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PROCEEDINGS
OF THE
33rd ANNUAL MEETING

6-12 July 1997

Proceedings Edited
by
Nelson Semidey and Lucas N. Aviles

Published by the Caribbean Food Crops Society

EVALUATION OF TWO YELLOW PASSION FRUIT (*Passiflora edulis* var. *flavicarpa*) TRELLIS SYSTEMS

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ABSTRACT. A garden of *Passiflora edulis* var. *flavicarpa* was planted 19 April 1994. The purpose of the planting was to compare two types of trellis systems: cross or "T" and back or fence. The cross shaped trellises were made up of metal pipes 1.5 m. high from the ground to top crossed by .9 m. pipes at a height of 1.2 m. Three wires ran parallel to each other from cross to cross, separated .3 m. from one another. The back trellis system used the same metal pipes 1.5 m high, without the cross. Two wires ran from pipe to pipe, one .9 m. and the other 1.2 m. from the ground. This type of trellis system is less expensive. The experiment of two treatments (the trellis systems) and three replications. Each treatment carried 45 plants, that is, 15 plants per replication per treatment. The vines were planted 3.7 m. within the row, and 3.7 m. between rows, using five plants per row. Results were analysed by LSD tests. Cross shaped trellises do promote a significantly higher production (290 kgs vs 226 kgs). The reason why so many local growers use the fence trellis system may have more to do with reducing expenses.

RESUMEN. Se sembró un huerto de *Passiflora edulis* var. *flavicarpa* el 19 de abril de 1994. El propósito de la siembra fue comparar dos tipos de sistema de emparrado: la cruceta tipo "T" y el tipo espaldera o verja.

El sistema de emparrado de cruceta consistió de tubos de metal de una altura de 1.5 m, cruzados por tubos de metal de .9 m de largo a una altura de 1.2 m. Tres líneas de alambre paralelas, separadas .3 m una de la otra, corrían de cruceta a cruceta.

El sistema de emparrado de espaldera usó los mismos tubos de metal de una altura de 1.5 m, sin la cruceta. Dos líneas de alambre corrían de tubo a tubo, una a .9 m y la otra a 1.2 m del suelo. Este tipo de emparrado es menos costoso.

El experimento consistió de dos tratamientos (los tipos de emparrado) y tres replicaciones. Cada tratamiento consistió de 45 plantas, esto es, quince plantas por tratamiento por replicación. Las plantas fueron sembradas a 3.7 m en la hilera y a 3.7 m entre hileras, usando cinco plantas por hilera.

Los resultados fueron analizados por pruebas LSD (Least Significant Difference o Diferencia Menos Significativa). El emparrado tipo cruceta promueve una producción significativamente mayor (290 kgs vs. 226 kgs). La razón por la cual algunos agricultores locales están usando más el tipo espaldera parece tener que ver con una reducción en los gastos.

INTRODUCTION

Passion fruit is native to Brazil (12, 13, 17). The yellow form arose in Australia as a mutation from the original purple form (13). It belongs to the Passifloraceae family, along with several other edible species (1, 7, 8, 13). Flowers are normally self-incompatible, but self compatibility has been reported (5, 6, 9, 11, 13, 14, 16, 17). It is a woody vine, perennial and

vigorous. It needs support. Its leaves are deep green, trilobulate with serrated margins. Its flowers are very attractive and the cause of the peculiar common name of this plant (2, 10, 13).

Passion fruits are grown commercially in Puerto Rico, mostly in the Central Eastern region. According to the Puerto Rico Department of Agriculture (3), the production of 1995-96 was estimated in 10,000 cwt (454,000 kgs), with a farm value of \$163,000.00. It is a growing commodity, albeit slowly: in 1990-91 (4) only 5,000 cwt (227,000 kgs) were produced, with a farm value of \$84,000.00.

Traditionally, a trellis system resembling a cross, known also as the "T" system, had been used by Puerto Rican passion fruit growers. It consisted of metal pipes or wood poles standing in line, each crossed by a three feet (.9 m) long pipe or stake at a height of four feet (1.2 m) approximately from the ground; these would sustain three parallel rows of wire. This design is more expensive simply because it requires more material and more labor. It does provide more area for the vines to grow and produce.

Lately, the type of trellis commonly used for grapes in other parts of the world, known as fence trellis, is being used. It requires less material and therefore is cheaper. It consists of pipes or poles standing in line, tied to one another by two rows of wire, one on top of the other, at a height of approximately four and three feet (1.2 and .9 m), respectively, from the ground.

The purpose of this study is to assess the effects of this "new", fence trellis design in fruit production and yield, as compared to the "old", T trellis system.

MATERIALS AND METHODS

Half an acre (.2 ha) was planted with yellow passion fruit, using the two trellis systems under test, but otherwise under the same management conditions, in a San Anton soil, fine-loamy, mixed, isohyperthermic, Cumulic Haplustolls, Mollisol (18). The experimental design was replicated three times. Each replication consisted of three rows featuring the cross shaped trellis and three rows featuring the fence trellis.

Yellow passion fruit seeds were sown 11 January 1994 in the propagators at Juana Díaz Experimental Substation, in the Southern Coast of Puerto Rico. The seedlings were transplanted to black polyethylene bags 16 February 1994. They were planted in the field 19 April 1994, using 60 feet long (18 m) rows.

There were guard rows at each side of the experimental area. The first and the last plant of each row were also considered guard plants and not harvested. Therefore, since there were three rows per treatment in each replication and five plants per row, of which three were harvested, nine plants per treatment were harvested in each replication.

Plastic mulch, drip irrigation and metal pipes, not wood poles, were used. The plants were located next to a pipe. The pipes were put at a distance of six feet (1.85 m) from one another in the row, but the plants were spaced at twelve feet (3.7 m) in the row. Distance between rows was also twelve feet (3.7 m).

No special problems occurred during the trial. All plants used were vigorous. No infestations occurred, and in fact, there was no need for pesticides. We believe this was due to the fact that the plot chosen was very fertile by nature (18) and no passion fruit plants existed in the general area at the time.

RESULTS AND DISCUSSION

Fruits were pick 24 times, beginning early November, 1994, and ending late July, 1995. At this time, production decreased sharply and a renewal was in order, so the year cycle was considered over. Highest yield, both for total weight and for number of fruits, and for both treatments, occurred in December, 1994, and June, 1995 (Figs. 1, 2). The experimental plot produced continually during the cycle.

The cross shaped trellis produced an average of 3,733 fruits or 639 pounds (289.85 kgs) of fruit, while the fence trellis produced an average of 2,748 fruits or 498 pounds (225.9 kgs) of fruit (Figs. 3, 4). The differences were statistically significant for both parameters, using LSD and Duncan tests. The average fruit weight in the first case (cross shaped trellis) was 2.7 oz (76.55 g). In the second case, fence trellis, it was 2.9 oz (82.22 g).

With such significant differences, it would seem that the main concern of many farmers who changed to the fence trellis system, is not to maximize yield but to earn more money through less spending. Such a statement would require, however, a cost/benefit analysis which is not being performed at this time. It may be noted, though, that similar research has been conducted in other Caribbean locations (15) with results also favoring the "T" trellis system in relation to yield.

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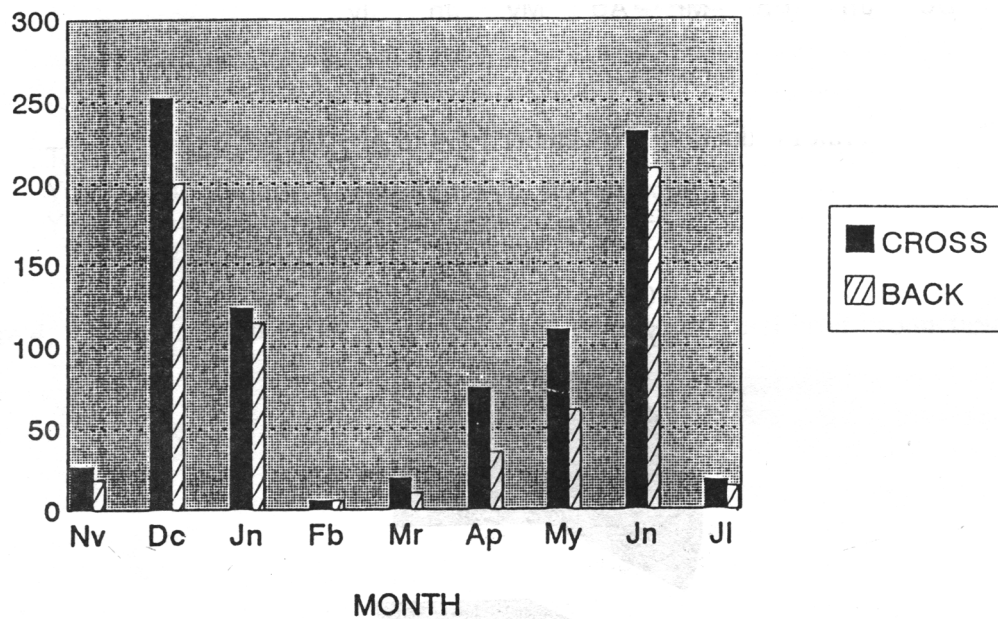


Figure 1. Monthly Yield, Kilograms (November 1994 to July 1995)

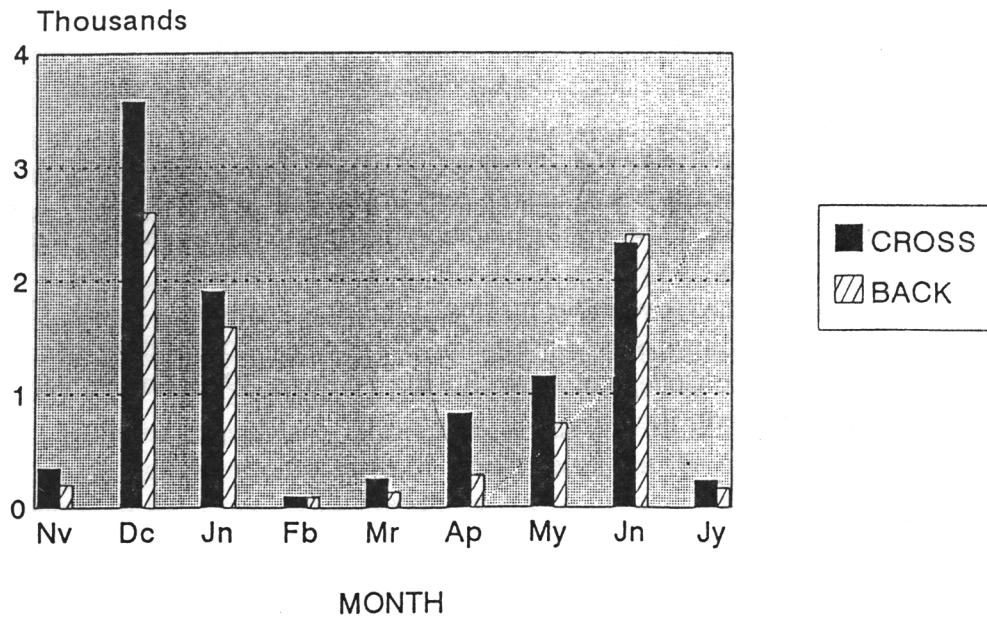
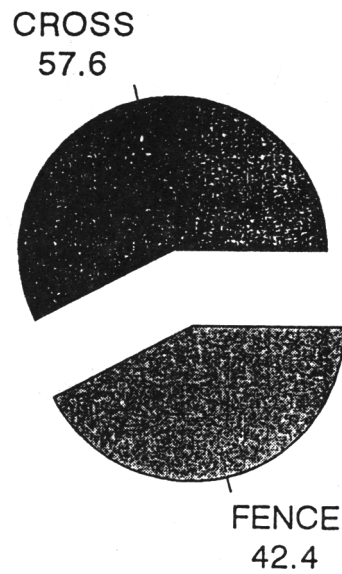
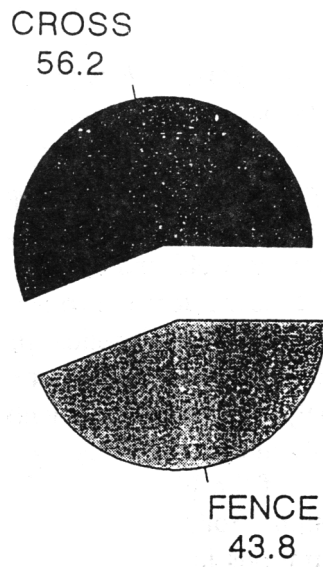


Figure 2. Monthly Fruit Production (November 1994 to July 1995)



Total fruit production: 6,481 fruits.
 Production using the cross shaped trellis: 3,733 fruits.
 Production using the fence system: 2,748 fruits.

Figure 3. Fruit Yield Per Treatment As A Percent Of Total Fruit Yield (Kilograms)



Total fruit yield: 515.74 kgs
Yield using the cross shaped trellis: 289.85 kgs.
Yield using the fence system: 225.9 kgs.

Figure 4. Fruit Production Per Treatment As A Percent Of Total Fruit Production