



DFID Department for International Development



Fruits for the Future Annona

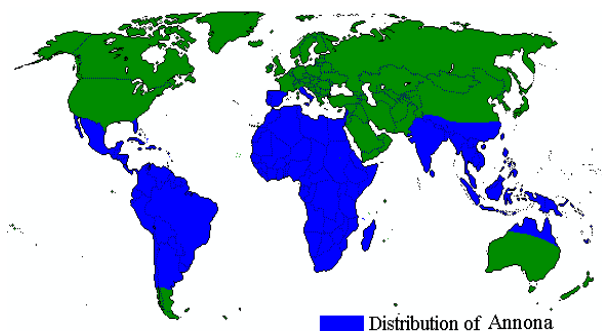
International Centre for Underutilized Crops.

Factsheet No. 5. March 2002



What is Annona ? - Annona is a genus of tropical fruit trees belonging to the family Annonaceae. There are approximately 119 species of which 7 and one hybrid are grown for domestic/commercial use. 5 species have been selected as important under-utilised species (and are therefore included in this factsheet), 3 are commercially important *Annona cherimola* (cherimoya), *A. muricata* (soursop, guanabana) and *A. squamosa* (sweetsop, sugar apple), and 2, *A. reticulata* (custard apple, bullock's heart) and *A. senegalensis* (wild soursop) are used locally. Most species are shrubs or small trees, with height varying from 5-7.5m, having erect or

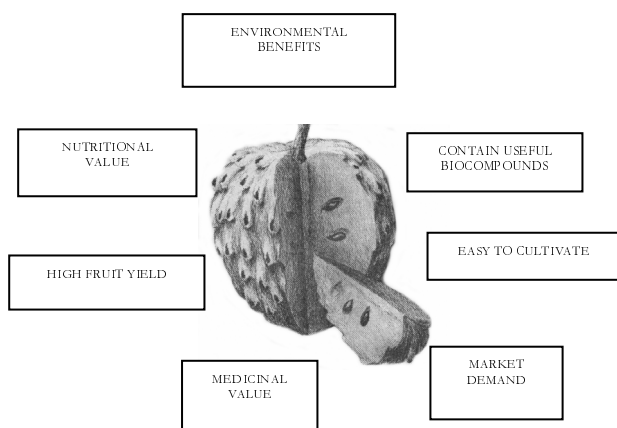
spreading crowns and a grey-brown, rough and corrugated bark. The stems are covered with a fine layer of hairs when young, later becoming smooth. With few exceptions, annonas are deciduous, even the tropical species, especially when cultivated in areas with a pronounced dry season and without irrigation. The fruits vary from species to species with differences in shape (round/oval/oblong/heart-shaped), size (between 2-3 cm up to 30 cm) and colour (mostly green though some cultivars are pink or red). The ripe fruit is called a syncarp. The primitive fruit form has spirally arranged carpels (female structures in the flower), resembling a raspberry, with each segment of flesh surrounding a single hard, black seed. Fruit size is generally proportional to the number of seeds within. The flowers are pollinated by insects, although fruit production is usually very poor. Production of many good quality fruits relies largely on hand pollination.



Distribution of Annona

Where does Annona grow ? - Of the 5 species covered in this factsheet, 4 are thought to have originated in Central and South America (cherimoya, soursop, sugar apple and custard apple) and 1 in East Africa (wild soursop). The first 4 species are now widely distributed and can be found growing, cultivated or naturalised, throughout the tropics. Wild soursop is still restricted to Africa. All species grow well in tropical climates, at high or low altitude and on a range of soil types. As they do not tolerate waterlogging, soils have to be well drained. Rainfall requirement ranges between species, from as low as 600 mm (for wild soursop) to 2000 mm (for the more tropical soursop). Soursop is the most tropical species and requires a moist,

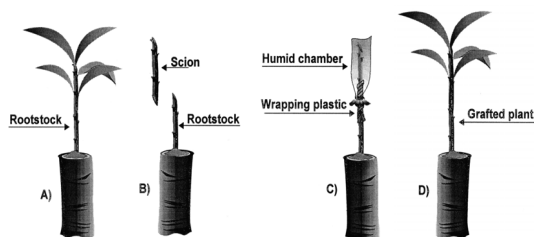
warm climate for good fruit production. Cherimoya has its origins on the highland plateaus of the Andes and is better adapted to cooler, drier, subtropical climates, producing a good fruit yield in the Mediterranean (Spain, Italy, Egypt, Israel), southern California, South Africa, Argentina and Chile. Sugar apple grows well in moist tropical climates and in drier, subtropical climates. It is the most drought tolerant of the species and does not fruit well in high rainfall situations. It is more resistant to low temperatures than soursop and more tolerant to high temperatures than cherimoya.



Why should you grow Annona ? - Annona is a multipurpose tree. The fruits are consumed widely and the tree is also a source of medicinal and industrial products. The fruits contain vitamin C and minerals such as calcium, phosphorous and potassium. They are also an excellent source of energy as they are high in carbohydrate. Annona trees can give an average fruit yield of 50-100kg/tree and the commercial life of a tree is about 15 years. They are generally small trees or shrubs, which makes maintenance and fruit harvesting easy. The trees are easy to cultivate, require comparatively little care and do not suffer from serious pests and diseases.



Economics of Annona - Annona trees can be categorised into two groups. In the first group are custard apple and wild soursop. Fruit quality is generally low and trees are grown by subsistence farmers under smallholder conditions, producing a low but important income to their growers. The second group includes cherimoya, soursop and sugar apple, which are grown on commercial farms as highly remunerative crops for both small and medium scale farmers. No economic information is available at present for the species in the first group. Commercial cherimoya production occurs mainly in Taiwan, Spain, Peru and Chile, with Spain, Taiwan and Chile being the world's largest producers. Estimated world production of cherimoya in 1994 was 213,500 hectares producing 81,000 tons of fruit. This has now been greatly exceeded as Chile alone produces in excess of 213,000 tons for export and 8,000 tons for the internal markets. Soursop is cultivated in several countries including Angola, Brazil, Colombia, India, Mexico, Panamá, Peru, Puerto Rico and Venezuela. Due to an increasing demand for both fresh and processed soursop, Mexico increased its soursop production area by 88% from 1990 to 1996. This reflects a large increase in market demand. The area of sugar apple production in the Alagoas state of Brazil also showed an increase of 63% between 1995 and 1996. This growth was due to the increasing demand for sugar apple in the north-eastern Brazil market. Like soursop, the development of agroindustry and reasonable price of fresh fruits have encouraged sugar apple growers to expand their cultivated areas in the Americas.



How do you grow Annona ? - Annona can be grown from seed and by vegetative propagation. Seeds germinate unevenly and irregularly. Germination can take a long time due to variability of seed dormancy; propagation by seed can therefore be difficult and as a result seed-produced plants are usually only used as rootstocks. Soaking of the seeds in gibberelic acid or distilled water can help break dormancy, but scarification techniques can facilitate fungal attack, which reduces germination. Seeds should be sown in seedbeds or pots at 2cm

depth, 1-3cm spacing and 10cm between rows. The soil should be well-drained. Vegetative propagation is the usual way of propagating Annona as it is relatively easy and convenient, and the time to tree maturity is shortened. A number of different methods can be used, but budding and grafting are the least expensive and easiest methods to adopt. Both methods involve the removal of a bud or graft-wood from an elite mother tree and grafting it to a compatible seedling rootstock. Budding involves the removal of a small patch (bud) from the stem or a branch of the scion, which is then attached, using polythene tape, to the rootstock. When the bud begins to grow, budding has been successful. Grafting involves the joining of scion to rootstock when both are approximately 1cm in diameter and the union is again bound with tape. When there is a new flush from the scion, the graft has been successful. The trees will bear in 3-5 years.



What are the uses of Annona ? - Annonas are generally consumed as fresh fruits, but are also widely used in semi-processed and processed products. Cherimoya is mostly eaten fresh because of its superior taste. It has been the most well researched of the 5 species and is exported to international markets worldwide. Soursop fruit is much larger than the other species and is ideal for processing due in part to the high recovery of pulp, and also because of its properties, especially the exotic taste and smell. Products such as juice, jam and ice-cream are widely commercialised in latin America and occasionally exported. The fresh fruit does not travel well. Sugar apple is seldom processed as most fruit is consumed fresh. However, when it is processed, it is used to prepare drinks, fermented liquors and ice creams. The fresh fruit of custard apple is considered to be of poor quality and of little commercial importance. However, like all annonas, chilling improves the flavour. There have been no reports of processing of wild soursop; the fresh fruits are sold in local markets in Africa. All species can produce seed oil. Essential oils extracted from soursop (pulp) have industrial applications and the oils are also thought to improve the flavour of processed fruit products. A large number of chemical compounds, including flavonoids, alkaloids and acetogenins, have been extracted from annona seeds and many other parts of the plant. Flavonoids and alkaloids have shown insecticidal and antibacterial properties, and have been used for treatment of medical conditions, such as skin disease, intestinal worms and inflammation of the eye. All species are used in traditional folk medicine, however pharmaceutical products have been developed for the international market. Acetogenins are thought to have anti-HIV and anti-cancer effects. A wide variety of products have been developed and are available for cancer treatment*. Research is on-going in these areas and although there have been some promising results, further research is necessary. Other uses reported from annonas are the timber for wooden implements, e.g. tool handles and pegs, and for the production of a yellow/brown dye. Annonas offer the potential for agroforestry, although this potential is seldom exploited.

* Self medication should not be practiced based on information in this factsheet.

Further Reading

Nakasone, H. Y. and Paull, R. E. (Eds.) (1998) Tropical Fruits. CAB International, Oxford.

Pinto, A. C. de Q. *et al.*, (in preparation) *Annona*. ICUC, Southampton, UK

Pinto, A. C. de Q. *et al.*, (in preparation) *Annona Extension Manual*. ICUC, Southampton, UK

Salunkhe, D. K. and Desai, B. B. (Eds.) (1986) Postharvest Biotechnology of Fruits, Vol. II. CRC Press Inc, Florida, USA.

Vogt, K. A (1995) Common Trees and Shrubs of Dryland Sudan. SOS Sahel Int. (UK), London.