



## Cape Gooseberry - Gold Yielding Berry

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Cape gooseberry (*Physalis peruviana*) L. is the minor fruit crop in India belongs to the family solanaceae. It is grown as perennial in tropical and subtropical region and as annual in temperate regions. It was originated from South America Andes where it was first commercialized in 1985 and it has been widely introduced into cultivation of other tropical, sub-tropical and even in temperate areas. It is said to succeed wherever tomatoes can be grown.

It is grown as cash crop in the form of sole crop, intercrop along with perennial fruit orchards and kitchen garden for their cherry size, attractive golden yellow and delicious fruits. It is also commonly called as Poha or Poha berry in Hawaii, Golden berry in South Africa and *Rashbhari*, *Makoi* or *Tepari* in India, winter cherry and ground cherry in English. Cape gooseberry is a short shrub that reaches to a height of 50-100 cm and can spread up to 4 meters wide. The flowers are self-pollinated. This crop bears globular fruits, each enclosed in inflated calyx, which become papery on maturity when ripe and weighs between 3.5 to 10g and has a diameter of 1 to 2.5cm. Fruit ripens best when it is still attached with plant. As the fruits ripen, they begin to drop on ground. *Physalis peruviana* fruit has a unique and pleasant flavor which constitutes its main sensory strength. The ripe fruits are eaten as such and used in making excellent quality of jelly, sauces and particularly jam for which it is called as the "Jam Fruit of India"

The Cape gooseberry deserves special attention particularly due to its availability in lean period, wide adaptability, quick growing in nature, high productivity, non-perennial occupation of land and delicious fruit with pleasing acetic taste.

Horticulture point of view, this fruit is a profitable commercial crop for arid regions also and does not require much effort and investment for cultivation. Despite being a nutraceutical and a medicinally important crop, its utilization is not up to the mark. Being a highly promising, remunerative and short duration fruit crop, the Cape gooseberry would be viable option for marginal and small farmers in India. There is untapped potential for increasing the range of food products suitable for human consumption. Farmers should be encouraged for commercial cultivation of locally available plant species which yet to be recognized as a crop.

### Market potential

Colombia is the main producer and exporter of Cape gooseberry in the world, but in the last years, Peru has become one of the main producers. In 2020, Peru exported 278 tons (240.79 tons organic Cape gooseberry and 46.21 tons conventional Cape gooseberry), equivalent to 2.6 million USD, to markets in USA, Netherlands and Germany (MIDAGRI, 2020).

## Nutritive value of Gooseberry

It is a good source of vitamins A, C & B and iron. It is high in protein and phosphorus compare to other fruits. The fruits are rich in alkaloids, flavonoids, carotenoids and bioactive compounds considered functional ones.

## Nutritional value per 100 g edible portion

It is a good source of vitamin A 720 IU, Energy 53 kcal, Carbohydrates 11.2g, Fat 0.7g, Protein 1.9g. It also contains Thiamine (vit.) 0.11mg (10%), Riboflavin (vit. B2) 0.04mg, Niacin (vit. B3) 2.8mg (19%), Vitamin C 11mg(13%) and minerals like Calcium 9mg (1%), Iron 1mg (8%) and Phosphorus 40 mg(6%) **Source:** Food Data Central (FDC) USDA (2019).

## Uses of Gooseberry fruits

The fruits can be eaten as fresh and dried. It is ideal for snacks, pies and jam making because of rich in pectin with mildly tart flavour. It is also used puddings, chutneys, ice cream and also relished in salads and fruit salads. In Colombia, the fruits are stewed with honey and eaten as dessert. It has been utilized traditionally as a therapeutic (antispasmodic, diuretic, antiseptic, sedative, and analgesic) and nutraceutical herb. It contains numerous active components like essential minerals,  $\alpha$ -linolenic acid, iron, vitamins, carbohydrates, phytosterols etc. It has potential as a multi-functional agent in beverages, foods and nutraceutical industries. The berries can be dried into tasty "raisins" or used as a garnish.

## Medicinal uses of Gooseberry

The leaf decoction is used as diuretic and antiasthmatic. It is popular as a folk medicine in Taiwan and used for treating cancer, leukemia, hepatitis and rheumatism diseases. Cape gooseberry juice regulates cholesterol levels and protects the liver from oxidative stress.

## Soil and Climate

The crop seemed to be widely adapted to varying agro-climatic and soil conditions. It- can thrive in mild cold upto 5°C and higher temperature (35°C); however, temperature around 18-21°C is thought to be ideal for crop. It can withstand low temperatures but irreparable damage happens below 0°C. Very high temperature & affects flowering and fruiting. It prefers sunny situations. It must have high water requirement at initial stages but not in fruiting stage.

It is a plant with high potential, as it grows in poor soils with low requirement of fertilization. It thrives best in slightly acid soil, although it tolerates well pH values between 5.5 and 7.3 with good organic matter content and rainfall between 1000 and 2000 mm. It does not tolerate clay soils because it has superficial roots.

## Propagation

In most of the cases plant is widely grown through seeds. Cuttings measuring 10-25 cm long treated with rooting hormones give more success than layering. it is commercially propagated by seed and stem cuttings.

The common practice of gooseberry propagation is through seed that is used to produce seedlings. It is important to note that seedlings propagated from seed are vigorous. Cape gooseberry seed are hardy seed with a high germination percentage (85% - 90%). The seed germinate 7 to 15 days after planting when day temperatures range between 22 to 28°C and night temperatures between 7 to 13°C.

Seeds are sown in raised seed beds. Seeds are sparsely placed on the surface of soil in rows 2 inches apart. Sprinkle a thin layer of soil and gently water with mist or a very light sprinkle. It is optional to place a thin layer of coarsely cut grass. Seed can also be planted in pots on finely cut moist coco-peat at least 4 inches thick. Sprinkle a shallow layer of coco-peat and lightly water. If practicing rain-fed, begin raising the seedlings on seed-bed in between February - March and allow for 6 weeks for field planting. Seeds can also be planted

in plastic seeding trays/flats filled with coco-peat. Put two seeds per cell and once germinated allow them to grow on the tray up to a height of 15 cm.

### **Propagation using stem cuttings**

In case of stem cuttings, sections with 3 to 4 nodes are used. The young stem sections are cut late in the afternoon and dipped in a rooting hormone. These cuttings are planted in soil prepared at a depth of 1 inch. Stem-cuttings tend to flower earlier and provide good yields although less vigorous than those propagated from seed.

About 150-200g seed is enough for one hectare planting.

### **Preparation of land and planting**

Land is prepared by 2 to 3 times ploughings are practiced to a fine tilth followed by harrowing thus avoiding big clumps of soil. Amend the soil by adding and thoroughly mixing 10 tons of FYM per hectare. Prepare raised beds with optimum spacing. First laid down the drip laterals on the raised beds then test the water flow, damages and pressure. Finally cover the raised beds with 25 micron polyethene sheet. Then make holes according to spacing.

The spacing or plant population per unit area play decisive role with regards to obtain optimum growth of plant and high yield. Plants grown at very closer spacing may cause over crowding and affect the reproductive growth of plant while wider spacing could be under utilization of solar energy, nutrients and other resources.

Use a spacing of 3-4 feet (0.9 -1.2 meters) within the row and 5-6 feet (1.5 – 1.8 meters) between rows.

Gooseberry seedlings are transplanted when they attain 10 to 20 cm tall. Manage weeds by lightly weeding with a hoe. The plants should be irrigated regularly to avoid moisture stress. Under dry/drought conditions, the plants become dormant and abort all the flowers. To ensure continuous production, the plants should be continuously watered.

### **Fertilizer**

The fertilizer application is of immense importance for soil fertility management and it is more responsible for realizing the higher yield. The first crop of gooseberry does not require any addition supplemental fertilizer. For the second year supplemental fertilizer should be applied at the rate of 100 kg nitrogen, 60 kg of phosphorus and 60 kg of potassium per hectare. Application of a foliar spray of 1% potassium chloride before and just after blooming enhances fruit quality. Potassium promotes flowering and fruit set and calcium is important for tissue and calyx formation. Boron is also required for improvement of TSS content of fruit. It is important to note that optimal yields can be attained with minimal or no fertilizer.

### **Training and Pruning**

Plants can be allowed to grow and spread on the ground or trained on a trellis. If a trellis is used, then the spacing between the rows is 1.5 meters. The plant canopy (new shoots) can be pruned to trigger lateral branch formation for increased area (bushiness) for fruit formation. Pruning can also open the canopy to allow for more penetration of light, thus enhancing fruit quality. Gooseberry plants are also pruned just before the beginning of the rainy season to stimulate multiple branching.

### **Flowering and Fruiting**

Cape gooseberry is a self-pollinated plant. The flowers are hermaphrodite meaning that they have both male and female organs in the flowers. Plants will begin to flower 4 to 6 weeks after transplanting or when plants have formed 12 to 13 internodes. Flowering and fruiting of gooseberry depends on variety and agro-ecological zone. Gentle shaking gooseberry plants trained on a trellis can promote pollination. It has been reported that lightly spraying the plants with water can enhance pollination.

## Pest and Diseases

The most important of the many insect pests that attack the Cape gooseberry are cutworms, in seedbeds. In India, mites may cause defoliation and it can be controlled with the spray of wettable sulphur @ 1.5 gm/liter water. The most diseases are powdery mildew and leaf spot and it can be controlled with the spray of wettable sulphur @ 1.5 gm/li water and 0.4% Filton at 15 days interval. The plants are prone to root rots in poorly- drained soil or if carried over to a second year. Therefore, farmers favour biennial plantings. In India, a strain of tobacco mosaic also affect crop.

## Harvesting and yield

Cape gooseberry fruits are harvested at 60 to 100 days after flowering or when the calyx has a tan (straw colour) or light-brown colour. When the calyx driers, the fruit ripen and become sweet. The colour of the fruit also changes to yellow-orange when ripe. Gooseberry may also be harvested when the fruit has a green-yellow colour and allowed to ripen. Gooseberries will continue to bear for 2 years if maintained well. One fruit weighs about 10 g thus each plant produces 1-5 kg per season. Yields are about 5-7 t/ha in the first calendar year, rising to 15 t/ha in the second and dropping to 10 t/ha-1 in the third and fourth years if the crop is maintained for that long.

The fruits are usually picked from the plants by hand at every 2 to 3 weeks, although some growers prefer to shake the plants and gather the fallen fruits from the ground in order to obtain those of more uniform maturity. In rainy or dewy weather, the fruit is not picked until the plants are dry. Berries that are wet should be dried in the sun for a short time. The harvested fruits are picked in traditional baskets or crates, etc. Harvested fruits should be put under shade or protected from direct sunshine. Grading should be done based on the size and colour.

The yields of this plant are influenced by agro-ecological zones, variety, soil-type, soil nutrition management and crop management practices. Water level and soil nutrition affect taste and sugar content of this crop. The average yield observed in Kenya is 5-8 tons per hectare.

## Storage and Marketing

The fruit is climacteric and the berries continue to ripen after picking with climacteric peak occurring 12-14 days after harvest. Cape gooseberry should be harvested using plastic crates that are clean and dry. The fruit should be stored under shade in a fully aerated room. It is recommended not to remove the calyx until ready for use. Fruits with intact calyx have a shelf-life of 4 to 6 weeks at room temperature in a well aerated room. For prolonged storage, gooseberry fruits can be stored at 2-4°C for 4 to 5 months.

Fruits are sold at farm-gate, on the road side, village markets and grocery shops, supermarkets. The calyx is removed from fruit for some markets. This fruit should be stored at 6 to 10°C and sold within a week. Since this is a newly commercialized fruit, the cost has not stabilized.

## Seed collection

Squeeze fresh fruits contents on an absorbent paper or cloth. The juice will soak in the absorbent material and leave small seeds on the surface. Dry the seeds under shade for one to three days and then plant or store them in a paper bag, in a cool dry place.

Another way is to squeeze the fruit in a plastic bag to extrude the content including seed. Repeatedly press the fruit until it is completely pulped. Add water and pour into a larger bowl. Shake gently whereby upon settling, the seed will sink to the bottom (see picture above). Gently decant (pour off) the fruit debris. Wash the seed three times, gently pouring

off the debris. Place the wet, well-drained seed on a tray and let it dry under shade for 3 to 5 days. Store the seed in a paper bag, in a cool dry place.

