

Sapota Cultivation in India

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Introduction:

Sapota (*Achras sapota* L. syn. *Manilkara achras* (Mill) Fosb. syn. *Achras sapota*, L. Family, Sapotaceae) popularly known as *chiku* and also commonly known as the sapodilla, is a long-lived, evergreen tree native to southern Mexico, Central America and the Caribbean. It is native of southern parts of Mexico and now it has been adopted in many countries of tropical and subtropical climate. Sapota is cultivated in many countries of tropical and subtropical climate. India is the leading producer of sapota in the world with an annual production of 1.294 million metric tons and accounts to about 10 % of world production. The popularity of the crop is increasing due to high production per unit area and continuous fruiting throughout the year. In India, It has become most popular fruit crop in Gujarat, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Kerala. The fruit is a good source of digestible sugar (12–18%) and an appreciable source of protein, fat, fibre and minerals, Ca, P and Fe. The fruit is commonly known as *chikku* in India and mainly cultivated for its fruit value; while in some

countries like Southeast Mexico, Guatemala, it is commercially grown for the production of chicle that is coagulated milky latex obtained from the bark of sapota tree. Which makes it an excellent laxative. Sapota juice showed free radical-scavenging potential due to the presence of a number of radical scavengers of different classes, viz., phenolics, carotenoids, and ascorbic acid.

Soil and Climate:

Sapota tree is a hardy perennial and evergreen tree and can be grown on wide range of soils ranging from sandy loam to clay loam with pH 6.0-8.0 are ideal for its sapota cultivation. Drainage is most important. There should not be a hard pan in the sub-soil. Deep and porous soils make a good growth. Sapota can tolerate the presence of salts in the soil or in irrigation water to some extent. Sandy soil is not suitable for sapota cultivation as they do not provide a strong anchorage to the tree and are liable to be uprooted by the strong winds. Sapota, a crop of tropical region, needs warm (10°–38°C) and humid (70% relative humidity) climate where it flowers and fruits

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throughout the year. However, if taken to subtropics or higher elevation like in Punjab and Haryana, it gives only one crop from summer flowering in April and May. Under moisture-stress also, it produces one crop only. Rain or cloudy weather is in no way harmful to the setting of fruit, but a high temperature above 40°C during the summer may cause dropping of flowers and scorching of the fruit. The optimum temperature for its cultivation is between 11 and 34 degree centigrade.

Varieties:

Kalipatti : It is cultivated for table as well as for processing purpose. It has dark green, broad and thick leaves. Fruits are oval in shape, less seeded, sweet, mellow flesh of excellent quality. Frangrance is mild, main harvest in winter. Widely grow in Maharashtra, Gujarat, Karnataka, Odisha, West Bengal, Madhya Pradesh, Chhattisgarh, Tamil Nadu etc.

Pillipatti: It is suitable for high density platation, fruits oval with rough surface, pulp gritty, medium sweet, and average fruit wt.150-200g, cross between Kalipati x cricket ball from Periyakulum. Mostly grow in Maharashtra, Gujarat etc.

Cricket Ball: It is also known as Calcutta Large. Leaves are light green. This bears the largest sized fruits which are round in shape. The pulp is gritty, granular and not very sweet. Tamil Nadu, Maharashtra, West

Bengal, Andhra Pradesh, Karnataka, Haryana, Gujarat, Odisha, West Bengal, Madhya Pradesh, Chhattisgarh etc. are the major producer states of sapota.

Co 1: It is a hybrid between Cricked Ball Oval varieties, start bearing after four year of planting. Fruits are large, oblong, and sweet; fles is reddish brroun and suitable for table purpose. Fruit weight is 125 g and TSS 18 °brix.

Co2: It is selection from Baramasi, suitable for table purpose. Tree is medium in height, fruit olong round, medium sized, and flesh soft juicy, sweet, gritty, light brown in colour with pleasant aroma, TSS 23 °brix with average fruit wt.125-150g.

Co 3: It is a hybrid between Cricket Ball and Vavivalasa. Trees are of intermediate stature. Bearing commences from the fourth year of planting. Fruit are dull broun, oblong sweet with an average annnunal yield of 157 kg fruits/tree.

PKM 1: It is clonal selection from Guthi which is suitable for table purpose, profuse in bearing, and fruits are medium sized, round or oval or elliptical or oblong shaped with thin skin. The pulp has buttery consistency and rich in sugar, TSS 23 °brix.

Flowering and Fruiting:

Under tropical climate sapota flowers throughout the year, with two main seasons i.e July-November and February-March. In sub-

tropical conditions it also flowers twice in October- November and April-May. The flowers are protogynous in nature i.e., stigma of the ovary becomes receptive earlier than the stamens produce pollen. Hence, Sapota is cross-pollinated crop. There is sufficient fruit set but retention is low. This may be due many reasons; particularly low auxin level in ovary just after fruits set or due to sudden change in temperatures in December (low temp) and in May-June (high temp). The fruit retention can be improved by spraying GA @ 100ppm at full bloom and fruit set, or NAA @ 300ppm twice. It takes over 10 months for full maturity of the fruit. Sapota is a climacteric fruit and can be harvested when fruits are still hard.

Propagation and Rootstock:

Sapota is propagated through seed, which has been the basis of its variability in India. But inarching using *rayan* as rootstock, air-layering and softwood cuttings, using IBA (2,000ppm) treatment are successful methods of propagation. However, plants raised through air-layering or cuttings establish poorly and are vulnerable to wind damage. However in west-coast, air-layering is common and such plants perform better in shallow soils. For air-layering, 1–2 years old 45–60cm long juvenile matures shoots of pencil thickness with plenty of healthy dark green leaves are selected. On the base of such shoots a ring of bark (2.5–3cm wide) is removed on which IBA + NAA

(10,000ppm) each in lanolin paste is applied, covered with rooting media like sphagnum moss, vermiculite or garden soil and wrapped with plastic. In 3 months, roots emerge, then layers are slowly separated and establish in nursery.

Planting Time and planting distance:

Since sapota is a crop of warm and humid tropics, it can be planted in any season provided irrigation facilities are available. But it is beneficial to plant the grafts in beginning of the rainy season. In areas having heavy rainfall, it can be planted in September. In light soils, pits of 60cm × 60cm × 60cm size, whereas in heavy and gravely soils pits of 100cm × 100cm × 100cm size are made in April–May and exposed to sun for 15 days. Top 30cm soil is mixed with equal quantity of well-rotten compost or farmyard manure, 3kg superphosphate and 1.5kg muriate of potash are used for pit filling.. Since sapota tree makes uniform all-round growth, square system of planting is recommended. However, in land with 5–15% slope, contour planting is recommended. Depending on growth habit, sapota orchards are planted at 10m × 10m but being slower in growth, it takes longer period to occupy allotted space. Therefore, high-density plantations having 5m × 5 m spacing up to the age of 13 years are very remunerative. Thereafter yields begin to decline.

Nutrient Management Manuring and Fertilization:

Owing to evergreen nature of the plant, any inadequacy in its nutrition leads to sub-optimal yield. Deficiency of N leads to yellowing of leaves from margin to mid-rib. The P-deficient plants have purplish flecks on lamina with rusty pigmentation all over and inadequacy of K is marked by development of chlorotic symptoms along leaf margins which become dark grey in advanced stage. Zinc deficiency is marked by small and erect leaves, short internodes and defoliation of terminals, whereas in calcareous soils Fe deficiency causes general yellowing of leaves with premature shedding. A dose of 50kg farmyard manure, 1000g N, 500g P₂O₅ and 500g K₂O/tree/year is optimum. This quantity can be regulated on the basis of age of tree and status of nutrients in soil especially of P and K. Under rainfed conditions, dose of N should be raised to 1.5kg/tree. Castor cake is beneficial for high-quality fruits. Under rainfed condition, fertilizers should be applied before the onset of monsoon. However, under irrigated conditions it should be applied in 2 splits. Total quantity of organic manure and half of chemical fertilizers should be applied at the beginning of monsoon and remaining half in the post-monsoon period (September–October). Since 90% of active roots are distributed within drip up to a depth of 30cm,

nutrients should be applied under tree canopy and mixed thoroughly in soil up to a depth of 15cm. In Zn and Fe deficiency, the requirement should be met through application of organic manures and spraying of ZnSO₄ and FeSO₄ (0.5%). After planting no fertilization is given for the first year.

Irrigation:

Sapota is grown both under irrigated and non-irrigated conditions. Sapota requires irrigation at 30 days interval in winter and 15 days in summer. Adoption of drip irrigation system is also beneficial, saving 40% water with 70–75% higher net income. This system should be laid out with 2 drippers spaced 50cm from tree during initial 2 years and 4 drippers at 1m from tree until 5 years of age. With dripper discharge rate of 4litres/hr, the system should be operated for 4 hr during winter and 7 hr during summer on alternate days. Under short supply of water, timing could be 3hr and 30minutes in winter and 5hr and 40minutes in summer.

Training and pruning:

A seedling tree grows excellently giving a shape of an umbrella. However, plants raised through inarching require training for appropriate shape and framework development. No definite system of training has been developed for sapota. Most trees are trained in central leader system. Sapota being an evergreen tree requires no regular pruning

but regulation of vegetative growth to improve productivity and quality of fruits is necessary. At times thinning of branches is affected in old plantation. Pruning in sapota is confined to open the tree to light, and removal of dead and diseased branches.

Harvesting:

Sapota takes about 7–10½ months from anthesis to maturity of fruits depending on variety and climate. Fruits follow double sigmoid pattern of growth. Properly developed fruits have high TSS and sugar, and reduced acidity, astringency, latex and vitamin C. Maturity is decided on the basis of ease with which brown scuff gets off the fruit surface and development of yellowish tinge intermixed with corky-brown colour on the surface of the fruit. At this stage, practically no green tissue and milky latex are seen on fruits when scratched with nails. The fruits are hand picked or harvested with special harvester which has a round ring with a net bag fixed onto a long bamboo. Depending on management level, 15–20 tonnes fruits are harvested from a hectare.

Insect:

Leaf webber

Caterpillar webs and feed on leaves by scrapping chlorophyll content. Caterpillar also bores into flower buds and tender fruits leading to withering and shedding. Neem seed kernel extract (NSKE) 5 %, collect and destroy

diseased and insect infected plant parts. Provide irrigation at critical stages of the crop, Avoid water stagnation.

Mealybug:

Mealybugs are soft pinkish-white insects with a waxy appearance. Adult females are soft-bodied, wingless insects that grow between 1/20 and 1/5 inch long. Mealybugs lay large clusters of several hundred eggs on the surface of a leaf, which then hatch into yellow nymphs, which feed on plant sap. After two weeks release 20 predatory beetles viz., *Cryptolaemus montrouzieri* beetle per tree.

Fruit fly:

Maggot bore into semi-ripen fruits with decayed spots and dropping of fruits. Oozing of fluid, Brownish rotten patches on fruits. Collect fallen infested fruits and dispose them by dumping in a pit and covering with soil. Raking the soil around the tree to expose the pupa, Monitor and mass trap the fruit flies with methyl eugenol traps. Use bait spray combining any one of the insecticides and molasses.

Disease management:

Leaf spot:

Numerous, small, circular, pinkish to reddish brown, conspicuous spots with whitish center on mature leaves • Spots coalesce and leaves drop prematurely.

Sooty mould:

It is a fungal disease developed on honeydew-like excretion secreted by aphids and scale insects. The fungus slowly covers the entire leaf area severely affecting the process of photosynthesis. This results in reduced translocation of food to the fruits, which leads to reduction in their size.

