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EVALUATION OF THE PERPENDICULAR-V PEACH ORCHARD TRAINING SYSTEM APPLICABILITY STUDY FOR SOUTHERN MARYLAND, 1999-2007

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Introduction/Situation

On March 4, 1999, at the Anne Arundel and Prince George's Fruit Producers Breakfast, area orchardists expressed an interest in the development of peach training system production research and demonstration project conducted at the University of Maryland Central Maryland Research and Education Center (CMREC), Upper Marlboro Facility. The producers also stated that orchard training system evaluations, and pest management spray research programs were needed in the Southern Maryland region. Fruit production for fresh market sales as well as wholesale sales would certainly be a viable alternative agriculture enterprise for farmers seeking to transition out of tobacco production.

Objectives

A decision was made to proceed forward with a peach orchard establishment at CMREC, Upper Marlboro facility in order to accommodate grower requests, also to provide an education tool for a viable alternative for southern Maryland tobacco farmers. The research orchard consisted of seven peach varieties in a training system comparison of the traditional open center to the perpendicular–V training system. For eight years from 1999 to 2006 this research orchard was instrumental in promoting fruit production in Southern Maryland, alleviating grower apprehension to fruit crop adoption by providing hands-on pruning clinics, field-days, twilights, lectures and demonstratable production data.

Experimental Procedure

The CMREC, Upper Marlboro facility peach research and demonstration orchard was planted on April 14, 1999 on a Monmouth fine sandy loam soil with a warm southern aspect exposure and orchard rows oriented north to south. The two training systems compared consisted of the traditional open center on 20 foot between row by 16 foot in row spacing verses the perpendicular-V on 20 foot between row by 8 foot in row spacing. Seven varieties were evaluated consisting of two early maturity varieties Candor and Garnet Beauty; three mid maturity varieties Red Haven, Flamin' Fury PF15 and Bounty; and two late maturity varieties Crest Haven and Fantasia (nectarine). The orchard was an arranged complete block with three replications. Each replication consisted of two trees for each variety, hence 42 trees for each training system. The varieties were purposely non-randomized but positioned according to maturity groups to facilitate the orchard use as a hands-on teaching tool. At planting of the two year whips a 24 inch heading cut was made to the open center trees and a 20 inch heading cut was made to the perpendicular-V trees. Tall fescue was drilled into the alleyways and herbicides were used throughout the study to maintain a 6 foot weed free root zone. Fruit cover sprays were adhered to utilizing a calendar approach with IPM scouting.

In March 2000, prior to 2nd leaf the open center trees were pruned to develop 3 to 4 scaffolds, whereas the perpendicular-V trees were cut to two opposite limbs with the limb selection for branch angles between 25 to 45 degrees from the trunk center line using a scaffold gauge. All of the fruit was removed on the 2nd leaf year. The trees were summer pruned to balance growth; this was especially important for the perpendicular-V tree scaffold development.

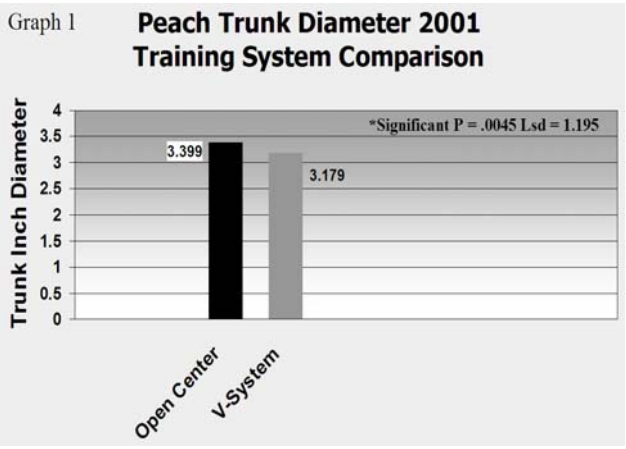
Observations

At 3rd leaf in May 2001 there was no significant difference in the average trunk diameter as measured at 12 inches from the ground for the open center trees verses the perpendicular-V trees, measuring 3.4 and 3.2 inches, respectively (Graph 1). This correlation of trunk diameter to yield is also apparent when examining the early yield per tree for combined years 2001 and 2003; (at 3rd and 4th leaf) the open center and perpendicular-V trees yielded an average fruit weight of 45.9 and 42.1 pounds per tree, respectively (Graph 4). When examining early fruit quality parameters the average peach disease rating of score of 1-10 was implemented, where a score of 1 represents complete disease loss and 10 represents no disease present, for the 3rd and 4th leaf combined were good to excellent for the open center trees and fair for the perpendicular-V trees scoring 8.8 and 7.5, respectively (Graph 2). Peach scab and brown rot were the most problematic diseases. By the 4th leaf the perpendicular-V scaffold limbs were already a challenge in regards to managing growth. The orchard site was a fertile agricultural soil, irrigation was only required in the establishment year and very little fertilization was necessary. Excessive growth of the perpendicular-V scaffolds made pruning, thinning, spraying and harvesting more time consuming. By the 4th leaf it was necessary to use a ladder for harvest. The loss of good disease control in the perpendicular-V trees was namely due to inadequate engineering of the sprayer to obtain thorough coverage in the center of the tree canopy. The average fruit size was also impacted by improper thinning of the perpendicular-V trees due to excessive tree height. This is reflected in the fruit size rating score for the open center trees verses the perpendicular-V trees of 2.5 and 2.0, respectively; where 1 is small 2 medium and 3 large (Graph 3). The notable advantage of the perpendicular-V is apparent when examining the average pounds of fruit per acre yield for the open center trees verses the perpendicular-V trees of 6,202 and 11,461 pounds, respectively (Graph 5). This is a reflection of tree density for the two training systems. The open center block has 136 trees per acre and the perpendicular-V block has 272 trees per acre, twice as many. By the 5th leaf it was necessary to head cut and branch the perpendicular-V trees in order to successfully manage the canopy. The average six year fruit production 2001-2006 for the open center and perpendicular-V trees was 65.5 and 51.5 average pounds per tree, respectively (Graph 6); and 8,908 and 14,008 average pounds per acre, respectively (Graph 7). There was a dramatic yield depression in 2004 and 2005 due to late spring freeze events. The southern aspect exposure induced an average annual early full bloom date of April 5th and late freezes are still problematic in most of southern Maryland until April 28th.

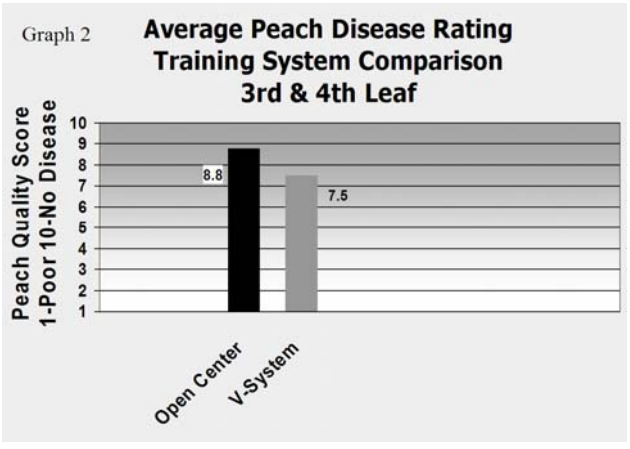
Conclusions

The perpendicular-V peach training system produces heavy early yields in a very compact orchard. The system offers the advantage of bringing new varieties to market quickly while occupying half of the acreage. The input costs are also reduced by maximizing the number of trees per acre. However, the perpendicular-V peach training system is much more labor intensive when compared to the standard open center training system. Scaffold development and pruning is laborious. Hand fruit thinning is very difficult on the Perpendicular-V trees, chemical or mechanical pruning equipment would be better suited for this system. The orchard sprayer design would also have to be modified specifically for spraying a Perpendicular-V tree orchard to ensure adequate spray coverage in the tree centers. The difficulty in maintaining size control of peach is exacerbated in the Southern Maryland region by a long growing season with continuous rainfall on productive agricultural soils. This is even more apparent when trying to manage the perpendicular-V tree training system. Therefore, this system is should not be recommended except for on a trial basis by experienced growers in the southern Maryland region. Growers should be encouraged to continue utilizing the traditional open center peach training system when establishing an orchard.

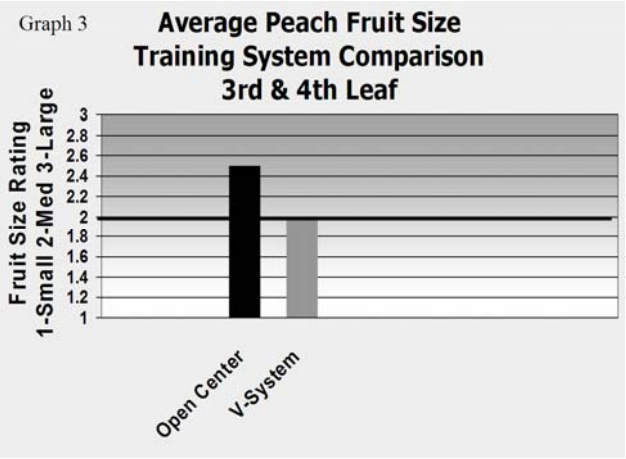
Graph 1



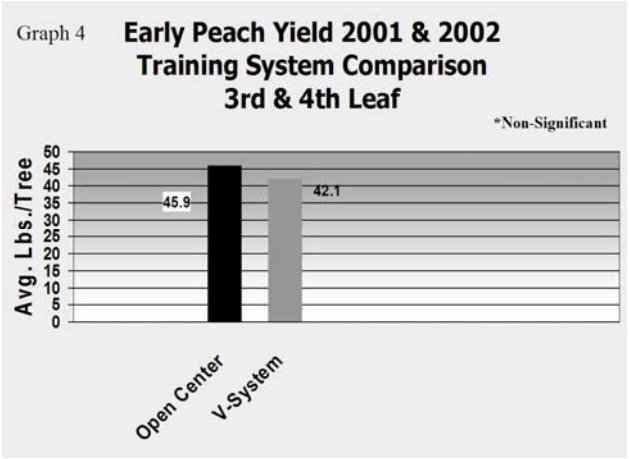
Graph 2



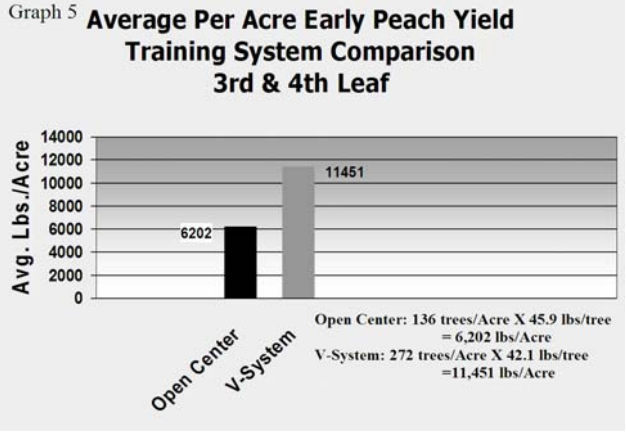
Graph 3



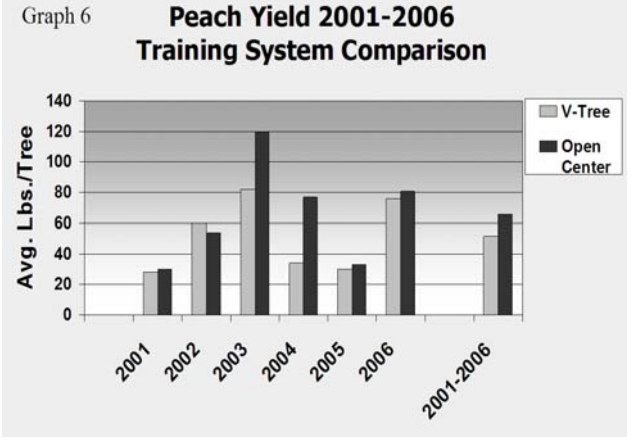
Graph 4



Graph 5



Graph 6



Graph 7