is strategic, tactical, and operational. Strategic planning considers three main aspects; the temporal dimension, the competitive dimension and the cooperation and coordination dimension. The temporal dimension implies the performance of actions with a view to achieving objectives that imply specific results in the short, medium or long term. The competitive dimension refers to the fact that politics, business and the public administration itself are usually faced with competition from third parties and the dimension of cooperation and coordination is manifested in the willingness to attend and fulfill the functions entrusted to them and the performance of the tasks by the members (SHCP, 2024).

3.1. Study Area

The research was carried out in the community of Cuilapam de Guerrero, Oaxaca located in the southern area of the Central Valleys of Oaxaca, the locality has an elevation of 1,560 m, surface, 49.75 km2 and coordinates of 16°59'50"N 96°46'54"W / 16.9972222222222, -96.7816666666667. The land use is mainly in agriculture (58.87%) and urban area (16.24%), the vegetation is induced grassland (16.84%) and forest (8.05%), these characteristics allow the potential use for continuous mechanized agriculture (65.38%) and for seasonal manual agriculture (7.46%). It has water supply from the hydrological region of the Costa Chica-Río Verde (100%), basin and sub-basin of the Atoyac River (100%) and intermittent currents of the Valiente and San Pablo rivers, it is worth mentioning that in recent years the level and supply of water in the community has decreased significantly. (INEGI, 2025).

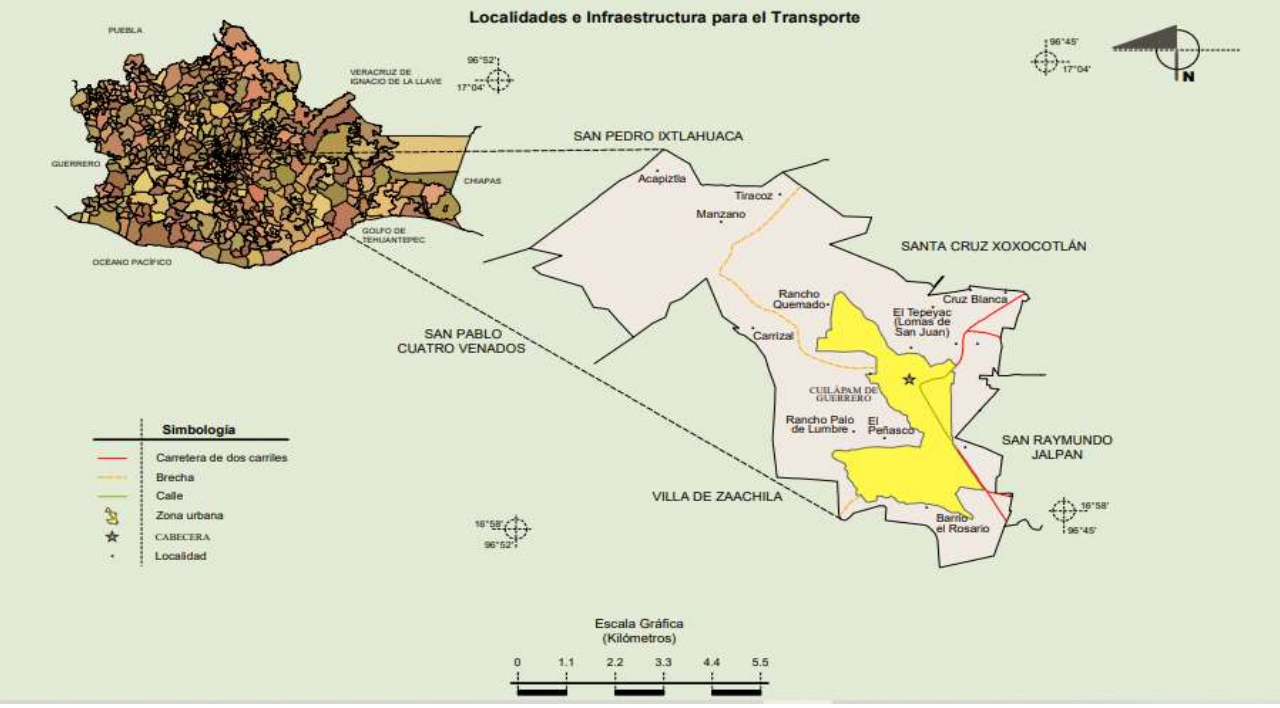


Figure 1: Location of the Study Area.

3.2. Field Visits

Informative talk about the nutritional and cultural importance of amaranth The talk was given at the community level, later to the group of producers interested in the crop.

Figure 2: Informative Talk on the Nutritional and Cultural Importance of Amaranth.

Talk about the technical-productive process of amaranth cultivation A talk was given on the technical-productive process of the cultivation of amaranth of three varieties: Amaranthus Hypochondriacus L. (PQ2, Arely, Diego).

Figure 3: Talk about the Technical-Productive Process of Amaranth Cultivation.

3.3. Establishment of Demonstration Plot

Planting Design Field visit to the land located in the "El Sabino" area, owned by Mrs. Margarita Fernández Cruz and another plot owned by Dr. José García in the Community of Cuilapam de Guerrero.

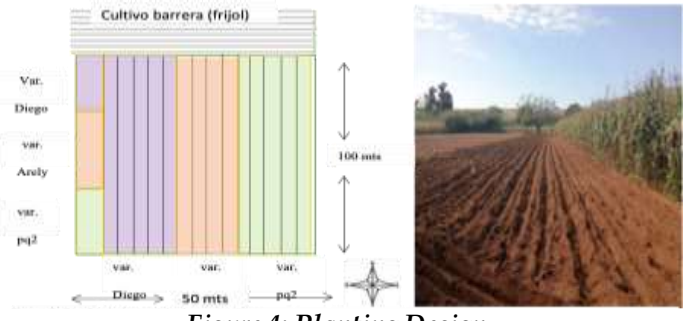


Figure 4: Planting Design.

3.4. Sowing

For amaranth planting, there are two types of traditional planting: it can be direct or transplanted.

The direct: A "chorrillo" is commonly used in the states of Morelos, Puebla and Tlaxcala on the slopes of the furrows in which it is scratched with a stick and then the seed is deposited that is then covered with a light layer of soil with approximately 4 kilograms of seed it is necessary to make a thinning; another form is matted, also depositing on the slope of the furrow a group of approximately 10 seeds every 30 centimeters between one and the other; Then, in a similar way to the previous one, the seed is covered with a light layer of soil.

Another direct way is by using semi-precision seeder for dobladense type maize for conservation agriculture, at a distance between rows of 0.8 and placing the seed in the tank for the granulated insecticide. It is calibrated at number 3 or 4. Under this system, between 3 and 4 kilograms of seed/ha are used. The seed is deposited at a depth of 2 cm.

Transplanting: it is used only in the producing area of the Federal District, in this case the vegetative cycle is lengthened and lower yields are obtained, because when frosts occur the plant has not fully matured, so the direct seeding system is more recommended.

A good strategy to achieve an adequate distribution of seed is to stir the 4 kilograms of good seed with 3 kilograms of sterilized seed at 200°C for four hours, you can also roast the seed until it takes on a brown color and when doing germination tests, this should always be 0%. It should be sown when the soil is very moist, once the storm has been established; if it is sown dry, it runs the risk of crusting of the soil surface and as a consequence failures in emergence. Another aspect that must be considered is the planting depth, the best results are obtained when sowing from 1 to 2 centimeters deep; if it is greater, you have problems; the emergence is very irregular, lasting up to 15 days after planting; To achieve greater uniformity, it should be ensured that the depth is the same throughout the terrain.

In this project, the traditional direct sowing "chorrillo" was used and for its better distribution the seed was mixed with compost and fine soil from the land.

A technique to repel pests in the plot is the association of crops, which is why beans were planted that allow the natural development of amaranth without using chemical additives. The planting of beans will first serve as a barrier crop and second, the space, irrigation and nutrition in the upper parts of the plot will be used. Bean planting. According to the design, the three varieties are planted (PQ2, Arely, Diego).

Figure 5: Academic Body Rural Development and Sustainable Management of Agroecosystems DEPI ITVO, 2024.

Informative talk about humidity and the importance of nutrition in the crop The talk was given on the humidity process and the importance of the nutrition of the amaranth crop of three varieties Amaranthus Hypochondriacus L. (PQ2, Arely, Diego), for which bioproducts are delivered.

Figure 6: Academic Body Rural Development and Sustainable Management of Agroecosystems DEPI ITVO, 2024.

Informative talk on pest control in amaranth cultivation The main pests of amaranth cultivation are: Stem borers: the larva of this insect makes galleries inside the stem, reaching the apex of the inflorescence.

Grasshoppers–Nymphs and adults affect the foliage of the plant, preventing good growth and reduction in leaf area.

Bed bug, lygus lineolaris: feeds on the grains in a milky state, causing their absorption and mummification. Control methods using organic

insecticides will be applied according to the pest that presents the crop.

Figure 7: Sowing.

Informative talk on the importance of thinning
The talk was given on the thinning process, which consists of eliminating weak plants or plants that are not of the desired type when they reach a height of between 10 and 20 cm. It can also refer to the action of uprooting plants that have been born close together, such as corn or beans.

Thinning, hilling and weeding activities must be carried out properly and in a timely manner, since if they are carried out spontaneously the crop can be infested by weeds which compete for moisture, space, nutrients and solar radiation with amaranth plants, resulting in them growing stunted and being susceptible to pests and diseases. Between 30 and 40 days after sowing or when the plants are approximately 30 cm high, the first "hilling" work will be carried out in order to bring soil to the foot of the plants to give them greater "anchorage" and to eliminate weeds that have grown simultaneously with the amaranth plants; Prior to this work, the second fertilization of the crop will be carried out to provide better development of the amaranth plants in their reproductive stage. The second "hilling" work will be carried out before the plants "close" or cross their foliage.

Figure 8: Weeding Activities.

In the thinning stage, the consumption of amaranth leaves in vegetables has a good texture, taste and nutritional quality, contains high values of calcium, iron, phosphorus and magnesium, ascorbic acid, niacin, vitamin A and fibre.

Informative talk on the harvest and post-harvest
The talk on the harvest and post-harvest was given. For the harvest, the panicles are cut and left to dry or check if they are already dry. Harvesting can be done manually or with a thresher. For manual harvesting, the process is similar to the bean harvest, the panicles are put to dry, then they are threshed manually or passed by a vehicle.

For thresher harvesting, the upper screen of the machine opens in a similar way when threshing wheat. The lower sieve with an opening of one-tenth of an inch, such as for threshing alfalfa seed. The fan speed should be 540 RPM. The speed of the thresher cylinder should be 800 to 900 RPM. The space between the cylinder and the concaves should be almost completely open. When the grain is clean, it is necessary to dry it before storing it, to avoid rot and the development of strange flavors due to humidity. This is particularly done in areas where the humidity is still harvested, the environment is high or the foliage of the plant is not yet dry; Moisture of 10-12 percent in the seed is the most recommended for storage, which is achieved by drying one or three days in the sun.

Figure 9: Post-harvest.

4. RESULTS

4.1. Cuilapam de Guerrero

In Cuilapam de Guerrero, the priority crops for the Harvesting Sovereignty 2025 strategy are corn and beans.

Given the effects of climate change and the reduction of water resources, there is a need to look for alternative crops that do not demand much water consumption, in view of this, amaranth was

proposed as an alternative crop.

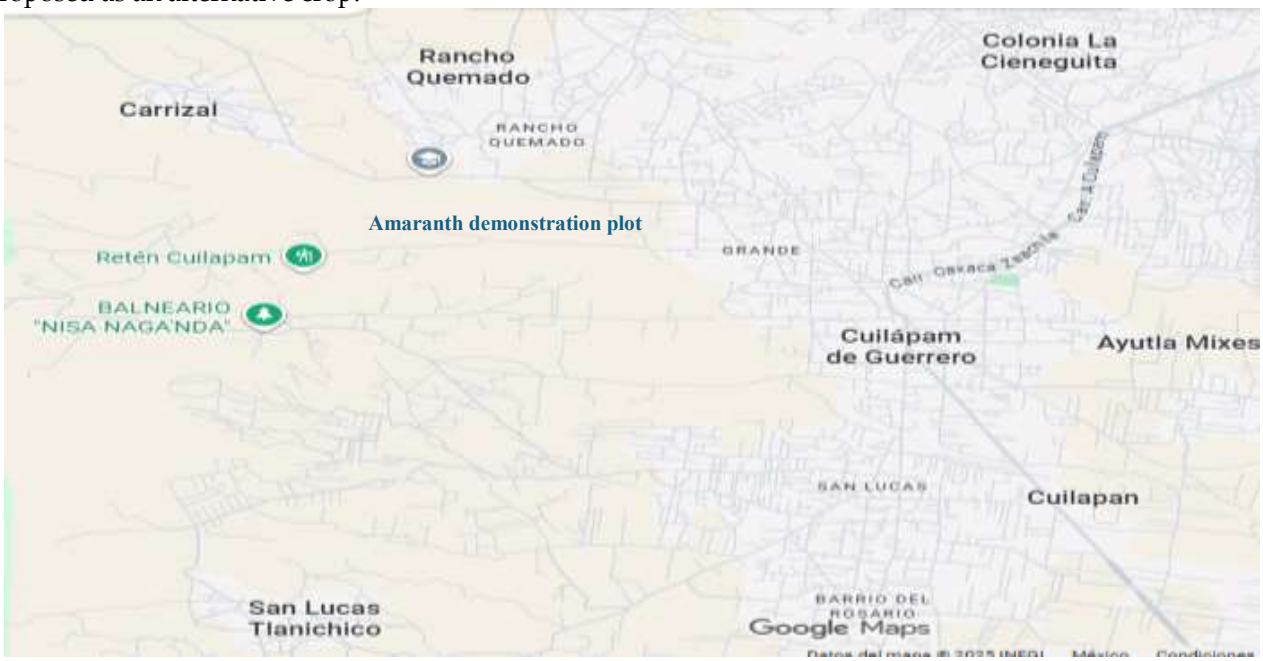


Figure 10: Micro Location of Cuilapam de Guerrero.

4.2. Workshop on the Use and Exploitation of the Amaranth Plant

In the thinning process, the population was invited to the workshop on the use of the amaranth plant. The meeting point was at the demonstration plot of Mr. José García, where the plant was collected for the preparation of food.

Figure 11: Plant Use.

Later, on behalf of the commissioner of Communal Goods of the community, we moved to a space in the baratillo (in Oaxaca it is an open-air market for the purchase and sale of animals, products

of the region and traditional food) to prepare and promote food with the amaranth leaf.

Figure 12: Workshops.

4.3. Demonstration Tour of Amaranth Production in Cuilapam de Guerrero

Together with the actor involved on behalf of the community, the Commissariat of Communal Goods, the community in general was invited to tour the demonstration plot to publicize the varieties that were cultivated and promote the production and consumption of amaranth, adopt it as an alternative crop, where on the one hand they develop a complementary economic activity through the sale of surpluses and on the other hand consume a food with high nutritional value.

Figure 13: Demonstration Tours.

5. DISCUSSION

The findings of this study—stakeholder buy-in, adoption of amaranth cultivation in demonstration plots, and growing interest from families in consuming amaranth-based products—are consistent with emerging evidence on amaranth's agronomic, nutritional, and social advantages.

Amaranth as a resilient and nutritious crop

The recent review by Segura-Jiménez et al. (2025) shows that amaranth production can be an effective tool to diversify the grain base in agricultural systems, especially in vulnerable areas, contributing to food security thanks to its reasonable yields and high nutritional value.

Similarly, the review by Mamayabay and Curayag (2025) emphasizes that amaranth provides protein, fiber, minerals, and bioactive compounds—making it a "superfood" with real potential to improve diets and combat nutritional deficiencies in rural communities.

In addition, recent studies argue that amaranth is suitable for sustainable agricultural systems with low environmental impact: it demands relatively little water, tolerates soils of low fertility, and can be integrated into rotations or polycultures without depleting the soil, favoring the conservation of agricultural biodiversity (Toimbayeva et al., 2025).

This coincides with the approach of our study by using demonstration plots in rural communities in the Oaxaca Valley, where soil conditions can be limiting.

Social and Solidarity Economy as a facilitator of change The SSE approach, applied to amaranth cultivation, makes it possible to overcome several structural barriers: it fosters collective organization, promotes cooperation, and reinforces the cultural identity linked to ancestral foods. Hernández's (2023) research demonstrates how producers organized under SSE manage to articulate production, transformation, and community nutritional well-being, proposing amaranth as the axis of a "new community rurality" oriented towards food sovereignty.

In our case, the participation of multiple actors – technical institutions, civil society, commissioners of communal goods – showed that the reintroduction of amaranth can be consolidated if there is accompaniment, training and community will.

Implications for food security and sustainability The revaluation of amaranth through SSE not only has an agronomic or nutritional value, but also a social and cultural one. It can help diversify diets, increase the availability of nutritious foods, and reduce dependence on commercial cereals. This diversification is strategic in the face of food or climate crises – as proposed by Kaur et al. (2024), who argue that amaranth contributes to the sustainability of global food systems and can be integrated into industrial, processing and marketing processes (flours, functional foods, etc.).

Challenges and limitations for its sustained implementation Despite the potential shown, the consolidation of amaranth faces concrete obstacles. In some production systems, economic profitability can be low if agronomic management is not optimized, access to quality seed, organic inputs, post-harvest infrastructure, and adequate markets are ensured (as documented by Ayala-Garay et al., 2025, in a recent study on minority amaranth production systems in Mexico).

In fact, even as the demand for nutritious and healthy food grows, the transition from a self-consumption crop to a market crop requires technical support, collective training, value chains, and public policies that recognize the importance of alternative and traditional crops. Without this support, the risk is that amaranth will be marginalized again, losing its value as a sustainable community resource (Yadav & Yadav, 2024).

Contributions to the present study and recommendations The experience developed in the Central Valleys of Oaxaca shows that when 1) community approach under SSE, 2) participatory methodology, and 3) cultural valuation of amaranth are combined, it is possible to reactivate its cultivation for productive purposes and local consumption. This offers a reference for other regions with similar characteristics: degraded soils, food precariousness and loss of agricultural biodiversity.

For this revaluation to be sustainable and scalable, it is recommended:

- Implement permanent technical support to optimize agricultural practices (adapted seeds, organic fertilizers, soil management).
- Encourage the creation of cooperatives or community initiatives under SSE models, which integrate production, transformation and marketing.
- Support research in genetic improvement, agroecological management and development of amaranth derivatives.
- Promote public policies that recognize amaranth as a strategic crop for food security, biodiversity and rural development.

6. CONCLUSION

It can be concluded that the study made it possible to promote the production and consumption of amaranth and within the lines of research that derive from the study are to promote the dissemination in two phases, the first to publicize the nutritional importance so that the population knows the health benefits of consuming amaranth, in a second phase is to disseminate the forms of consumption and a third phase to promote production.

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