

CAPE GOOSEBERRY: POTENTIAL UNDERUTILIZED BERRY FRUIT OF INDIA

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ABSTRACT

Cape gooseberry (Physalis peruviana L) is an underutilized berry fruit grown in small pockets of Uttar Pradesh, West Bengal, Madhya Pradesh, Punjab and Jammu & Kashmir. It is a semi-shrub, semi-perennial in nature. Fruit is consumed fresh, dried to make raisins, and added to different functional foods. This berry fruit is highly nutritious, rich in vitamins, minerals, antioxidants and other bioactive compounds and has anti-diabetic, anti-cholesterolemic, hepato-protective, anti-inflammatory, and immunomodulatory properties. There is limited germplasm of Cape gooseberry available in India. There is an urgent need for germplasm introduction, cultivar selection, and to expand the area under cultivation for crop diversification and to ensure nutritional security.



INTRODUCTION

Physalis peruviana L. is a minor berry fruit of India belonging to the family Solanaceae. It is indigenous to the South American Andes, which include Peru, Brazil, Chile, Ecuador, and Colombia (Fischer and Melgarejo, 2014). This fruit was named after the "Cape of Good Hope" in South Africa, where it was first grown for commercial purposes (Chattopadhyay, 1996). It is also known by several names such as gigantic ground cherry, African ground cherry, Peruvian ground cherry, Peruvian cherry, Pok Pok (Madagascar), (Hawaii), Rasbhari (India), and many others. The berries are flavorful, tiny, lustrous, bright orange, sensitive, and encased in a calyx (a protective husk) (Puente et al., 2011). It has a high moisture content (78.9 g/100 g), protein (0.05-0.3 g/100 g), lipid (0.15-0.2 g/100 g), carbohydrate (19.6 g/100 g), fibre (4.9 g/100 g), ash (1.0 g/100 g), calcium (8.0 mg/100 g), phosphorus (55.3 mg/100 g), iron (1.2 mg/100 g), carotene (1.6 mg/100 g), thiamine (0.1 mg/100 g), riboflavin (0.03 mg/100 g), niacin (1.70 mg/100 g) and ascorbic acid (43.0 mg/100 g) (Hassanien and Morsel 2004). Uttar Pradesh, West Bengal, Madhya Pradesh, Punjab, and Jammu & Kashmir are the Indian states where it is grown. Farmers choose this fruit because of its attractive appearance, delicious flavour and scent, nutritional benefits, and high production per unit area. This fruit crop deserves special attention due to its tolerance to various agro-climatic and soil conditions, rapid growth patterns, high productivity, non-perennial occupation of land, and availability during the lean season,

BOTANY

Cape gooseberry is a semi-shrub between 1 and 1.5 metres in height with an erratic growth pattern and a semi-perennial nature that typically develops four upright, fruitful branches. The plant attains commercial fruit production during the first 18 months of the crop. Simple, heart-shaped, alternating, and pubescent leaves shield the plant from strong UV radiation from the tropical highlands and abrupt fluctuations in day/night temperatures. The blooms are solitary, hermaphrodite, and have a cupuliform calyx with five persistent sepals and a yellow tubular corolla (or modified leaves). These come together to create a husk about 4-5 cm long that encloses the fruit and shields it until it reaches maturity from pests, UV rays, rain, hail, and cold. Due to the breakdown of its chlorophyll and the translocation of almost all of its carbohydrates, especially during the first 20 days of the fruit's development, it then transforms into a translucent and parchment husk. Fruit matures in about 60 to 80 days, depending on the agroecological conditions. The fruit is spherical, yellow-orange, 1.25 to 2.5 cm in diameter, and weighs between 4 and 10 grams. The fruit has up to 350 small, lenticular, flattened seeds, each weighing about 1.1 grams.



Cape gooseberry fruit tied in clusters



Cape gooseberry fruits separately

SOIL AND CLIMATIC REQUIREMENTS

Cape gooseberry can adapt to a wider range of climate and soil conditions. Being a warm-season crop, it needs a long growing season to generate satisfactory yields. It can be grown effectively up to 1200 m in northern India and up to 1800 m in southern India. Although it can tolerate moderate cold up to 5 °C and higher temperatures (35°C), it is believed that a temperature of about 21 °C is best for crops. The location should be bright, free of frost, and shielded from high winds for the plant. Because it is a delicate crop, it cannot sustain a severe cold. High humidity with high temperatures causes foliage diseases, and hot desiccating winds result in the dropping of blossoms (Phillip and Khan, 1952). Being a tender crop, it does not withstand a hard freeze. It can be grown in sandy to heavy clay soils and performs best in sandy loam, well-drained soil having adequate porosity for drainage and neutral pH (Chattopadhyay, 1996). Loams,

clay loams and silt loams are preferred over lighter soils for the long growing season. Low-lying areas with poor drainage are not suitable for this crop.

PROPAGATION METHOD

Cape gooseberries are frequently grown from seeds. Another method of vegetative propagation is cuttings or layering. Around 150 to 200g of seed is sufficient for a planting of one hectare. Under north Indian circumstances, seed sowing in raised beds begins in mid-June, and transplanting follows after about a month of sowing during the rainy season. Cuttings treated with rooting hormones and measuring 10 to 25 cm in length are more successful than layering.

USES

The fruit is either eaten fresh (in deserts, salads, and as a garnish on a variety of foods and pastries), dried to make raisins, or processed to separate the juice and pulp from the seeds and peels (Singh et al., 2019). The fruit and the juice/pulp fraction are used to prepare jellies, jams, fillings, dressings, etc., because of the high pectin concentration and gelling qualities. It is also added to novel functional foods like yoghurt, ice cream, reduced-sugar goods, and diabetic foods (Valdenegro et al., 2013; Hegazy et al., 2019).

NUTRACEUTICAL PROPERTIES

According to several researchers, the fruit of cape gooseberry is a rich source of vitamins, minerals, carotenoids, polyphenols, phytosterols, reducing carbohydrates, pectin and other polysaccharides, as well as many other classes of functional compounds (Rodrigues et al., 2009, Puente et al., 2011, Ramadan et al., 2011, and Yldz et al., 2015). Its myriad phytonutrients and bioactive compounds further support its anti-diabetic, anti-cholesterolemic, hepato-protective, anti-inflammatory, immunomodulatory, antioxidant, and other effects, making it a superior functional meal (de Carrasco and Zelada, 2008; Hassanien, 2011; Puente et al., 2011; Ramadan, 2011; Eken et al., 2014; Lal et al., 2019; Singh et al., 2019).

INSECTS, PESTS AND DISEASES

The mite is the major pest which attacks this crop and may result in defoliation, which can be prevented by spraying wettable sulphur at 1.5 gm/litre of water. Powdery mildew and leaf spot are the two most significant diseases and can be managed with a spray of wettable sulphur at 1.5 gm/litre water, and 0.4% Filton spaced 15 days apart. If the plants are in poorly-drained soil or are left over from a previous year, they are vulnerable to viruses and root rots. Farmers, therefore, prefer biannual plantings. A tobacco mosaic strain also affects the crop in India. If not repelled, hares harm young plants, and birds (francolins) eat the fruits.

CONCLUSION

The need for horticultural crop diversification is urgent, seeing the present scenarios of increasing population and also for farmers with small land holdings, particularly in hilly states of India. For these farmers, Cape gooseberry can be a very good option because it ripens quickly after planting, has a short lag period and can be used as an intercrop in orchards because of its small stature and bushy habit. As a result, it is crucial to spread this fruit to areas of the country where the agro-climatic circumstances appear to be favorable for its growth.

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