



Vendor selling vegetables on La Terminal Market in Guatemala City. Credit: Bioversity International/N. Amaya

Research brief: Value chain and market potential of Chaya to strengthen climate resilience, nutrition security and incomes in Guatemala

This value chain analysis was completed by Nadezda Amaya as part of the international Programme "Linking agrobiodiversity value chains, climate adaptation and nutrition: Empowering the poor to manage risk" supported by the International Fund for Agricultural Development (IFAD), the European Union (EU) and the CGIAR Research Programmes on Climate Change, Agriculture, and Food Security (CCAFS) and Agriculture for Nutrition and Health (A4NH).

Chaya (*Cnidoscolus aconitifolius*) is a perennial vegetable native of Guatemala, which has enormous potential to make significant nutritional and health contributions in vulnerable communities due to its high nutritional value and capacity to produce leaves year-round. Chaya can truly be considered as a 'superfood' and as a viable option for an economic food supply for the Guatemalan population. Yet, paradoxically, its production, consumption and marketing have been poorly studied and promoted insofar. In 2017, a value chain assessment was carried out by Bioversity International and the Universidad del Valle de Guatemala (UVG) to contribute to fill this gap in knowledge, and identify opportunities and constraints for developing the market of chaya in Guatemala. This study deployed a Rapid Market Appraisal methodology to collect qualitative data through semi-structured interviews of different stakeholders engaged in the chaya value chain, including producers, vendors, consumers, indirect actors and other informed participants.

Production

Most chaya production in Guatemala takes place in rural indigenous communities. This is the case for example of the Departments of Petén, Alta Verapaz, Baja Verapaz, Izabal, Escuintla and Chiquimula. Four varieties of chaya are cultivated across Guatemala, viz.

Estrella, Mansa, Plegada, and Picuda, the first two being the most popular. Chaya production in Guatemala is not significant when compared to other crops (e.g. coffee), but the area cultivated is unknown as no information is collected on this plant in national statistics. On average, families interviewed in Chiquimula and Petén own between 5 to 20 chaya plants, which are used as living fence-posts either around the house, home garden or agricultural plots. People keep producing chaya for traditional reasons, but also because of its nutritional value and easy cultivation. Unlike Petén, in Chiquimula the main problem for chaya production are the heavy drought spells and the limited access to water. Even though the quantity of water that chaya requires is really small, its lack does affect the quantity of leaves the plant can produce during the year. In Chiquimula in fact, the production of chaya



Credit: Bioversity International/N. Amaya



leaves reduces during summer, and only farmers who have access to irrigation are able to get some yield to bring to the market. Chaya is quite resistant to numerous pests and diseases, and although it does show susceptibility to some of them. Farmers are used to just rip off the infected leaves to control the infestation.

The costs for chaya cultivation are minimal. According to our estimates, taking care of five plants (mainly labor) can cost between 2 to 4 USD/month. In Guatemala, chaya production and consumption is measured in bundles, each one made of 15-20 leaves. The quantity of leaves harvested varies by season and region; for instance, a family from Chiquimula can harvest on average 10 bundles/week. Most chaya production in the villages surveyed is used for household consumption, and to a lesser extent for feeding animals or sale in the market. Other findings of our study indicate that the main reasons for farmers not growing chaya are the low levels of production and low market demand. Interestingly, some farmers have also shown reluctance to grow a crop wrongly perceived by many as “food of the poor”.

Marketing

It is not very common to see chaya in local and regional markets in Guatemala. The supply and diversity of greens in the markets is quite high, but the assessment revealed that chaya is not an important green for vendors, who prefer to sell mostly black nightshade, chipilin, spinach, amaranth leaves, chard, lettuce, watercress, squash leaves, and condiment plants (e.g. cilantro, parsley, spearmint). This happens mainly because most vendors and consumers do not know chaya nor its nutritional and medicinal benefits; and also, because the other mentioned greens can be produced at different altitudes so that their distribution and availability in the markets are much broader than that of chaya. In fact, chaya is produced only in low lands (i.e. up to 1500 meters above sea level), thus its production is limited to specific regions of Guatemala.

Our surveys found chaya on sale in the markets of Jocotan and in two markets in Chiquimula (Central Market and Terminal), those in San Benito and Santa Elena in Petén and in few more in Guatemala City (e.g. La Terminal, Central Market and La Palmita).

However, the number of vendors who were selling it in these markets was not significant. In the markets of Petén and Chiquimula, vendors reported selling chaya between one to four times per week, but in very limited amounts (on average 12 bundles per week). In the case of large cities' markets, the frequency of chaya sales was even lower (once/month to twice/week, with an average of 4 bundles/week). Chaya's price varies by season and market. For instance, in the markets located in Chiquimula and Petén, chaya prices vary from 1 to 4 GTQ/bundle and in the markets in Guatemala City from 3 to 5 GTQ/bundle.

Consumption

Even though people in numerous communities produce and have access to chaya, their levels of consumption are minimal and in decline. Low and declining consumption of chaya in urban areas is related to low awareness of the plant and lack of availability in the markets. Most Guatemalans in the city do not even know that chaya exists and the ones who do know chaya cannot find it easily in the markets. For instance, it is estimated that at the



Credit: Bioversity International/N. Amaya



Chaya promotion in Chiquimula. Credit: S. Maselli/CIAT

community level a family in Chiquimula consumes on average five bundles of chaya once a week during winter (i.e rainy season) and only three bundles in summer. Another important factor that influences the level of chaya consumption is the limited number of dishes that include chaya as ingredient. There are not many recipes used in the communities for preparing chaya. The most common dishes are tamales, scrambled eggs with chaya, soups, and chaya with pinol (i.e. flour made from toasted corn mixed with chaya and water). In the communities surveyed in Chiquimula, people eat chaya mostly in soups and with pinol, which are not very attractive nor desired by children. Of paramount importance to popularize chaya, is thus the development of innovative, more attractive and easy ways to cook chaya to make this nutritious food more appealing especially to younger generations.

Around 65% of the consumers interviewed in the markets located in Chiquimula and Petén stated that they knew about chaya, while only 20% of

the consumers from the markets in Guatemala City were aware of this plant. Consumers who buy chaya in the markets in Petén and Chiquimula and at lesser extend in urban markets of Guatemala, do so primarily for its unique flavor. Fewer consumers, mostly in Guatemala City, mentioned using chaya for its nutritive or medicinal value. It is estimated that consumers in these markets buy around two bundles of chaya between one up to four times per month. The level of consumption by these consumers depends on the availability of chaya in the markets, which most of the time is inexistent. Around a third of the consumers encountered in the markets in Peten, Chiquimula and Guatemala City, who never heard about chaya, were interested in trying it. Nevertheless, it is important to mention that a lot of people, especially among younger generations in rural areas, perceive leafy vegetables such as chaya as “food of the poor”. Because of this stigma, traditional Mayan groups increasingly prefer introduced crops and products over native ones. These findings show that,

one of the problems of malnutrition and food insecurity in Guatemala, cannot be ascribed only to the lack of availability and access to food, but also to the loss of knowledge and appreciation for ancestral foods. .

Chaya’s underutilized potential

The majority of the Guatemalan population bases its diet on maize and beans, important sources of protein and energy, but poor providers of all micronutrients needed for a healthy diet. On the other end, the cost of micronutrient-rich foods and low incomes represent a barrier for large sectors of the population to incorporate these items into their diets. According to the UN, almost half of the population cannot afford a basic food basket and as a result, the prevalence of stunting in children under five is one of the highest in the world (46.5% nationally with peaks as high as 90% in some Departments). The market price of chaya in Guatemala is lower compared to other leafy vegetables, meanwhile its nutritional composition is considerably higher in comparison. Chaya has seven times more vitamin C, four times more calcium and two times more protein than spinach, while its price is almost half that of spinach. Moreover, chaya has five times more vitamin C than chipilin, three times more than that found in black



Chaya powder. EuroTropics. Credit: Bioversity International/N. Lauridsen

nightshade, and more carbohydrates and fiber than all the mentioned greens, yet it is much less easily found in the market in Guatemala. The low price of chaya in the market is an opportunity for consumers to diversify their diets with this Mayan superfood, although issues of quality and awareness of its nutritional value need to be addressed.

Many consumers were either unaware of chaya or had negative perceptions of chaya, which should be reversed. One way to increase consumer awareness is through Guatemalan cuisine, which can help revalue Mayan traditions and culture and help chaya (and other native plants) regain status and no longer be considered "poor people's food", but more rightly as nutritious food and part of Guatemala's culture. Given that another important constraint in the value chain of chaya is its perishability, various options for post-harvest handling have been looked into. As a matter of fact, apart from the use of chaya as fresh product, nutrient rich food can be boosted also with the addition of dehydrated chaya leaves. Despite the many bottlenecks limiting its use, the interest for chaya is slowly growing

and few but very interesting initiatives are emerging, such as its use in commercial gastronomy (e.g. restaurants, hotels, bakeries), in the processed food industry (e.g. chaya flour, instant soups tea and pills) or as ingredient for animal feeding.

There are many organizations in Guatemala that have been working with chaya and believe in the potential that this plant can offer to tackle the severe malnutrition problems faced by the country. Most of the work of these organizations deals with awareness raising on chaya's benefits and the promotion of its production, consumption and marketing through workshops, brochures, videos and recipes; but it is worth mentioning that there are also other very strategic efforts as well, like the distribution of chaya cuttings, the establishment of gardens (at home, school and/or in different rural communities) and the introduction of chaya into school lunches. The efforts of these different stakeholders are essential to raise chaya's importance and use in Guatemala to leverage its potentials to improve livelihoods, nutrition, and resilience.



Bioversity International is a CGIAR Research Centre. CGIAR is a global research partnership for a food-secure future.

Bioversity International delivers scientific evidence, management practices and policy options to use and safeguard agricultural and tree biodiversity to attain sustainable global food and nutrition security

Bioversity International

Via dei Tre Denari, 472/a
00054 Maccarese (Fiumicino), Italy
Tel. (+39) 06 61181
Fax. (+39) 06 6118402
bioversity@cgiar.org

www.bioversityinternational.org
www.nuscommunity.org

Universidad del Valle de Guatemala

Centro de Estudios Agrícolas y Alimentarios (CEAA)
18 Ave. 11-95, zona 15, VH III
Guatemala, Guatemala
info@uvg.edu.gt

www.uvg.edu.gt



Chaya tortillas cooked at the nutritious recipe workshop in Chiquimula. Credit: UVGIS/ Maselli



Rice cooked with Chaya. Credit: UVGIS/ Maselli



Pasta La Chaya served in Restaurant Chaya in Peter. Credit: Bioversity International/ N. Arneja