

CAPE-GOOSEBERRY(*PHYSALIS PERUVIANAL.*):A NEW CASH CROP FOR FARMERS IN INDIA

Kishan Singh^{*}, AmanSrivastav^{*}, Shwetank Singh^{*}, Rajaneesh Singh, HariBaksh, Bijendra K. Singh and Raj Pandey

^{*}Student M.Sc.(Ag.)Horticulture, Department of Horticulture,
T.D.P.G. College, Jaunpur– 222002
: Kishansingh170895@gmail.com

ABSTRACT: The genus *Physalis*, of the family Solanaceae. Several species of *Physalis* are grown for their edible fruits like, *Physalis peruviana* L. (Cape-gooseberry), *Physalis pruinosa* L. (Strawberry tomato), *Physalis ixocarpa* Brot. (Husk tomato), *Physalis pubescens* and *Physalis alkekengi* (Winter cherry or Chinese lantern). Various species of genus *Physalis* have been subjected too 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.). 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 fruit is a berry, globose, smooth glossy, yellow-orange in colour containing juicy pulp with numerous very small seeds. The fruit is covered by bladder like structure of persistent calyx called husk. This crop can be grown successfully in kitchen garden. In temperate region it grows as annual while in tropical and subtropical grow as perennial due to absence of frost. It is also called golden berry, teparee, tiparee, makowi, poha, uchuba etc. It is native to Peru and Chile. It reaches 3 ft (0.9 m) in height but occasionally may attain 6 ft (1.8 m). It is said to succeed wherever tomatoes can be grown. Cape-gooseberry can also be grown as an intercrop with other fruit crops. The fruit type is berry with the diameter about 12.5 to 25.0 mm and the weight ranges from 4-10 g, which contain about 100-300 seeds per fruit. It is a good source of carotene and ascorbic acid. It is a useful small crop for the home garden. It gives quick returns to the growers. It can even be sundried. The fruits of Cape-gooseberry have an increasing presence in exotic fruit markets they may be interesting for the diversification of horticultural production. A popular suggestion is that the name properly refers to the calyx surrounding the fruit like a cape.

Keywords: Cash crops, Farmers, Husk tomato and Cape-gooseberry.

The genus *Physalis*, of the family Solanaceae. Genus *Physalis* contains around more than 100 species of annual and perennial herbs. Several species of *Physalis* are grown for their edible fruits like, *Physalis peruviana* L. (Cape-gooseberry), *Physalis pruinosa* L. (Strawberry tomato), *Physalis ixocarpa* Brot. (Husk tomato), *Physalis pubescens* and *Physalis alkalengi* (Winter cherry or Chinese lantern). Various species of genus *Physalis* have been subjected too 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.). The Cape-gooseberry deserves special attention particularly due to its availability in lean period, wide adoptability, quick growing in nature, high productivity, nonperennial 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). The fruit is a berry, globose, smooth glossy, yellow-orange in colour containing juicy pulp with numerous very small seeds. The fruit is covered by bladder like structure of persistent calyx called husk. This crop can be grown successfully in kitchen garden. The commercial importance of *Physalis* was start in Colombia in 1985. In India, Cape-gooseberry grown throughout the plains and hills. In temperate region it grows as annual while in tropical and subtropical grow as perennial due to absence of frost. It is also called golden berry, teparee, tiparee, makowi, poha, uchuba etc. It is native to Peru and Chile. It reaches 3 ft (0.9 m) in height but occasionally may attain 6 ft (1.8 m). It is said to succeed wherever tomatoes can be grown. Cape-gooseberry can also be grown as an intercrop with other fruit crops. The fruit type is berry with the diameter about 12.5 to 25.0 mm and the weight ranges from 4-10 g, which contain about 100-300 seeds per fruit (Verma *et al.*, 2017). It is a good source of carotene and ascorbic acid. It is a useful small crop for the home garden. It gives quick returns to the growers. It can even be sundried. The fruits of Cape-gooseberry have an increasing presence in exotic fruit markets they may be interesting for the diversification of horticultural production. A popular suggestion is that the name properly refers to the calyx surrounding the fruit like a cape. *Physalis peruviana* was first reported in England in 1774 (Morton, 1987). In the 18th Century, the fruits were perfumed and worn for adornment by native women in Peru. But in absence of frost it can be perennial.

Origin and distribution: The large number of species belonging to the genus *Physalis* has varied origin both in temperate and tropical regions of old and new world. *Physalis peruviana* is said to be originated in the western part of South America. While other species like *ixocarpa* and pubescence

are said to be originated in Tropical Asia and India. (Chattopadhyay T.K., 2014). Presently the species is commercially cultivated in tropical and subtropical regions of the world starting from Australia, Indonesia, Sri-Lanka, Bangladesh, Southern China, Italy, Northern part of South America and Florida in USA.

Nutritive value: It is a good source of vitamins A, B,C and iron. It is high in protein and phosphorus compare to other fruits. But it is low in calcium. The fruits are rich in alkaloids, flavonoids, carotenoids and bio-active compounds considered functional ones.

Table: Nutritional value per 100 g edible portion

S.No.	Nutrients	Quantity(per 100 g)	S. No.	Nutrients	Quantity(per 100 g)
1.	Energy	222kJ (53kcal)	7.	Riboflavin (Vit. B ₂)	0.04 mg (3%)
2.	Carbohydrates	11.2 g	8.	Niacin (Vit. B ₃)	2.8 mg (19%)
3.	Fat	0.7 g	9.	Vitamin C	11 mg (13%)
4.	Protein	1.9 g	10.	Calcium	9 mg (1%)
5.	Vitamin A	36 µg (5%)	11.	Iron	1 mg (8%)
6.	Thiamine (Vit. B ₁₂)	0.11 mg (10%)	12.	Phosphorus	40 mg (6%)

Source: wikipedia.org/wiki/*Physalisperuviana*.

Food uses:The fruits can be eaten fresh and dried. The fruits are excellent in crumbles or raw with ice-cream. It is ideal for snacks, pies and jam making because it rich in pectin with mildly tart flavour. It also used puddings, chutneys and ice-cream. It is relished in salads and fruit salads. In Colombia, the fruits are stewed with honey and eaten as dessert. The British use the husk as a handle for dipping the fruit in icing. In Europe it is dipped in chocolate or used to decorate pastries.

Medicinal properties and uses:The leaf decoction is used as diuretic and antiasthmatic in Colombia. It was found to inhibit both Gram-positive and Gram-negative bacteria (MunizI and Rufato, 2014). It also has anti-bacterial and anti-inflammatory properties. It is used medicinally as a diuretic and anthelmintic, and in abdominal disorders. It has provided preliminary evidence that its constituents, possibly polyphenols and carotenoids, may have anti-inflammatory and antioxidant properties. Cape-gooseberry juice regulates cholesterol levels and protects the liver from oxidative stress.

Production potential:Cape-gooseberry being a minor crop in India, scientific information on improved production technology of under varying agro-climatic conditions is lacking. General and vogue recommendations however, been made by some workers (Phillip and Khan, 1952, Hayes, 1966, Singh *et al.*, 1977 and Chattopadhyay, T.K., 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 favours 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 marketed 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.

Soil: The ideal soil for cropping is well drained sandy-clayey and should be rich in organic matter (greater than 4%) with 5.5-6.8pH. The plants are seen to be widely adapted to varied condition of soils, but sandy loam soils are considered to be the best. Low lying areas with poor drainage are not at all suitable for this crop. It can thrive on neutral as well as on acid soils. It is also seen to grow on saline soil in the coastal regions, black cotton soils, clay and gravelly soils, provided there is good drainage. (Chattopadhyay, T.K., 2014)

Climate: The climatic conditions required for the crops mentioned earlier are predominantly tropical to subtropical in nature. It can thrive in mild cold upto 5⁰C and higher temperature (35⁰C) however temperature around 21⁰C is thought to be ideal for crop. The seeds have a high germination percentage, about 85 to 90% and they germinate 10 to 15 days after sowing. It germinates more easily at 7 to 13⁰C at night temperature and 22 to 28⁰C day temperature. Frosting or excessive desiccation is quite unsuitable for the crop. It prefers drier climatic conditions for growth, pollination which is accomplished by insect and development of better quality fruits.

Propagation: It is commercially propagated by seed but may be propagated by stem cuttings treated with rooting hormone. The cutting plants are grown flower early and yield well but are less vigorous than seedlings. Morton, 1987 reported the propagation by 'air-layering' but air-layering is not often practiced.

Sowing of Cape-gooseberry: Seeds are sown in seedbeds. In India, sowing time vary with the agro climatic conditions and growing regions. Generally seed can be sown April to August.

Field preparation and planting: The field is prepared to a fine tilth by giving 2 to 3 ploughings and mixed 20 tons FYM per hectare. The field should be divided in to small plots for convenience of transplanting and irrigation. The seedling should be transplant when they attain 15-20cm height. Where drainage is a problem, the plantings should be on gentle slopes or the rows should be

mounded. The plants are planted at 0.50 to 1.50 m. The field should be irrigating immediately after planting.

Manuring: Prior to transplanting the soil should be thoroughly prepared to fine tilth and mixed with 20 tons of organic manure (Anonymous, 1955). 3.5 quintals of single super phosphate, 1.2 quintals of murate of potash and 1.0 quintals of urea per hectare. Prasad *et al.*, 1985 observed that the application of 100 kg nitrogen, 60 kg P₂O₅ and 60 kg K₂O/ha produced highest yield with highly juicy fruits. Foliar spraying of 1% potassium chloride before and just after blooming enhances fruit quality. Potassium promotes the flowering and fruits fixation. Calcium plays an important role in tissues and calyx formation. Boron is the most required micronutrient because its deficiency reduces the TSS content of the fruit.

Flowering and fruiting: Flowering and fruiting vary with cultivars, locality and agro climatic condition. Fruit buds are produced after 12 to 13 stem internodes are formed. The flowers are hermaphrodite which have both male and female organs. It is a self-pollinated crop but pollination can be enhanced by a gentle shaking of the flowering stems or giving the plants a light spraying with water. After the flower falls, the calyx expands, forming a straw coloured husk much larger than the fruit enclosed, which take 70 to 80 days to mature. Harvesting of the fruit usually happens about 60 to 100 days after flowering when the husk has turned straw colour. The fruiting season lasts from February through May (Singh *et al.*, 2012). Although no fruits remained on the plants to maturity until the cooler months of winter when a good yield was obtained.

Pest and diseases: In South Africa, 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. Hares damage young plants and birds (francolins) devour the fruits if not repelled. The most diseases are powdery mildew and leaf spot and it can be controlled with the spray of wettable sulphur @ 1.5 gm/liter water and 0.4% Filton at 15 days interval. The plants are prone to root rots and viruses if on 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.

Fruit maturity and harvesting: The fruit become ready to harvest about 55 days after harvest anthesis and it should be picked at fully ripe stage when the husk starts dry and berry become ripe and sweet. When the colour of fruit change to yellow-orange indicate the ripening. The fruit may also be

picked partially green and allow to ripe, but harvesting at decoding stage has great important to get sweet as on plant ripened fruits. The fruit are picked every 2-3 weeks.

Yield: The Yield depends upon agro-climatic condition, locality and orchard management practices. Nutrientmanagement being one of the prime considerations for higher yield. A single plant may yield up to 300 fruitsunder ideal conditions. Average yield varies with 4.5-6.0 tons per hectare. But it has potential production up to 10tons per hectare under proper management. **Storage:** If the fruit is left inside the intact calyx husks and it about 30–45 days shelf life at room temperature. In case ofstorage fruits should be stored at 2-4⁰C. In cool storage at 2⁰C temperature, the fruits will keep for four to fivemonths.

Marketing: The fruit may be sent to market directly after harvesting and properly packed fruits can besending to market. Kour and Bakshi (2006) recommended plastic packing boxes with 7-7.5 kg fruits and maximum height of 250 mm.The fruits are usually dehusked before delivery to markets.

CONCLUSION

From the above discussion, the Cape-gooseberry is an important crop for income, food, and medicinal applications. Diversification in horticulture is the need of the day particularly for farmers having small land holding like Jammu province for which Cape-gooseberry can be a very good option as this crop has low lag period, ripens within few months of planting and can be used as an inter-crop in orchards due to its small stature and bushy habit.Thus, it becomes imperative to introduce this fruit in different parts of the country where the agro-climatic conditions seems to be suitable for its cultivation. Economic potential of Cape-gooseberry fruit was found to be high with profit margins of 95% recorded for some Cape-gooseberry products along the value chain. The government of Uganda ought to promote this plant in a poverty reduction campaign due to its high economic potential.

REFERENCES

1. Anonymous (1955). Agriculture and Animal Husbandry, U.P. 5(9): pp. 26-29.
2. Chattopadhyay, T.K. (1996). A Text Book of Pomology, Vol. II, *Kalyani Publishers*, New Delhi.
3. Chattopadhyay, T.K. (2014). A Text Book of Pomology, Vol. II, *Kalyani Publishers*, Calcutta, India.285-290.
4. Hayes, W.B. (1966). Fruit Growing in India.3rd revised ed. *Kitabistan*, pp. 415-416.
5. Kour and Bakshi (2006). Comparative performance of some Cape-gooseberry strains under Amritsar conditions. *Haryana J. Hortic. Sci.*, 35(3-4): 263-264.

6. Morton, J.F. (1987). Fruits of Warm Climates. Creative Resource Centre Inc. *Miami*, pp. 431-434.
7. Muniz, K.R.P. and Rufato Macedo, A.D. (2014). General aspects of *Physalis* cultivation. *Ciencia Rural, Santa Maria*, 44(6): 964-970.
8. Phillip, A.G. and Khan, M.A. (1952). Trial on Cultivation of Cape-gooseberry. *Punjab Fruit J.*, 15(5): p. 17.
9. Prasad, I.D., Sengupta, B.N., Singh, R.K. and Singh, S.P. (1985). Effect of NPK on growth, yield attributes and quality of Cape-gooseberry (*Physalis peruviana* L.). *Haryana J. Hort. Sci.*, 14(3-4): pp. 151-155.
10. Singh, D.B., Pal, A.A., Shrivastava, N. and Mirza, A. (2012). Growth and developmental changes of Cape-gooseberry fruits. *Asian J. of Hort.*, 7(2): 374-378.
11. Singh, U.R., Pandey, I.C. and Prasad, R.S. (1977). The effect of N, P and K on growth, yield and quality of Cape-gooseberry. *Punjab Hort. J.*, 17(3-4): pp. 148-151.
12. Verma, A., Singh, S.P., Singh, B.K. and Pal, A. (2017). Response of Physico-Chemical Attributes in Cape-gooseberry (*Physalis peruviana* L.) to Integrated Nutrient Management. *International Journal of Current Microbiology and Applied Sciences*, 6 (11): 210-2015.