SOUTHERN REGION SMALL FRUIT CONSORTIUM RESEARCH PROJECT
Progress Report for 2003 Grant

TITLE Effective Pollination Period of Rabbiteye Blueberry

INVESTIGATORS

D. Scott NeSmith, Professor and Patricio A. Brevis, Graduate Research Assistant
Department of Horticulture, University of Georgia, 1109 Experiment Street
Griffin, GA 30223
Phone: 770-228-7358; e-mail: snesmith@griffin.uga.edu

JUSTIFICATION

Rabbiteye blueberries (*Vaccinium ashei* Reade) are well suited for conditions in the Southeast. In a recent survey, blueberry growers ranked poor fruit set among the three most important horticultural problems of the industry in Georgia (Scherm *et al*., 2001). In fact, problems derived from the low degree of self-fruitfulness for rabbiteye blueberries force growers to adopt practices to aid pollination and improve fruit set (NeSmith 2002). Poor fruit set in rabbiteye blueberry may not be only due to a lack of cross-pollination, but may be related to the effective pollination period (EPP). EPP is defined as the remaining period of ovule viability beyond the time required for the first pollen tube to reach and fertilize the ovule (Sanzol and Herrero, 2001). Essentially it is the number of days during which pollination is effective enough to produce a fruit. A reduced EPP can result from short lifespan of the ovules, slow pollen tube growth rate, short length of stigmatic receptivity, or a combination of these. Research in crops such as apple, cherry, kiwi, pear, and plum has shown that a short EPP and erratic or low production are correlated (Sanzol and Herrero, 2001). Chemical treatments such as spraying of putrescine (a polyamine ethylene regulating compound) at anthesis may increase fruit set and yield by lengthening the EPP (Crisosto et al., 1988). Although Young and Sherman (1978) determined the length of pistil receptivity in two blueberry cultivars, little is actually known about factors contributing to the EPP. Research is needed to understand the role that EPP plays in fruit set of rabbiteye blueberry, which could open the way to further research seeking the manipulation of fruiting by controlling the factors limiting the EPP. Also, research to determine if EPP can be prolonged through the usage of putrescine is needed.

METHODS

To accomplish the first objective, potted plants of 'Tifblue' and 'Brightwell' rabbiteye blueberry were self- and cross-pollinated under growth chamber conditions. Pollen loads were applied on stigmas at different time intervals after anthesis. EPP was determined for each of the cultivars by assessing fruit set resulting from the pollinations, along with determination of time to ripening, seed numbers per fruit, and berry weights. To complete the second objective, EPP was studied under field conditions. The same two cultivars were used, and applications of putrescine at 0 and 10^{-3} M concentrations were

made during anthesis. Branches containing flowers for all treatments were bagged before flowering, and flowers were exposed to pollinators at different time intervals by removing bags at different times of "percent bloom". Fruit set was determined for all treatments in order to calculate EPP.

RESULTS

EPP for the two cultivars was quite different. For 'Brightwell', fruit set was high (>80%) when cross-pollination occurred beginning at the day of anthesis, and remained near this level for 4 days. After 6 days, 'Brightwell' fruit set resulting from cross-pollination declined rapidly. For 'Tifblue', fruit set resulting from cross-pollination on the day of anthesis was low (<25%), and slowly climbed to the highest level (ca. 70%) when pollination occurred 4 days after anthesis. Fruit set then begin to steadily decline with very low levels occurring for pollen applications made 8 days after anthesis. Also, overall, the EPP of 'Brightwell' was 2 days longer than that of 'Tifblue'. Under field conditions, EPP was more difficult to assess due to some freeze damage. However, we were able to test the main effect of putrescine, and no influences of the compound were observed.

IMPACT

These data suggest that rabbiteye cultivars have different effective pollination periods, and EPP should be considered in cultural practices. For example, the best cultivars used to cross-pollinate 'Tifblue' would be those that bloom just a few days after the cultivar itself, since 'Tifblue' optimal pollen receptivity time is around 4 days after anthesis. Likewise, 'Brightwell' would benefit most from a cultivar that blooms near the same time. The fact that 'Brightwell's EPP is longer than that of 'Tifblue' may contribute to the superior performance of this cultivar with regards to fruit set. Putrescine does not appear to be beneficial in manipulating the EPP of blueberry flowers. Additional research is needed to determine which factors are actually limiting EPP in blueberries (i.e., ovule longevity, stigmatic receptivity, or pollen tube growth rate).

LIST OF REFERENCES

Crisosto, C.H., P.B. Lombard, D. Sugar, and V.S. Polito. 1988. Putrescine influences ovule senescence, fertilization time, and fruit set in 'Comice' pear. J. Amer. Soc. Hort. Sci. 113(5):708-712.

NeSmith, D.S. 2002. Response of rabbiteye blueberry (*Vaccinium ashei* Reade) to the growth regulators CPPU and gibberellic acid. HortScience 37: 666-668.

Sanzol, J., and M. Herrero. 2001. The "effective pollination period" in fruit trees. Scientia Hort. 90:1-17.

Scherm, H., D. S. NeSmith, D. L. Horton and G. Krewer. 2001. A survey of horticultural and pest management practices of the Georgia blueberry industry. Small Fruits Review 1(4):17-28.

Young, M.J., and W.B. Sherman. 1978. Duration of pistil receptivity, fruit set, and seed production in rabbiteye and tetraploid blueberries. HortScience 13:278-279.