

Title: Comparison of Runner-tip Production Among Classes of Certified Nursery Stocks of Strawberry Cultivars

Research or Outreach Project: Research

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Objective:

To compare runner-tip production among Foundation, Registered and Certified plants of the strawberry cultivars Chandler, Camarosa, Sweet Charlie and Bish.

Overall, the southeastern US (other than Florida) ranks third nationally in fresh strawberry production. Major cultivars grown in the plasticulture system in the region are Chandler, Camarosa and Sweet Charlie. Between 35 and 40 million bare-root and plug plants are planted in berry fields annually. Until recently growers had to rely primarily on planting stocks produced by nurseries in northern states and Canada, or California. These stocks are not derived through certification programs, or even if they were (California), frequently harbor pathogens and pests such as anthracnose, Phytophthora crown rot, angular leaf spot and mites. The use of infected transplants has led in recent years to frequent outbreaks of anthracnose fruit rot in individual grower fields and has contributed to lower yields and financial loss to the grower. The most economical approach to control anthracnose and other diseases and pests is through the use of clean planting stocks produced through micropropagation and plant certification systems, preferably within this region where it will be easier to maintain strict controls over all steps and aspects of the plant production system.

The production and performance of runner-tips may vary among three classes of certified plants. Under present certification schemes, Foundation plants (derived from Nuclear Stocks) are used for production of Registered plants, and these plants are used for production of Certified bare-root plants and runner-tips (plug plants), which are then used to produce fruit. However, if the demand for runner-tips (plug plants) increases in the future, and the demand is higher than the supply, it may be necessary to also use Certified plants for runner-tip production. The nurseries also may benefit economically from using

Certified plants for runner-tip production because these plants are less expensive than Registered plants.

The purpose of this study was: 1) to determine how three classes (Foundation, Registered and Certified) of southeastern region produced strawberry plants of Chandler, Camarosa, Sweet Charlie and Bish perform in comparison to runner-tip production; and 2) to evaluate performance of plug plants produced from usable runner-tips for fruit production in several locations throughout the region.

Materials and Methods:

Runner-tips of four strawberry cultivars, Chandler, Camarosa, Sweet Charlie and Bish were produced in two locations (Wilson and Lee Counties, NC). The test was designed as a randomized split plot (main plot cultivars; split plot plant class) with four replications. Four strawberry cultivars (Chandler, Camarosa, Sweet Charlie and Bish) and three classes of plants (Foundation, Registered and Certified), or a total of 12 treatments were included in the test. Dormant bare-root Foundation plants were obtained from the Sandhills Research Station and Registered and Certified plants from two certified nurseries in NC. Plants were transplanted in methyl bromide treated soil on white/black plastic in double rows with 14" spacing between plants (overheating of black plastic during the summer results in dieback of runner-tips). Each treatment was 22 plants but only runners from 20 plants were harvested and evaluated. The test consisted of 48 plots in one row. Spacing between plots was 30". Test in Wilson County. was planted on 2 June, and in Lee Co. on 3 June 2004, respectively.

Runners with tips were harvested on 16 August and 1 September 2004 in Lee County. Test in Wilson County was not harvested because of the poor plant growth caused by inadequate irrigation and poor weed control. Only runners with harvestable tips suitable for rooting that had crown size of approximately 1/4"- 3/8" or 0.63-0.95 cm were cut at each harvest date and three counts were made: 1) total number of runners/plant; 2) total number of runner-tips/plant; and 3) total number of usable runner-tips/plant.

Results:

First harvest.

1. Total number of runners per plant (Fig. 1). There were significant differences in the number of runners produced per plant for cultivar and class. Camarosa had statistically the highest production of runners per plant, followed by Bish, Chandler and Sweet Charlie. Although there were no significant differences between Bish and Chandler, both were statistically higher than Sweet Charlie. Certified class produced the highest number of runners per plant for all four cultivars, followed by Registered and Foundation, respectively.

2. Total number of runner-tips per plant (Fig. 2). There were significant differences in the number of runners produced per plant for cultivar and class, and those differences were dependent on the significant interaction between cultivar and class. Camarosa had

statistically the highest production of runner-tips per plant followed by Bish, Chandler and Sweet Charlie which were not statistically different. Certified class produced the highest number of runner-tips per plant for all cultivars followed by Registered and Foundation class.

3. Total number of usable runner-tips per plant (Fig. 3). Camarosa produced the highest number of usable runner-tips per plant followed by Chandler and Bish that were not significantly different but were significantly higher than Sweet Charlie. Certified class produced the highest number of usable runner-tips for cultivars Chandler, Sweet Charlie and Bish, followed by Registered and Foundation, respectively. In Camarosa, Registered class had the highest number of usable runner-tips, followed by Certified and Foundation.

Second harvest.

1. Total number of runners per plant (Fig. 4). There were significant differences in the total number of runners produced per plant among cultivars. Bish had the highest number of total runners per plant, followed by Camarosa, Chandler and Sweet Charlie. Certified Camarosa and Chandler produced the highest number of runners followed by Registered and Foundation, respectively. Certified and Foundation class of Bish produced more runners per plant than Registered class. In Sweet Charlie, Registered class produced the highest number of runners, followed by Certified and Foundation.

2. Total number of runner-tips per plant (Fig. 5). Camarosa and Bish produced significantly higher number of total runner-tips per plant than Chandler and Sweet Charlie, but there was no significant difference between Camarosa and Bish. Certified class produced more runner-tips than Registered and Foundation for all cultivars.

3. Total number of usable runner-tips per plant (Fig. 6). Camarosa and Bish produced the highest number of usable runner-tips per plant but there was no significant difference between the two cultivars. They were significantly different from Chandler and Sweet Charlie that produced fewer runner-tips per plant. Among classes of plants, Certified class produced the highest number of runner-tips per plant for all cultivars. Foundation class was more productive than Registered class for Bish and Camarosa, while Registered class produced more usable runner-tips than Foundation class for Sweet Charlie.

Total harvest (1st & 2nd).

1. Total number of runners per plant (Fig. 7). Camarosa and Bish were not significantly different in the production of runners per plant, but they were statistically higher than Chandler and Sweet Charlie. Chandler had a statistically higher total runner production than Sweet Charlie. There were statistical differences in runner production between classes of plants. For all four cultivars, Certified class produced the highest number of runners per plant, followed by Registered and Foundation classes, respectively.

2. Total number of runner-tips per plant (Fig. 8). Although there were significant differences in the total number of runner-tips produced per plant for cultivar and class, those differences were dependent on the significant interaction between cultivar and class. Camarosa had the highest production of the total number of runner-tips per plant

followed by Bish, Chandler and Sweet Charlie. For all cultivars Certified class produced more runner-tips per plant than Registered and Foundation, respectively.

3. Total number of usable runner-tips per plant (Fig. 9). There were significant differences in the total number of usable runner-tips produced per plant for cultivar and class. Camarosa produced the highest number of usable runner-tips per plant, followed by Chandler, Bish and Sweet Charlie, respectively. Certified class produced the highest number of usable runner-tips per plant for all cultivars, followed by Registered and Foundation, respectively.

Tests to evaluate performance of plug plants produced from usable runner-tips were not conducted in 2004 due to technical difficulties.

Conclusions:

The comparison of runner-tip production among Foundation, Registered and Certified plants of strawberry cultivars Chandler, Camarosa, Sweet Charlie and Bish has shown that Camarosa was the most prolific producer of runners, runner-tips and usable runner-tips per plant, followed by Bish, Chandler and Sweet Charlie, respectively. The total number of runners, runner-tips and usable runner-tips produced per plant was much higher for all cultivars at the 1st harvest conducted approximately ten weeks after planting, compared to the 2nd harvest conducted 2 weeks after the 1st harvest.

Among the classes of plants, Certified class was overall the most productive for all cultivars, followed by Registered and Foundation, respectively.

Finally, we need to evaluate under grower conditions performance of plug plants produced from runner-tips of Foundation, Registered and Certified Camarosa, Chandler, Sweet Charlie and Bish strawberry plants. If we show that there are no significant differences in yield and quality of fruit among three classes of plants, then Certified plants can be used in certification programs for production of runner-tips and plug plants.

Summary and Impact Statement:

Our work shows that there are differences in runner-tip production among three classes of plants (Foundation, Registered and Certified), and four strawberry cultivars (Camarosa, Chandler, Sweet Charlie and Bish) grown in the southeast. The results of our study will enable strawberry nurseries to more efficiently and economically produce runner-tips under southeastern conditions.

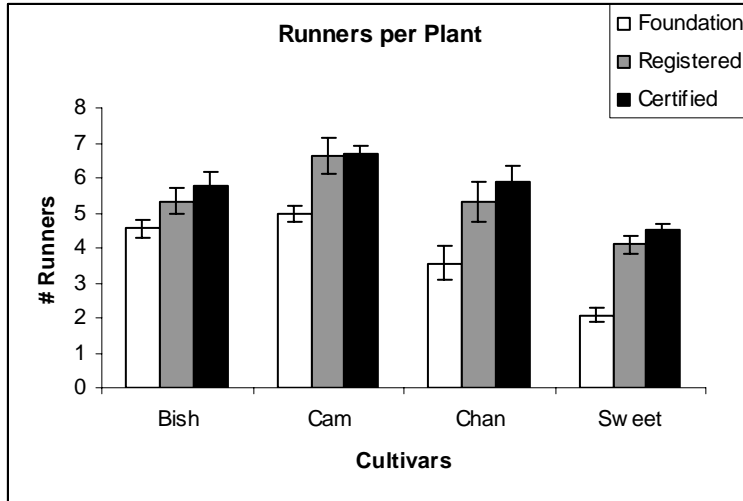


Fig. 1. Total number of runners/plant harvested on 08/16/2004.

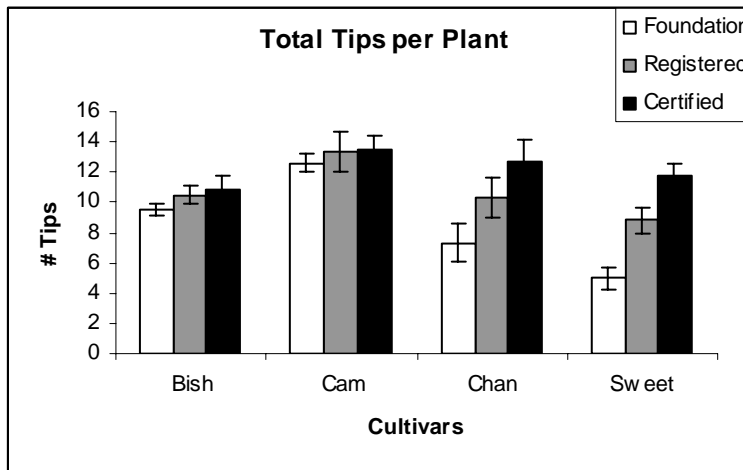


Fig. 2. Total number of runner-tips/plant harvested on 08/16/2004.

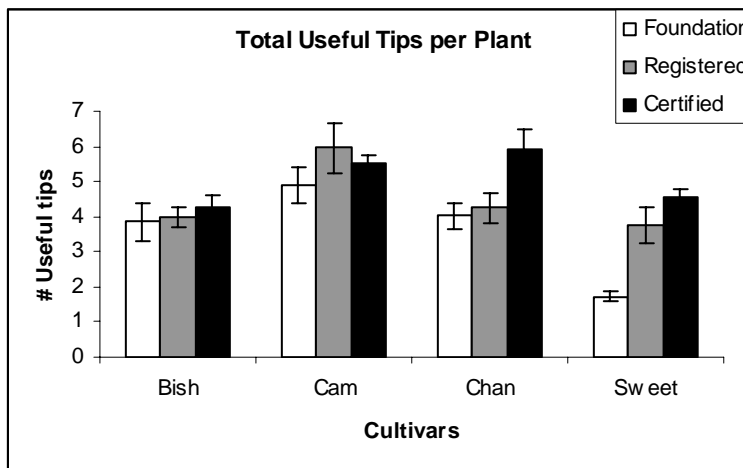


Fig. 3. Total number of usable runner-tips/plant harvested on 08/16/2004.

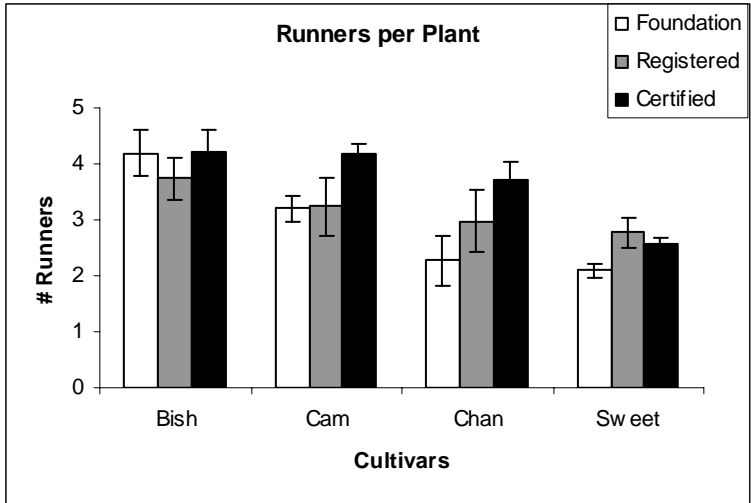


Fig. 4. Total number of runners/plant harvested on 09/01/2004.

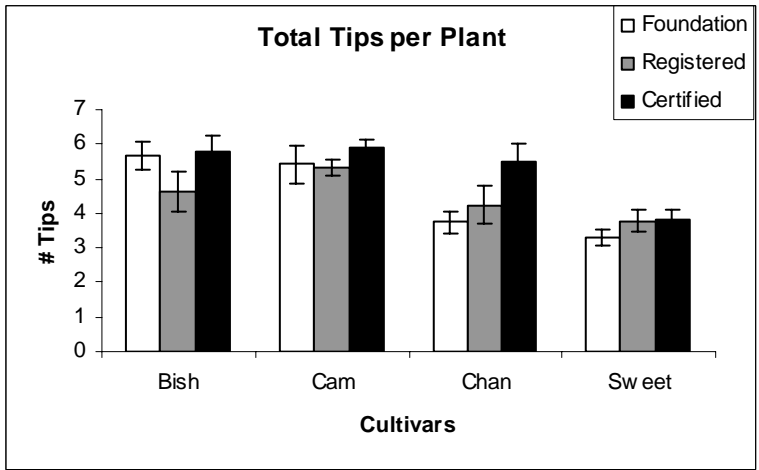


Fig. 5. Total number of runner-tips/plant harvested on 09/01/2004.

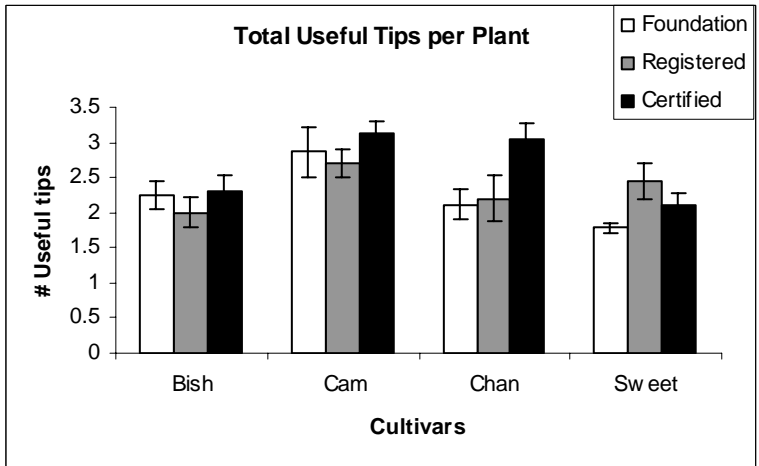


Fig. 6. Total number of usable runner-tips/plant harvested on 09/01/2004.

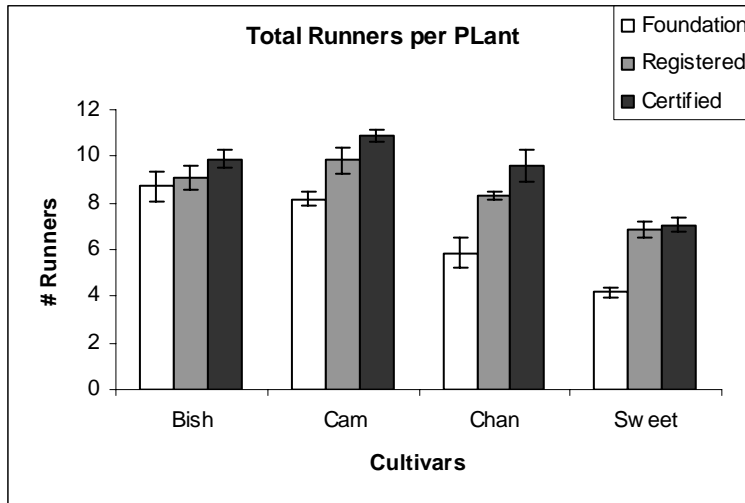


Fig. 7. Total number of runners/plant harvested for two harvest dates.

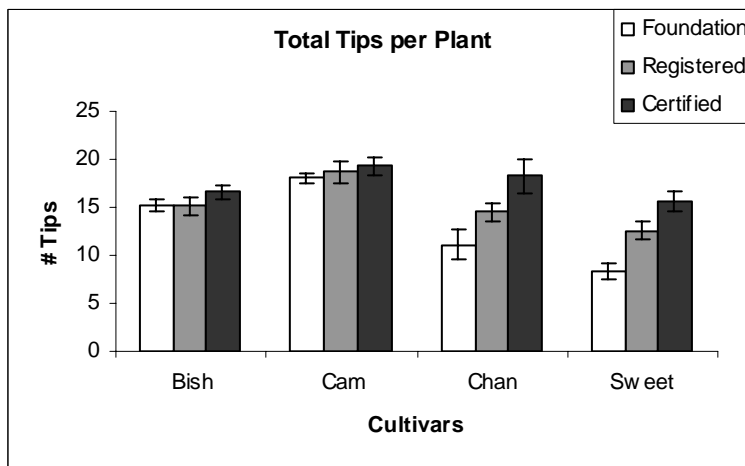


Fig. 8. Total number of runner-tips/plant for two harvest dates.

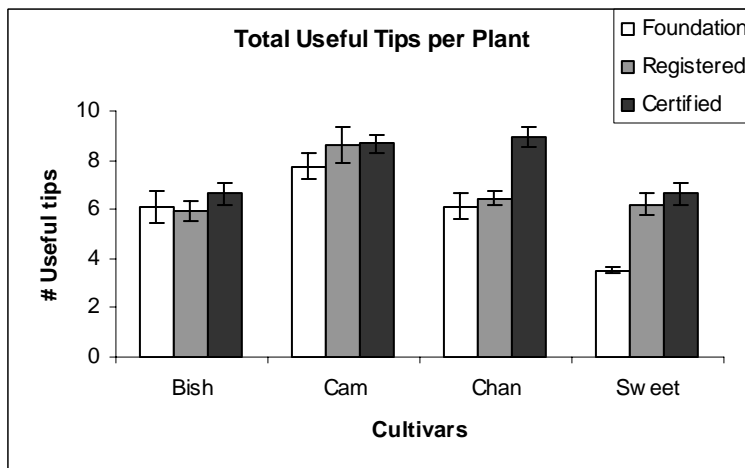


Fig. 9. Total number of usable runner-tips/plant for two harvest dates.

