



Promoting cultivation of cherimoya in Latin America

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The challenge of developing niche markets for an unfamiliar fruit.

The cherimoya (*Annona cherimola* Mill.) is one of the so-called "lost crops of the Incas" (Vietmeyer in Popenoe *et al.*, 1989) that has come to us from the Andean heights. Also called chirimoya, chirimolla, or the custard apple in English it is well-known to indigenous populations in Latin America, familiar to only a limited group of consumers outside the region and largely ignored by mainstream agricultural science.

In Latin America and particularly in Ecuador, the cherimoya has the potential to become a commercial subtropical crop for both resource-poor farmers and commercial farmers who serve international markets (George, Nissen and Brown, 1987; Sanewski, 1991; Rasai, George and Kantharajah, 1995). The following discussion focuses on the challenges involved in developing the crop, particularly those related to infrastructure, institutional support and market factors.

[Fruit-bearing *Annona cherimola* tree \(Ecuador\)](#)

[Improved cherimoya with a low seed content](#)

CHARACTERISTICS

Cherimoya is a fairly dense, fast-growing tree that is often briefly deciduous during the coldest period. It can reach 9 m or more but is fairly easily restrained. Young trees "harp", forming opposite branches as a natural espalier. These can be trained against a surface or pruned off to form a regular free-standing trunk.

The cherimoya fruit is a fleshy compound (syncarp) of a primitive form with spirally arranged carpels which fuse after fruit set. Each segment of flesh, i.e. each true fruitlet, contains a single hard black bean-like seed. The fruit is conical to somewhat heart shaped, 10 to 25 cm long and up to 15 cm wide, weighing on average 250 to 800 g. Fruits turn a pale green or creamy yellow as they reach maturity; they are considered to be overripe when the skin starts to turn dark brown to black. The skin, thin or thick, may be smooth with fingerprint-like markings or covered with conical or rounded protuberances left from the flowers.

Cherimoya is primarily a dessert fruit, consumed fresh and when fully ripe. The sweet, juicy fruits are cut open and eaten with a spoon. They have a high sugar content (20 to 22 percent) and are low in acids (1 percent) (Popenoe *et al.*, 1989; Pittmann, 1956). The white, creamy flesh has a strong aroma reminiscent of a mixture of strawberry, banana and pineapple. The

seeds are inedible. The flavour of the ripe fruit is improved by chilling just prior to eating; ripe fruits can be frozen and eaten like ice cream. Cherimoya fruit is also used for making ice cream, milkshakes or sorbets. It is processed into yoghurt, flan, fruit juice and wine (Popenoe, *et al.*, 1989).

CENTRE OF ORIGIN, DISSEMINATION AND CURRENT PRODUCTION

The cherimoya originated in an area now covered by southern Ecuador and northern Peru. The province of Loja and the so-called sacred valley of Vilcabamba in Ecuador (California Rare Fruit Growers Association, 1996) are the likely centres of biodiversity. The Vilcabamba valley still contains wild stands of cherimoya. The tree had already moved into southern Mexico, Central America and the northern part of South America by the time of its sighting by the conquistadores in the sixteenth century. But it was not until the eighteenth century that cherimoya seeds were taken to Spain and Portugal, from which they proceeded to Italy, Egypt and Palestine and ultimately throughout the world.

The fruit is cultivated mainly in the Mediterranean (Popenoe *et al.*, 1989; Anderson and Richardson, 1990; Sanewski, 1991). Spain leads the world in cherimoya production, with some 3 600 ha cultivated in the southern part of the country, which yielded 20 000 tonnes of fruit in 1991 (Sanewski, 1991).

Cherimoya is considered an important crop in Chile, where it is grown on approximately 1 000 ha for national and international markets, primarily the United States, Japan and a number of Latin American countries (Gardiazabal, 1999). The fruit is also produced on a limited commercial scale in Argentina, Bolivia, Ecuador, Mexico and Peru (Sanewski, 1991), and production has recently begun in Colombia and Brazil.

In the United States, cherimoya has been cultivated in southern California since 1871; some 120 ha cultivated in Carpinteria produce 1 000 tonnes annually for domestic and export markets (Grossberger, 1999 and personal communication). Demand greatly exceeds supply in all United States markets, as most of the fruit never leaves California, the only producing state. The major labour costs are pruning, pollination, ant and termite control, irrigation and harvesting.

Outside Europe and the Americas, cherimoya is cultivated in Central Africa (and on an experimental basis in South Africa), Thailand, Indonesia, Australia and most recently New Zealand (Rasai, George and Kantharajah, 1995). In general, the fruit commands high wholesale and retail prices, but costs are high and major crop losses from frost and fruit splitting are a common threat. In South America, the fruit fly is an additional menace.

These instances of commercial cultivation notwithstanding, most of the cherimoyas that are consumed or sold come from plants growing in home gardens or in the wild. In particular, the cherimoya is an important backyard crop in Bolivia, Colombia, Ecuador, Peru and Venezuela. True cherimoya plantations are found only in Chile, Spain and the United States.

DEVELOPMENT OF CHERIMOYA AS A NICHE CROP

In Latin America cherimoya is a dual-context crop, grown under subsistence farmer to smallholder conditions (picked in the wild or grown in home gardens or backyards with limited market involvement) and under commercial farm conditions (characterized by improved cultivars and irrigation, commercial organization and processing infrastructure). Development of cherimoya as an income-generating crop must focus on both sectors and cater to their respective needs. Experience shows that even limited increases in input levels and technology improvement can positively effect yields. Moreover, improvements in commercial sector activities may also have positive repercussions for subsistence farmers.

The development of cherimoya into a niche crop that fetches high prices in local, national and international markets, as has been accomplished for the kiwi (*Actinidia chinensis* or *Actinidia deliciosa*), will depend on the following factors:

- overcoming production constraints:
- developing infrastructure for processing, transport and marketing;
- improving institutional support, particularly as regards financial resources;
- adopting an appropriate merchandising and marketing strategy to introduce cherimoya to consumers.

Production constraints

Lack of timely access to farm equipment, labour and basic inputs such as fertilizer, pesticides and adapted cultivars and/or graft material-owing to lack of capital, transport and input delivery points - is often mentioned by farmers as a major production constraint.

In most subtropical areas rainfall is an unreliable source of water. Seasonal water shortages and flooding cause physical damage to trees, physiological disorders and increased incidence of disease. The cherimoya is particularly vulnerable, as it generally grows in shallow soil with a limited water carrying capacity, on sloping land prone to erosion. In most cases, water management practices such as water harvesting techniques and the use of terraces have not been developed, nor has the local irrigation potential been fully investigated and/or developed.

Harvesting cherimoya fruit at the right time is critical to quality. If picked when ripe, the fruits may quickly become overripe; but if picked when still unripe, subsequent maturing at room temperature seems to pose no major problems. Fruits on the tree ripen at different times, so that farmers have to judge each fruit individually for maturity and must harvest at intervals, which entails labour costs.

Processing and transportation infrastructure

A delicate fruit with a short shelf-life, the cherimoya must be picked unripe and transported with great care. A proper processing infrastructure, with on- and off-farm facilities or technology to store and/or ripen the fruit, would alleviate some of the fresh fruit storage problems and allow for the distribution of a higher-quality, more valuable product.

A poor system of roads makes transport and access to markets and necessary goods and services difficult and hampers communication of vital market information. A better transportation infrastructure connecting rural production areas with more urban areas where inputs could be purchased and farm produce marketed is imperative to the success of a cherimoya-based rural economy.

Institutional support

The development of a specific crop such as cherimoya cannot be separated from the broader context of rural development, which must also deal with issues such as health care, education, finance, access to water and fuel energy and stimulation of the rural non-agricultural economy. Although governments and the donor community consider the development of small-scale agriculture to be of great importance, current policies have a *de facto* urban bias and lack a sound legal and physical structure to support small-scale farmers and rural communities.

A subsistence or small-scale farmer interested in using modern technology and improved

cherimoya cultivars is seen by financial institutions as a high risk for production-oriented credit programmes. So-called "microfinance" programmes seem to favour urban-based activities over rural ones, and small-scale farmers are often simply unaware of the institutional help that is available to them. Thus, limited access to capital keeps poor farmers at the subsistence level, dependent on grants, subsidies and subsidized loans. This situation is aggravated by high inflation and lack of access to the banking sector, which discourages savings. Small-scale farmers' suspicions about Western production and marketing models tend to make them pessimistic about anything but traditional, centrally defined economic development and production models.

A farm family in Ecuador with harvested cherimoya fruit ready for transport

In addition to providing information about cherimoya, extension should provide general information about staple crops to make farmers aware of innovations in inputs and production methods as well as to improve their knowledge of marketing procedures. This seems to be especially important in the early phases of development intervention, as most small-scale farmers are not currently affiliated with any form of farmer organization. There is wide agreement that extension (no matter by whom it is organized) has an invaluable part to play in helping farmers move towards more commercialized production methods and the use of external services such as credit and marketing. Extension officers can also serve as intermediaries or "translators" of farmers' voices to various stakeholders in development in the area and beyond. Unfortunately government-run extension services are often understaffed, and the poorly paid extension officers often lack proper background and training.

Another issue that clearly needs to be addressed is that of land tenure. Any investment or long-term development strategy involving a perennial crop such as cherimoya will remain purposeless if farmers do not have secure access to land. Especially in the context of South America, this is a tricky issue that needs to be considered before any development effort is started.

Although in Ecuador, to take a typical example, there are a few excellent agricultural research facilities which have recently included small-scale subsistence farmers' research needs in their programmes, more research and on-farm trials are needed to understand and optimize existing farming systems. Research and development needs to be more demand driven, and solutions should address farmer-defined and understood problems. Small-scale and emerging farmers are particularly vulnerable when new technology or higher-cost inputs are introduced; not only must the innovations themselves be carefully researched, but also the manner of introducing them. Ideally, farmers and farmers' organizations should be involved from the start in new cultivar development through their participation in germplasm and breeding programme evaluation.

Marketing factors

Most of the problems that have been enumerated so far are related to low crop production. If households cannot derive a disposable income from cherimoya farming, it will not be socially sustainable to introduce its cultivation to resource-poor areas. However, to increase farm income, an increase in production and productivity must be met by suitable marketing efforts.

A lack of communication, transportation and knowledge of marketing processes makes it difficult or impossible for farmers to take advantage of potential market opportunities. Improved marketplaces and corresponding facilities (storage, transportation, etc.) are imperative for the promotion of trade in both agricultural and non-agricultural commodities. Cherimoyas produced in South America could find their way into American, European and Japanese markets if and when these conditions are met and schemes developed accordingly.

As it gains popularity, cherimoya is receiving increasing attention from researchers, growers and consumers in many countries (Grossberger. 1999). The marketing of cherimoya will probably be set up around a chain of wholesale intermediaries that will introduce, develop and create markets for cherimoya as a speciality fruit. Another key to success is the establishment of solid partnerships between growers and retailers (Caplan, 1996; Van Damme, 1998). Through so-called outgrower schemes, producers and/or producer groups are guaranteed a secure outlet for their produce and are provided with inputs and advice from retailers. In the beginning, producers might consign the cherimoyas to the retailer, who pays them upon the sale of the produce. Whatever the channel chosen, there will be a need to develop a proper strategy for packaging and marketing. It will be necessary to unite individual producers and producer cooperatives in South America into structures that can guarantee timely production at reasonable prices, and to link them with wholesale companies or associations in the North. These structures should also guarantee fair prices for producers and intermediaries, perhaps through fair trade organizations. Ideally, retailers will also collaborate and define common marketing strategies across countries and continents.

The short-term commercial development of cherimoya may be impeded by limited production for the near future, because expansion of its production may pose large financial risks to producers and because the potential production area is limited in light of currently known varieties and cropping techniques. Research will have to broaden the range of potential growing zones through new cultivar development. Finding the most sound areas for investments that are financially, ecologically and socially sustainable can be considered an all-important first step in providing incentives and making small-scale production a viable part of a growing rural economy. Ideally, cherimoyas will be grown using only limited amounts of inputs and improved cultivars which could yield major production increases. Research should focus on the development of *in vitro* propagation techniques (Castro, Cautón Morales and Biancani, 1999), development of improved varieties, environment-friendly production techniques including biological fruit fly control, processing and reduction of postharvest losses.

CONCLUSION

Factors that may facilitate the commercial development of cherimoya include:

- the presence of sometimes large ethnic populations familiar with its characteristics in many parts of the Western world;
- the growing mobility of potential clients, with tourism to exotic spots helping to familiarize consumers with previously unknown products;
- the potential of cherimoya to appeal to the general population as an ethnic or exotic speciality product;
- the existence of entrepreneurial producers, wholesalers and retailers in potential growing areas and at or near the consumers' level;
- efforts to develop and select improved cultivars;
- applied and basic research at different levels (private and public) and in different countries;
- the low cost of production factors (land, inputs and labour) which gives Latin America a comparative advantage over other locations.

A great difficulty in developing a niche crop derives from the fact that even with a broad retail acceptance, it might take years before sales will cover initial product development cost. The

private sector hesitates to invest in new crop research and development, which is necessarily long term and high risk, and adapters and users intentionally wait until the profit potential and margins are more obvious and less risky before investing in new crops (Jolliff, 1996). As a result, potentially viable new crops such as cherimoya have not been developed to the point of profitability for the private sector. Governments should therefore fund crop improvement programmes, at the level of selection and breeding, and should stimulate universities and scientists to collaborate with the private sector. Especially in the context of low opportunity costs for land and labour, and in the presence of diverse plant genetic material from which to breed and develop new cultivars together with the proper scientific expertise and technology, it should still be possible to develop cherimoya into a solid income-generating commodity. According to Jolliff (1996), the loss of income opportunities through the lack of new crop development not only has severe socio-economic consequences to farmers and rural areas, but is also extremely costly to taxpayers, especially when all the basic conditions for developing the crop are present. Therefore the public sector, international donor agencies and non-governmental organizations should all combine efforts and invest money in the development of cherimoya.

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