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Passion Fruit: A Potential Alternative Fruit Crop for Florida

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Passion fruit can be grown in warm climates, which allows Florida growers to grow them throughout much of the state. Currently, Florida is estimated to have 50 acres in production, with most acreage located in the southern part of the state. Passion fruit has great potential for both value-added products as well as fresh fruit. Passion fruit can be used to produce juice, wine, jellies, candies, ice cream, and other value-added products. The vast majority of passion fruit is imported and valued at greater than $1.35 per fruit, indicating high demand for the domestic market. Florida can become a major producer and meet domestic demand with high-quality passion fruit products. For passion fruit to become a significant crop in Florida, there are several key areas where additional research is needed. More information is needed to define the best management practices to successfully grow passion fruit in southern Florida in open field conditions as well as in central and north-central Florida in both open field and high tunnel conditions. Production costs currently remain unknown as there is no well-defined industry standards. Intermittent freezing temperatures in parts of Florida pose a significant threat to passion fruit production; methods for effective cold protection, such as high tunnel production, are needed. Productive cultivars with a wide range of desirable characteristics need to be determined. Harvest, postharvest handling, shelf-life, and processing methods will further help producers, processors, and retail establishments maximize and retain the value of the crop. Marketing aspects of passion fruit is an area that needs substantial investigation in order to attract potential producers to plant this crop.

Origins and History

Passion fruit belong to the Passifloracea family, which has worldwide distribution (Fig. 1). The *Passiflora* genus contains more than five-hundred species, most tendril-bearing vines. Several species have ornamental and agricultural value. The most widely grown and valuable species is *P. edulis*, passion fruit. Passion fruit is a short-lived evergreen perennial that produces an aromatic, potent tropical-tasting fruit. Its origins are warm climate regions of Brazil, Paraguay, and northern Argentina (Ulmer and MacDougal 2004). Purple passion fruit is the most commonly cultivated type in the United States. The name "passion fruit" dates back the 1500s when it was used by missionaries in Brazil to illustrate the wounds from Christ's cruxificion (part of the "passion of Christ") while trying to convert the indigenous population; the Portuguese name is "flor das cinco chagas" ("flower of five wounds"). The scientific name reflects this association. Passion flower (*P. incarnata*) is commonly mistaken for passion fruit (*P. edulis*) due to similar over-all appearances.

Adaptation to Florida

Passion fruit is well-adapted to the tropical and semi-tropical conditions found throughout much of Florida. Specifically, recommendations are that passion fruit be planted in USDA hardiness zones 9b and higher. Central and South Florida are well within the recommended USDA hardiness zones which allows for a larger area of potential production than is currently being utilized. The vines have limited drought and flood tolerance, thus they should be planted in well-drained soil and be provided with sufficient irrigation (Queensland Department of Agriculture and Fisheries, 2016). Passion fruit grow best in slightly acidic soil and a location that is in full sun throughout the day. Under suitable conditions, new plants grow quickly and may begin producing flowers and fruit within a year of planting. Rapid growth and subsequent fruit production may quickly return investment costs for entrepreneurial farmers. These characteristics make passion fruit an attractive alternative crop. Freezing temperatures, which can kill unprotected plants, present the most significant limiting factor for passion fruit production in

Fig. 1. Passion fruit flower. Photo credit: Mark Bailey.

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Florida. Established passion fruit vines can survive temperatures slightly below freezing, however becomes increasingly unlikely as temperatures decrease. Mature vines with dense foliage may tolerate temperatures slightly below freezing with some foliage loss, though exposure to temperatures in the mid-20s (°F) may result death of the aboveground vine (Campbell et al., 1977). In regions where cold temperatures or other weather conditions are a concern, high tunnel production may be a viable option. In situations where high tunnel production has not been implemented and cold is a concern, the base of the plants can be protected from lethal freeze events.

Production in Florida

Passion fruit production in Florida is limited both in terms of acreage planted and region. Florida is estimated to have 50 acres in production, with most acreage located in the southern region of the state (USDA NASS, 2021). Acreage in production has remained limited for the past several decades. However, with adequate support and actionable information, production can be expanded beyond its current limited acreage and geographic location. Passion fruit is commonly sold as fresh fruit as well as used in the production of value-added products (Fig. 2). Passion fruit can be used to produce juice, wine, jellies, candies, ice cream, and other value-added products. Passion fruit juice is a source of dietary fiber, ascorbic acid, carotenoids, riboflavin, iron, potassium, and niacin (Percival and Findley 2007). The majority of fresh passion fruit sold in the United States is imported. It is valued at greater than $1.35 per fruit, thus indicating high value and stable demand for this fruit (USDA AMS, 2021). The high value of the crop further provides incentives for growers to expand or begin production. Given concerns over reliability of complex international supply chains and a range of other concerns associated with food imports, domestic production may have advantages that imports lack. With a comprehensive effort to develop this fruit, Florida can become a major producer and meet domestic demand with high-quality passion fruit products. Passion fruit as an alternative crop, while full of potential, will need to be supported by production and marketing information. Should substantial acreage be planted, it is possible that challenges may arise such as sourcing an adequate supply of starter plants in a timely manner. Passion fruit cultivars need to be evaluated for characteristics that include fruit size, appearance, disease resistance, quantity of pulp or juice, pulp-to-skin ratio, flavor, sugar and acid concentration, and aromatic qualities. Management practices for open field passion fruit production in southern Florida need study as do open field and high tunnel conditions in central and north-central Florida. It is difficult to determine production costs as there is no well-defined industry standards. Regions of Florida with intermittent freezing temperatures pose a significant threat to passion fruit production so reliable methods for effective cold protection, such as high tunnel production, are needed. Establishing harvest, postharvest handling, shelf-life, and processing standards will further help producers, processors, and retail establishments maximize and retain the value of the crop. Marketing aspects of passion fruit need significant investigation in order to attract potential producers to plant this crop. If current and prospective growers have access to marketing information, this may greatly reduce the potential risk associated with alternative crops.

Fig. 2. 'Purple Possum' fruit. Photo credit Mark Bailey.

Conclusion

Passion fruit has great potential to become a significant alternative crop for Florida growers. In order to help current and prospective growers succeed, a comprehensive approach to identifying and responding to both production and marketing challenges is needed.

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