

SOUTHERN REGION SMALL FRUIT CONSORTIUM RESEARCH PROPOSAL

Progress Report for SRSFC Research Project No. 2008-02

TITLE Evaluation of Advanced Blueberry Selections for Regional Adaptation and Mechanical Harvest Potential

INVESTIGATORS

D. Scott NeSmith
Department of Horticulture
University of Georgia, Griffin Campus
1109 Experiment Street
Griffin, GA 30223
Ph. 770-228-7358
e-mail: snsmith@griffin.uga.edu

Bill Cline
Department of Plant Pathology
North Carolina State University
Hort Crops Research Station
3800 Castle Hayne Road
Castle Hayne, NC 28429
Ph. 910-675-2314
e-mail: bill_cline@ncsu.edu

OBJECTIVE

The objective of this multi-state project is to evaluate field performance of advanced selections of southern highbush and rabbiteye blueberry from the University of Georgia Blueberry Breeding Program for regional adaptation and for potential to be mechanically harvested for sale as fresh fruit.

JUSTIFICATION

Blueberry production has rapidly expanded in the Southeast in the past decade. While prices have remained good, expectations are that market prices for fresh fruit will decline as acreage expands and production supply increases. Currently, most of the early ripening southern highbush are harvested by hand, and much of the early rabbiteye crop is as well. Hand-harvesting expense is considerably greater than the cost of mechanical harvesting; although, fresh fruit quality can be greatly diminished when harvesting with a machine (Brown et al., 1996). The higher harvesting costs associated with hand-harvesting, coupled with troublesome labor issues growers face has elevated the interest in mechanical harvesting of blueberries for the fresh market. Thus, cultivars suitable for machine harvesting are needed.

Many of the current industry standard blueberry cultivars grown in the Southeast were released with hand-harvesting operations in mind. However, due to the reasoning presented above, there is a great need for blueberries that can be adapted to machine harvesting of fruit for the fresh market. While a number of traits render a blueberry

selection suitable for mechanical harvesting, one of the more important aspects is berry firmness. Over the past 5 to 8 years, we have identified both southern highbush and rabbiteye selections in the University of Georgia Blueberry Breeding Program that have very firm fruit (NeSmith, 2006). Therefore, the objectives of this project are to establish plantings of these advance selections in North Carolina and Georgia to determine their regional adaptability and their potential for mechanical harvesting.

METHODS

This research was initiated in 2008 at one site each in North Carolina and Georgia that is suitable for southern highbush and rabbiteye blueberry production. Selections and cultivar standards of similar sizes were provided by UGA. Six UGA advanced selections (3 rabbiteye and 3 southern highbush) were identified as those having potential to be harvested mechanically due to their berry firmness, fruit quality, and plant vigor (NeSmith, 2006). The rabbiteye selections T-619, T-672, and T-747 were planted along with the standards 'Brightwell', 'Premier', and 'Vernon'. The southern highbush selections TH-647, TH-665, and TH-678 were planted along with the standards 'Legacy', 'Palmetto', and 'Star'. All plantings were established in the winter of 2008 in field plots at each location. There are three replications of 5 plants for each selection at the North Carolina site, and three replications of 10 plants for each selection at the Georgia site. Management at each site will include customary practices for the location. The plants will be grown for at least two years to achieve reasonable size to begin the harvesting evaluation. Annual pruning to shape plants for mechanical harvesting will be conducted. The study is expected to last a minimum of 5 years.

Both the UGA and the NC State research farms are equipped with a LBT tractor pulled mechanical harvester (provided by BEI). Beginning the third year, each selection will be harvested 2 to 3 times annually using these machines. The first harvest will begin when 30 to 40% of the berries of a selection are ripe. The harvested fruit will be taken through sorting and packaging procedures that simulate commercial operations, and will be assessed with regards to postharvest quality. Quality assessment will include measurement of fruit firmness using a FirmTech II assessment device (NeSmith et al., 2002; NeSmith et al., 2005; Tetteh et al., 2004). A protocol will be used that measures initial firmness at harvest, followed by firmness measurements after 72 h of storage at room temperature (25 C). This effort will reveal not only firmness at harvest, but firmness losses in response to elevated temperature. Overall visual assessment of fruit will be made as well to determine suitability for fresh market usage.

RESULTS

Plots for this project were established at the UGA Blueberry Research Farm near Alapaha, Ga. and at the NC State Blueberry Research Farm near Castle Hayne, NC in 2008. Routine field maintenance was conducted throughout 2008, and will continue for the next 5 years. This first year of the project is simply an establishment year. Data concerning machine harvesting cannot be taken until the 2010 growing season.

IMPACT

There is great interest in blueberry cultivars that can be mechanically harvested for fresh market sales among growers. This trial will be on display at the UGA Blueberry Research Farm and the NC State Blueberry Research Farm which are open to visits by growers. Also, annual Blueberry Field Days are held each year at both sites, and the test plots will be shown to growers in attendance. Development of blueberry varieties that can be mechanically harvested can reduce harvesting costs from over \$0.70/lb to less than \$0.10/lb. This is a savings of more than \$6 million per 10 million lbs of fruit. Georgia and North Carolina combined currently produces more than 50 million lbs of blueberries annually. In addition to harvest cost savings, development of mechanical harvested blueberry cultivars would substantially reduce reliance on migrant labor for the blueberry industry.

LIST OF REFERENCES

- Brown, G.K, N.L. Schulte, E.J. Timm, R.M. Beaudry, D.L. Peterson, J.F. Hancock, and F. Takeda. 1996. Estimates of mechanization effects on fresh blueberry quality. *Appl. Eng. Agric.* 12: 21-26.
- NeSmith, D.S. 2006. Blueberry cultivar development at the University of Georgia. A progress report for 2005. Posted at www.smallfruits.org/Blueberries/production/alap05Report.pdf.
- NeSmith, D.S., A. Nunez-Barrios, S.E. Prussia, and A. Aggarwal. 2005. Postharvest berry quality of six rabbiteye blueberry cultivars in response to temperature. *J. Amer. Pomol. Soc.* 59: 13-17.
- NeSmith, D.S., S.E. Prussia, M. Tetteh, G. Krewer. 2002. Firmness losses of rabbiteye blueberries (*Vaccinium ashei* Reade) during harvesting and handling. *Acta Hort.* 574: 287-293.
- Tetteh, M.K., S.E. Prussia, D.S. NeSmith, B.P. Verma, and D. Aggarwal. 2004. Modeling blueberry firmness and mass loss during cooling delays and storage. *Trans. Amer. Soc. Agri. Engin.* 47: 1121-1127.