



A Case Study

Article history :

Received : 25.07.2013

Accepted : 25.11.2013

Potentials of cape gooseberry (*Physalis peruviana* L): An under-exploited small fruit in India

■ **ANGREJ ALI AND B.P. SINGH¹**

Members of the Research Forum

Associated Authors:

¹Department of Horticulture,
Narendra Deva University of
Agriculture and Technology,
Kumarganj, FAIZABAD (U.P.) INDIA

Author for correspondence :

ANGREJ ALI

Department of Horticulture,
Faculty of Agriculture, Sher-e-
Kashmir University of Agricultural
Sciences and Technology (K),
Wadura Campus, SAPORE (J&K), INDIA
Email : anghort@gmail.com

ABSTRACT : The genus *Physalis*, of the family Solanaceae bearing globular fruits, each enclosed in inflated calyx. A species, which bears superior fruit and has become widely known is cape gooseberry (*Physalis peruviana* L.) native to Peru and Chile and has been widely introduced into cultivation of other tropical, sub-tropical and even in temperate areas. It is a nutritive and high value small fruit; the food value is almost at par with other major fruit crops of India. In India, cape gooseberry has been in cultivation on very limited scale and considered as minor crop, mostly as annual crop in plains of north India. It is commonly cultivated as backyard crop and in peri-urban areas and sold in cities at very high prices. Cape gooseberry is a warm season crop and requires a relatively long season to produce profitable yields. Being a minor crop in India, scientific information on improved production technology like varieties, nutrition, water management etc. of this crop for different agro-climatic conditions are lacking. Although, crop has potential production of 10 tonnes ha⁻¹. This noble crop deserves special attention particularly due to its availability in lean period, wide adoptability, quick growing in nature, high productivity, non-perennial occupation of land and delicious fruit.

KEY WORDS : Cape gooseberry, *Physalis peruviana*, Production, Small fruit

HOW TO CITE THIS ARTICLE : Ali, Angrej and Singh, B.P. (2013). Potentials of cape gooseberry (*Physalis peruviana* L): An under-exploited small fruit in India. *Asian J. Hort.*, **8**(2): 775-777.

The genus *Physalis*, of the family Solanaceae consists about 80 species bearing globular fruits, each enclosed in inflated calyx, which become papery on maturity and look like Chinese Lantern. However, only four species are well known for the food value *i.e.* *Physalis peruviana*, *Physalis ixocarpa*, *Physalis pubescens*, *Physalis alkekengi*. Various species of genus *Physalis* have been subjected to much confusion in literature and trade (Morton, 1987). A species, which bears superior fruit and has become widely known, is cape gooseberry (*Physalis peruviana* L.). It is also commonly called as *Poha* or *Poha berry* in Hawaii, Golden berry in South Africa and *Rashbhari*, *Makoi* or *Tepari* in India (Gupta and Roy, 1980; Morton, 1987; Sarangi *et al.*, 1989). The name of cape gooseberry is most probably derived from the name of “Cape of God Hope” of South Africa where it was commercially grown (Chattopadhyay, 1996).

The cape gooseberry is reportedly native to Peru and Chile (Legge, 1974) and 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 (Morton, 1987). From nutritional point of view, its importance is not less than any other major fruit crops, as the edible portion of berry contains 11.5% carbohydrates, 1.8% protein, 0.2% fat, 3.2% fibre, 0.6% mineral matter and 49 mg ascorbic acid per 100g edible portion of fruit (Khan and Gowder, 1955). The fruit also contains carotene (as vitamin A 2380 I.U.) (Anonymus, 1969), pectin 0.9% (Majumdar and Bose, 1979) and vitamin P (the bioflavonoides) (Hayes, 1966). 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” (Majumdar, 1979). The fruits are also an attractive sweet when dipped in chocolate or other glazes or pricked and rolled in sugar.

The history of *Physalis* cultivation in South America can be traced to Inca Indians (Cailes, 1952; Legge, 1974). Cultivation in Europe started during the 1900s in United

Kingdom and later expended to South Africa, Australia and New Zealand; and as a minor fruit crop, it has also been widely grown throughout Asia, Africa, the United States and Carabians (Naik, 1949; Majumdar, 1979; Klinac and Wood, 1986). In India, it has grown as annual crop in plains of north India and as perennial crop in the hills of southern region. Being minor fruit crop, the information about area and production of this crop is lacking. However, it is grown successfully in several states like Uttar Pradesh, West Bengal, Madhya Pradesh, Haryana, Punjab, Nilgiri hills and other parts of country as more commonly in peri-urban areas and sold in cities at very high prices.

The cape gooseberry deserves special attention particularly due to its availability in lean period, wide adoptability, quick growing in nature, high productivity, non-perennial occupation of land and delicious fruit with pleasing acetic taste. The crop seemed to be widely adapted to varying agro-climatic and soils conditions (Prasad *et al.*, 1985).

Plant characteristics :

The cape gooseberries are herbaceous, soft wooded erect and somewhat vine shrubs. Plant has ribbed, often purplish spreading branches and nearly opposite on which, velvety heart shaped pointed leaves of 6-15 cm long and 4-10 cm wide appears regularly along the stem. Yellow pendulous flowers born in leaf axils having companulate hairy corollas with purple to brown spot. The flowers are self-pollinated but the pollination is enhanced by gentle shaking of flowering stems or giving the plants alight spray with water (Mortan, 1987). After the flower falls, the calyx expands, ultimately forming a straw-coloured husk much larger than the fruits encloses. Fruits ripe best when it still attached with plant (Poi, 1989). The berry is globose, smooth, glossy, orange-yellow skin and juicy pulp containing numerous very small yellowish seeds. As the fruits ripen, they begin to drop on ground. Generally fruit are harvested manually at frequent interval, which is considered to be most expansive operation in cape gooseberry production.

Production potential :

Cape gooseberry being a minor crop in India, scientific information on improved production technology of under varying agro climatic conditions are lacking. General and vogue recommendations have, however, been made by some workers (Phillip and Khan, 1952; Hayes, 1966; Singh *et al.*, 1977; Chattopadhyay, 1996). This fruit crop has wide adaptability for soil and climate requirements. Cape gooseberry is basically a warm season crop and requires a relatively long season to produce profitable yields. It is a tender crop and does not withstand a hard freeze. High humidity with high temperature favour the development of foliage diseases. Hot desiccating winds often results in the dropping of blossoms. High and low temperatures have been

shown to exert a marked effect on market quality. In northern India, it can be grown successfully upto an elevation of 1200m, while in south India it thrives well upto 1800m. The plant likes a sunny, frost-free location and sheltered from strong winds. It can thrive in mild cold upto 5^o C and higher temperature (35^o C); however, temperature around 21^o C is thought to be ideal for crop. Frosting or excessive desiccation is quite unsuitable for the crop (Phillip and Khan, 1952).

The cape gooseberry can be grown on soils from the sand to heavy clays (Morton, 1987). It can be grown in any well-drained soil of neutral pH but it does best in sandy loam soils having adequate porosity for drainage (Chattopadhyay, 1996). Loams, clay loams and silt loams are preferred over the lighter soils for long growing season. Research conducted at Narendra Deva University of Agriculture and Technology, Kumarganj Faizabad (UP) showed that it can also be cultivated in saline-alkali soil having pH 8.56. Furthermore, a well drained soil is essential for high production. Low laying areas with poor drainage is not suitable for this crop.

Very little information is available about the varieties except the annual and perennial types and some local names in various parts of India. Attention should be paid to classify the types in variety name (Chattopadhyay, 1996). In most of the cases plant is widely grown through seeds if desired to grow as annual crop; although, the perennial crop which can thrive for four years may be propagated by vegetative means (cutting and layering). About 150-200g seed is enough for one hectare planting. Cuttings measuring 10-25 cm long treated with rooting hormones give more success than layering. Under North Indian conditions, three four weeks old seedling transplanted during rainy season with plant density of about 1700-2000 per hectare. High yield of good quality fruits can be by the application of 80 kg ha⁻¹ each of nitrogen, phosphorus and potassium (Singh *et al.*, 1977). Findings of an study conducted at NDUAT Faizabad (UP) revealed that NPK application @ 100:80:80 resulted about 10 tonnes fruits ha⁻¹ (Table 1). The nitrogen, phosphorus and potash were applied in form of urea, single super phosphate and muriate of potash, respectively, half dose of urea and full dose of single super phosphate and muriate of potash as basal dose while remaining half dose of nitrogen (urea) top dressed in two equal doses at 45 and 75 days after transplanting.

Plants start flowering while observing age of two

Table 1 : Plant height, fruit yield and fruit weight of cape gooseberry at varying fertility levels

NPK (kg ha ⁻¹)	Plant height	Fruit yield	Fruit weight
No NPK	79.14	57.94	7.75
60:40:40	94.58	77.02	8.79
80:60:60	105.48	90.15	9.23
100:80:80	112.44	102.94	9.60

months after transplanting (Singh *et al.*, 1977). Fruits takes about 8 weeks to reach maturity and flowering-fruiting remain continue until onset of the hot summer (April). Fruits are ready to harvest when the calyx has changed their colour from green to golden brown. Ripe fruits hang on the plant for several days although some will fall and these must be gathered. Under good management conditions about 10 tonnes fruits can be harvested from one hectare area. Harvesting of fruit has been considered most expensive single operation as it requires several round of picking of ripe fruits throughout the fruiting period.

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