

Optimum In-row Distance for Eggplant Production and Economic Returns¹

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Eggplant in Florida

Eggplant (*Solanum melongena*) is native to India and Pakistan and it is a popular vegetable crop among the Hispanic and Asian minorities throughout the U.S. Eggplant comes in many types and different shapes, sizes and colors abound. However, the preferred eggplant types for consumption by both conventional and ethnic markets are purple with either round or elongated fruits. This warm-season solanaceous crop is in the same family as tomato (*Lycopersicon esculentum*) and pepper (*Capsicum* spp.).

Worldwide eggplant production has been steadily increasing over the last decade, with major planting areas concentrated in China, India, Egypt, Turkey and Japan. In the U.S., about 7,000 acres are planted in California, Florida, New Jersey, New York, and Georgia. Although the exact planted area in Florida is unknown, in 2002 it was approximately 1,200 acres, and it is currently estimated at about 2,000 acres in the west central and southern part of the peninsula. In those production areas, eggplant is either transplanted as a stand-alone crop or intercropped with strawberry (*Fragaria x ananassa*).

When intercropped with strawberry, eggplant transplants at the four-true-leaf stage are placed in single rows between double rows of strawberry.

Growers use various in-row distances to transplant eggplant, ranging between 12 and 36 inches, whereas the current recommendation for Florida is between 18 and 40 inches. Narrowing this wide spacing range would provide growers with more accurate information for eggplant production and allow them to better use their lands, especially when increasing urban development in Florida is pressuring agricultural farms to be more efficient. Thus, research was conducted to determine appropriate in-row distances for eggplant and to determine the best economic returns of this practice.

Eggplant Yields and Profits

Research studies were conducted during 2005 and 2006 at the Gulf Coast Research and Education Center of the University of Florida in Wimauma, State Florida. Classic eggplant seedlings in the four-true-leaf stage were manually transplanted 2 weeks after fumigation in single rows

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on polyethylene-mulched beds. In-row distances were 1.0, 1.5, 2.0, 2.5, 3.0, and 3.5 ft. Eggplant marketable fruit number and weight were determined over 5 weekly harvests beginning at 8 weeks after transplanting (WAT). A marketable fruit was defined as a fruit without visible injury or deformation and at least 2.5 inches wide and 8 inches long. The total planting densities were 8,712, 5,808, 4,356, 3,485, 2,904, and 2,489 plants/acre.

For the economic analysis, marginal return rates (MRR) were calculated applying the partial budget methodology on the two most promising treatments. This methodology only uses the variable production costs changing between the two treatments to be compared. Thus, other production costs were assumed constant and a whole-farm operation budget was not necessary. The MRR is calculated by dividing the highest net income by the lowest net income. It indicates the percentage of net revenue gains of switching from one practice to another.

The results indicated that in-row spacing affected total eggplant fruit number during both seasons. A quadratic equation described the relationship between in-row distance and fruit number (Fig. 1). Standard errors among observed means indicated that there were no fruit number differences among 1.0, 1.5, 2.0, and 2.5 ft, averaging approximately 46,800 fruits/acre, whereas the treatments with plants spaced at either 3.0 or 3.5 ft resulted in an average fruit number of 26,000 fruits/acre, which is approximately 45% lower than the total fruit number for the first four distances.

Total fruit weight followed a trend similar to that for total fruit number, where the maximum total fruit weight occurred at an in-row distance of 1.50 ft (Fig. 2). The observed values resulted in no fruit weight differences among 1.0, 1.5, 2.0, and 2.5 ft, ranging between 18.2 and 19.9 ton/acre. In contrast, total fruit weight drastically declined at distances of 3.0 and 3.5 ft, producing under 11 ton/acre. It appears that as in-row distance increased from 1.0 to 2.5 ft between plants, the intraspecific competition did not affect total fruit yield. However, as in-row distance increased above 2.5 ft, intraspecific competition and total number of plants per acre decreased but without compensating for the reduced total yields. To help

demonstrate the latter observation, fruit weight per plant was calculated, and the values steadily increased up to 2.5 ft between plants (4.3, 6.7, 9.1, and 10.4 lb/plant for 1.0, 1.5, 2.0, and 2.5 ft, respectively), while at distances of either 3.0 and 3.5 ft fruit weight per plant declined (7.5 and 8.6 lb/acre).

From the economical standpoint, the comparison between 2.0 and 2.5 ft resulted in the former spacing having a MRR rate of 8.03% in relation with an in-row distance of 2.5 ft, which indicated that for each dollar of net profit obtained with 2.5 ft between plants, eggplant growers would obtain a net gain of \$1.08 with 2.0 ft between plants. These results showed that although the same yields are obtained with distances between 1.0 and 2.5 ft between plants, transplanting at an in-row spacing of 2.0 ft provides the highest economic returns.

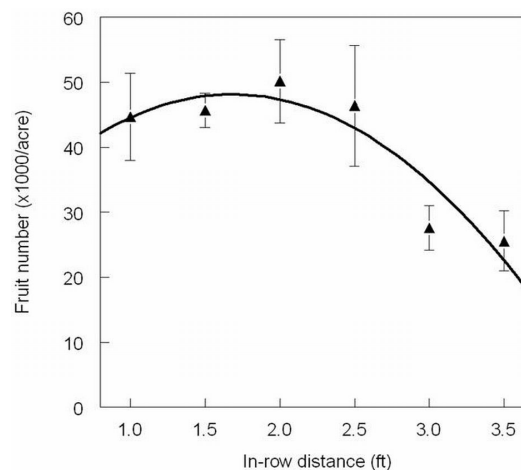


Figure 1. Effect of in-row distances on total eggplant fruit number.

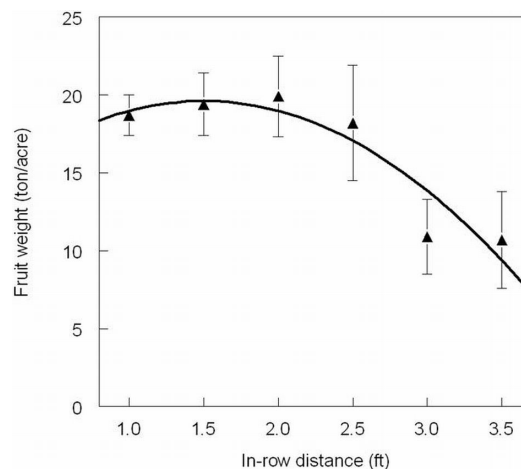


Figure 2. Effect on in-row distances on total eggplant fruit number.