

A Profile of Passion Fruit (*Passiflora edulis*)

Sivappa^{1*}, S. R Ramyashree², S. Mounashree³ and V. Venkatachalapathi⁴

¹ Assistant professor, Dept. of Horticulture, College of Sericulture, Chinthamani

² Dept. of Food science and Nutrition, College of Sericulture, Chinthamani

³ Dept. of Horticulture, College of Sericulture, Chinthamani

⁴ Assistant professor, Dept. of Agronomy, Chinthamani

*Corresponding Author E-mail: sivappacos153@gmail.com

Received: 28.02.2019 | Revised: 30.03.2019 | Accepted: 7.04.2019

ABSTRACT

The Passion fruit (*Passiflora edulis*) originated from Brazil, belongs to Passifloraceae, is an attractive high value crop and known for its unique flavour, aroma and its excellent nutritional and medicinal properties. Fruits are nearly round to oval in shape with tough rind which is smooth and waxy and weighing about 35 to 40g in yellow species (*P. edulis flavicarpa* Deg) and about 60g in purple species (*P. edulis* Sims) and bears on woody perennial vines. An aromatic mass of double-walled, membranous sacs containing orange colour pulpy juice and as many as 250 small, dark brown to black pitted seeds, inside the fruit are the edible portion. In India it is grown in wild in many parts of Western Ghats such as Nilgiris, Kodaikanal, Coorg, Malbar and other places. The fruits are the richest sources of phyto-nutrients.

Key words: Origin, Types of fruits, Phyto-nutrients, Processing industry.

INTRODUCTION

Passion fruit is grown mostly in tropical and sub-tropical part of the world. The purple passion fruit is native from southern Brazil through Paraguay to northern Argentina. It has been stated that the yellow form is of native to the Amazon region of Brazil. In India, it is found to be grown wild in many parts of Western Ghat such as Nilgiris, Kodaikanal, Shevroys, Coorg and Malabar and North Eastern States like Manipur, Nagaland and Mizoram. Today, passion fruit is grown nearly everywhere in the tropical belt of South

America to Australia, Asia and Africa. South America is currently the largest producer of passion fruit. This fruit is native to Brazil and Ecuador, where it is used for medicinal purposes as a sedative, as well as a food source. The total global supply of passion fruit is estimated at 8.52 lakh tons, with major producing countries comprising of Brazil, Mexico, Ecuador, Australia, Zimbabwe, Kenya and Columbia. Over 95% of the production is the yellow form for juice extraction, while purple contributes predominantly for fresh fruit trade.

Cite this article: Sivappa, Ramyashree, S.R., Mounashree, S. and Venkatachalapathi, V., A Profile of Passion Fruit (*Passiflora edulis*), *Int. J. Pure App. Biosci.* 7(2): 140-144 (2019). doi: <http://dx.doi.org/10.18782/2320-7051.7409>

In India, passion fruit cultivation is confined to Kerala, Tamil Nadu (Nilgiri hills and Kodai Kenal), Karnataka (Coorg) and northeastern states (Mizoram, Nagaland, Manipur and Sikkim) with an area and production of 9.11 thousand ha and 45.82 thousand tons. The northern and north-eastern regions of the country are responsible for more than 80% of the national production⁶.

Types of *Passiflora*

There are about 600 known species of *Passiflora* now found worldwide. Of the 600 species of *Passiflora*, in the family Passifloraceae, only one, *P. edulis* Sims, has the exclusive designation of passion fruit, without qualification. *Passiflora edulis* exists in two distinct types known as *P. edulis*, *edulis* the purple passion fruit and *P. edulis flavicarpa*, the yellow passion fruit. The purple passion fruit, *P. edulis*, is native to southern Brazil. It bears a dark-purple or nearly black, rounded or egg-shaped fruit about 5 cm long, weighing 30-45 g. The yellow passion fruit, *P. edulis flavicarpa*, evolved from the purple type. Fruit of the yellow passion fruit is deep yellow and similar in shape but slightly longer than the purple passion fruit. Its length is about 6 cm and it weighs about 60-90 g. The yellow form has a more vigorous vine and generally larger fruit than the purple. The yellow form has brown seeds. It has a firm, round, shiny shell. It is sometimes called sweet granadilla and is more common on Pacific islands since it will grow only in the tropics or subtropics. It is lower in acid, so that it may be eaten straight from the shell. Another type, the giant granadilla (*Passiflora quadrangularis*) is also cultivated rarely³.

Processing

Passion fruits are processed into juices, which are sold either in single strength or as frozen concentrates. The passion fruit juice is also used in the production of cordials, alcoholic beverages, ice creams, and confectionery and mixed fruit blends. Both purple and yellow passion fruits begin to lose moisture as soon as they fall and quickly become quite wrinkled if held under hot, dry conditions. Juice in these

fruits is wholesome, but they are unsightly and thus unmarketable. Clean fruit can be stored in polyethylene bags at 10°C for as long as 3 weeks without loss.

Benefits

Passion Fruit as an Edible Fruit

Passion fruits contain numerous small, black wedge-shaped seeds that are individually surrounded by deep orange-colored sacs that contain the juice, the edible part of the fruit. Passion fruit is either eaten fresh or used in commercial juice production. Passion fruit is a high acid food (pH~ 3.2) due to the predominance of two acids, citric (~93-96 % of total) and malic (3-6 % of total) acid. Passion fruit also contains about 14.45 g sugar/100g of edible portion, including fructose, glucose and sucrose, along with seven others in trace amounts. The acids and sugars add to the unique taste and serve as a preservative nature for the tropical fruit. Ascorbic acid is an organic acid with good antioxidant properties and is a good source of Vitamin C. The purple passion fruit has a sugar: acid ratio of 5:1. The yellow passion fruit has a sugar: acid ratio of 3:8. The purple passion fruit is generally sweeter than the yellow passion fruit. Passion fruit is high in potassium, vitamin A, vitamin C, niacin and fiber and it is low in sodium, cholesterol and saturated fats.

Functional Activity

Passion fruit is proved to have analgesic (pain-reliever), anti-anxiety, anti-inflammatory, antispasmodic, cough suppressant, aphrodisiac, cough suppressant, central nervous system depressant, diuretic, hypotensive (lowers blood pressure) and sedative activities. Besides, it is traditionally reported to possess anticonvulsant, antidepressant, astringent, cardiostimulant (tones, balances, strengthens the heart), disinfectant, nervine (balances/calms nerves), neurasthenic (reduces nerve pain), tranquilizer and vermifuge (expels worms) activities. It may have promising and powerful effects on neurological disorders and chronic diseases such as heart disease and cancer. The native American Indians, Aztecs and Mayas used

Passiflora as a remedy for pains and ailments, a tradition which is still continued today. Local markets offer dried passion flowers which are used to brew a pain-killing tea¹.

Other Benefits

By far the greatest benefit of passion fruit to humankind is its fruit and the delicious juice made from it. It is condensed, frozen, and shipped worldwide. The fruit pulp contains 2.2 percent protein, 0.7 percent fat, and 21.2 percent carbohydrates. In addition, the seeds contain 23 percent oil similar to sunflower or soybean oil and the rind residue is used for cattle feed. The fruits of native and naturalized stands furnish food for numerous species of wild mammals and birds. The whole plant, especially the leaves, contains alkaloids and a number of other phytoactive chemicals. Among these is passiflorine, a known sedative and tranquilizer. Extracts of the leaves have been used for centuries as sedatives by native Brazilians. They prepare a drink from the flower to treat asthma, bronchitis, and whooping cough. The plant is also used as a diuretic to treat urinary infections^{4,7}.

The fruit can be grown to eat or for its juice, which is often added to other fruit juices to enhance aroma. The fruit is eaten alone or in fruit salads, sherbets, ice cream, jams, cool drinks and as concentrates. Passion fruit is mainly used in jams, jellies, and fruit juices. It is used for medicinal purposes as a sedative, as well as a food source. As an edible fruit, it contains several components such as acids and sugars, nutrients, and non-nutritive phytochemicals that make passion fruit a tasteful and healthy addition to the diet. It is used for mood disorders (depression, anxiety, stress); insomnia and sleep disorders; headaches, migraines and general pain; stomach problems (colic, nervous stomach, indigestion, etc.) and to relieve menstrual cramps and premenstrual syndrome⁵.

Constraints

Lack of awareness

Passion fruit having a unique and excellent flavor and aroma has not reached to the majority of the people even within the country due to poor or lack of publicity. Most of the people have not come across this fruit and its

processed product which otherwise would have definitely captured their attention and boost the industry in the region.

Poor market linkages

As in many of the Horticultural crops, passion fruit marketing both for fresh as well as processed or semi-processed products is also very weak and almost negligible except for the exotic juices which could manage an outlet in some parts of the country and is now in the process of export with the assistance of APEDA. Growers are apprehensive to expand the area under its cultivation without assured market of their produce. In a situation where there is no proper market channel, the growers will not expand the area under its cultivation which in turn will result in inadequate volume of raw materials for the processing industries.

Lack/ inadequate processing units

There are only handful of processing units in the region. In fact, there is only one that is having the state of art facilities for juice extraction and making of concentrates of passion fruit. Some new units are coming up now in Mizoram, Nagaland and Manipur, however these are too meager to cater to the need. There are no semi processing units in the region as well which would otherwise ease the transportation cost of bulk quantities of fresh passion fruit.

Poor infrastructure facilities

Poor or inadequate storage facilities and poor road connectivity to the production site results in huge quantitative and qualitative post harvest losses in all parts of NER.

Low production and productivity

Despite the fact that passion fruit has a great potentiality in the region due to suitable climatic and soil conditions, the productivity and production is still very low which perhaps is a result of raising plantations with non-descriptive planting materials as well as poor crop husbandry. This crop is noted for its instability and unpredictability in production.

Lack of post-harvest management

Like for many of the Horticultural crops, post-harvest management aspect of passion fruit is also not given due attention, thus resulting in

loss of large quantity of the harvested produce and deterioration in quality of the produce.

Challenges & Strategies:

Creating awareness /Publicity

In order to boost up the passion fruit industry in the region, the first and foremost step to be taken up is to create an awareness among the people and give wide publicity through different means. In this regard, the govt. may initiate some steps to link up the producers/processors with the airlines and railways in order to have an assured supply chain. Some assistance may also be extended to the producers for advertising their products in T.V. and other mass media.

Developing market linkages

To encourage the growers to grow and produce more in order to get the volume of produce for the processing units, proper and assured market linkages needs to be developed. Govt. should create platform for linkages between the investors / business houses and the producers. Creation of proper market linkages would help in the passion fruit of this region to reach to the consumer in different parts of the country and abroad.

Marketing strategy for Passion Fruit

As the passion fruit is not cultivated commercially not only in region but also in the country, it will take some time to develop the market. However, it is difficult proposition for small farmers to invest into crop without assurance of markets. Therefore, integrated efforts are required from all the possible stakeholders e.g. farmers, government agencies, research institutions and other agencies involved in horticulture development in the region.

Formation of growers cooperative or grower's company can be viable alternate to develop the crop and make it a commercial success. However, State governments at the regional level need to take initiatives in forming such group, training the farmers and handholding till these associations become commercially viable enterprises. At initial stage, it is possible that a few progressive farmers can be selected who have sufficient resource to make some investment and sustain the activities till the revenue generation starts.

Private sector can also play a crucial role by investing into post-harvest infrastructure, processing facilities and marketing. Government should explore the possible Public-Private Partnership models attracting private sector investment in enhancing marketability of Passion fruit.

Keeping in mind, the huge potentialities of the region and various bottlenecks that are hindering the growth of this industry in the region, a concentrated effort is much needed in creating awareness, strengthening /developing market linkages, strengthening of existing processing units and setting up of semi processing & processing units, post-harvest management and creation of proper infrastructures and logistics. The above strategies if taken up would certainly boost the passion fruit industry in the region.

Setting up / strengthening of new /existing processing & semi- processing units

There is a need for upgrading and modifying the existing processing units and also set up at least one new processing unit with state of art facility in each state of the region and semi processing units for juice extraction at production sites. There can be a collection centre at the centre point where the producers can bring their produce of both fresh and semi processed products and the wholesaler / processors comes to collect the produce.

Creation of proper storage facilities

Creation of proper storage facilities (low cost storages & Cold stores) at production site, collection centre and at processing units will be vital for judicious utilization of the harvested produce and smooth running of the processing units.

Developing package of practices through location specific trials

Even though the production level is good with congenial condition in the region, the productivity level needs to be improved by addressing some key production problems to harness the full potentials of growing area giving maximum benefit to the growers. Agriculture Universities and Research Institutes should be encouraged to develop

package of practices based on the location specific trails.

Proper Post Harvest Management

Lot of awareness is needed for the growers about the importance of post-harvest management especially with regards to the right stage of harvesting, post-harvest treatments to enhance shelf life of fresh as well as semi processed products. Proper trainings need to be given to the extension functionaries, the growers, handlers and processors and facilities for various post harvest treatments need to be established.

Growing passion fruit is highly remunerative especially in hilly terrain whether northeast or south India. With more refinement in techniques involving accurate identification of nutritional disorders and re-orientation in site specific constraint based-fertilization programme, the heavy returns from passion fruit cultivation could be easily accomplished by bringing the desired improvisation in productivity level from the present scenario and simultaneously prolonging the longevity of productive life, from the present average life of only 3-4 years. While doing so, high density planting with fertigation should be an ultimate aim of production management in the years to come, in order to match with frontline passion fruit growing countries. A concentrated effort on the other hand is much needed in creating awareness, strengthening /developing market linkages, strengthening of existing processing units and setting up of semi processing & processing units , post-harvest management and creation of proper infrastructures and logistics. The above strategies if taken up would certainly boost the passion fruit industry in the region.

CONCLUSION

Passion fruit is rich source of all the nutrients especially it is rich in Vitamin--A and

Ascorbic acid. Both are essential for day today life to prevent the free radicle formation of in the body. The fruit also rich in other nutrients and plays important role in preventing many disorders. Hence, considering all the aspects of the fruit, it is indeed need to create awareness among people to increase the production, processing, value addition and utilization of the passion fruit.

REFERENCES

1. Divya, N., *Health benefits of Passion Fruit, Biotech articles*; **10(35)**: 238 (2013).
2. Available from:<http://www.biotecharticles.com/Biology-Article/Health-Benefits-of-Passion-Fruit-3053.html>
3. Sita, S. P., Himesh, S., Kaushelendra, M. and Akhlesh K. S., Recent Updates on the genus Passiflora: A review. *Int. J. Res. Phytochem. Pharmacol*; **1**: 1-16 (2011).
4. Bolaji, O. A., Opeyemi, D. B. and Segun, O., Phytochemical Screening and Antibacterial Activity of Passiflora edulis. *Researcher*; **3**: 9-12 (2011).
5. Lingaraj, N. and Sangram, K. P., Phytochemical Investigation and Anthelmintic Activity of Passiflora edulis Linn Leaves Available in South Eastern Odisha *International Journal of Pharmaceutical and Chemical Sciences*; **1**: 154649 (2012).
6. Dhawan, K., Dhawan, S. and Sharma, A., Passiflora: a review update. *J. Ethnopharmacol*; **94**: 1-23 (2004).
7. Sunitha, M. and Devaki, K. C., Antimicrobial activity of *passiflora edulis sims* leaves. *Adv pharmacol toxicol*; **10**: 171 – 174 (2009).
8. <http://wiki-fitness.com/passion-fruit-health-benefits>
9. <https://www.organicfacts.net/health-benefits/fruit/passion-fruit.html>

