Southern Highbush Blueberry Response to Mulch

John R. Clark¹ and J.N. Moore²

Additional index words. Vaccinium spp., blueberry culture

Summary. Blue Ridge, Cape Fear, Georgiagem, and O’Neal southern highbush blueberry cultivars were grown for 5 years on a fine sandy loam soil in a comparison of plants either mulched with uncomposted pine sawdust and woodchips or nonmulched. Other cultural practices were identical and all plants received the same amount of trickle irrigation. A significant mulch × cultivar interaction for yield and mulch × plant age interactions for yield, individual berry weight, and plant volume were found. ‘Cape Fear’ was the highest-yielding mulched cultivar, followed by ‘Blue Ridge’, ‘Georgiagem’, and ‘O’Neal’. Mulched plants had higher yields and produced larger plants. Average individual berry weight was greater for mulched plants in the first year of harvest, but not different among treatments in other years. The data reveal that these southern highbush cultivars performed similar to northern highbush (Vaccinium corymbosum L.) in their need for mulching for adequate production on upland soils.

Mulching of blueberries has been found to be a beneficial practice in numerous reports (Moore 1976, 1979, 1990; Moore and Pavlis, 1979; Patten et al., 1988a, 1989; Spiers, 1983, 1986). Beneficial effects of mulch include weed control, insulation of soil from high summer temperatures, retention of soil moisture, increase in soil organic matter, enhancement of nitrogen and micronutrient availability, and improvement of soil structure (Moore, 1990). Rabbiteye blueberries (V. ashei Reade) respond positively to mulch, with the reduction in moisture stress being the major benefit (Spiers, 1983). Also, mulching has been found to influence root spread and irrigation water distribution in rabbiteye blueberries (Patten et al., 1988a, 1988b, 1989).

Mulching of highbush blueberries is a standard recommended commercial practice in Arkansas (Schaller, 1989). Highbush blueberries (V. corymbosum) grown on a silt loam soil in Arkansas responded to several mulching materials, with the largest yields in peat moss-amended soil and soil mulched with sawdust (Moore, 1979). Gough (1980) reported that the roots of highbush blueberry plants were found mostly in the area of decomposed mulch when grown on a fine sandy loam soil in Rhode Island.

The southern highbush blueberry is the result of hybridization of highbush with V. darrowi camp and V. ashei (Lyrene, 1990). This relatively new type of blueberry was developed to have a low chilling requirement and be grown in the deep south, yet produce a blueberry with the desirable characteristics of the northern highbush blueberry (Lyrene, 1990). Another possible benefit from the use of V. darrowi and V. ashei as parents was the inclusion of genes for upland soil adaptation and drought resistance (Galletta, 1975). Korcak (1986) found that blueberry progenies containing decreased amounts of highbush percentage with an increased genetic component from V. darrowi, V. ashei, V. atrococcum Heller, and V. angustifolium Aiton grew better on a range of soil types than essentially highbush progeny. However, the three southern highbush cultivars developed in Florida have not performed well in soils containing <2% organic matter unless mulched with pine bark (Lyrene, 1990).

This study determined the effect of mulching on growth and productivity of four southern highbush cultivars grown on a mineral soil.

Two-year-old container-grown plants were planted in Mar. 1985 at the Univ. of Arkansas Fruit Substation, Clarksville, on a Linker fine sandy loam soil (fine-loamy, siliceous, thermic Typic Hapludults), pH 5.5. The culti-

vars were Blue Ridge, Cape Fear, Georgiagem, and O'Neal. At planting, 4 liter of peatmoss was placed in the planting hole, half at the base of the hole and half mixed with the soil used to fill around the plants. The plants were watered immediately after planting, and standard cultural practices for Arkansas highbush blueberry production were followed, including annual fertilizer and preemergent herbicide applications (Schaller, 1989). Trickle irrigation was used (one 3.8-liter h’emitter near the base of the plant) and water was applied as needed, with increased irrigation rates as the plants increased in age. A combination of uncomposted pine sawdust and wood chip mulch was surface-applied to a depth of 15 cm and a width of 1.2 m to the mulched plants 1 month after planting; and this mulch thickness was maintained with annual mulch applications. No mulch was applied during the period of this study to the nonmulched plants, but all other cultural practices were identical to those of the mulched plants. Flowers were removed from all plants during the first 2 years. Data collection, including yield, individual berry weight, and plant volume, was conducted in 1987-89. Weight per berry was determined by weighing 25 berries at each harvest and calculating an average berry weight. Plant volume (an indicator of plant size) was measured by multiplying width x spread x height of each plant. A winter freeze and spring frost reduced yields in 1989, but otherwise no crop-reducing environmental conditions occurred during this study. There were four single-plant replications of each cultivar for mulched and two single-plant replications of each cultivar for nonmulched treatments. The experiment was designed and analyzed as a split-split plot with mulch as the main plot, cultivar as the sub-plot, and year (plant age) as the sub-subplot.

The analysis of variance of the data revealed that significant sources of variation were the mulch x cultivar interaction for yield and mulch x year (plant age) interactions for yield, individual berry weight, and plant volume.

The mulch x cultivar interaction was averaged over years, and the mean separation for the mulch x cultivar interaction for yield is presented in Table 1. Cape Fear with mulch was the highest-yielding treatment combination, followed by mulched Blue Ridge, Georgiagem, and O'Neal. Mulched vs. nonmulched comparisons were significant for all cultivars except O'Neal.

Yield, individual berry weight, and plant volume means for the mulch x year interaction (plant age) are presented in Table 2. Significant differences occurred in 1988 and 1989 between mulched and nonmulched plants. The greatest yields were achieved in 1988. The large LSD value for yield was probably because only two replications were used for the nonmulched treatment and a large year-to-year yield variation occurred in 1989, compared to 1988 for Georgiagem and O'Neal. A significant difference among mulch treatments for weight/berry was found only in 1987, the first fruiting year. There were significant differences each year in plant volume due to mulch treatments. Mulched plants were much larger at the conclusion of this study, while nonmulched plants were stunted although still alive.

Yield trends in this study are similar to those of Collins highbush blueberry in a comparison of mulched vs. nonmulched plants (Moore, 1979). However, the nonmulched plants in this study generally performed more poorly than the nonmulched Collins plants. Spiers (1983) reported a similar significant response to mulch for rabbiteye blueberry, although he found that an increase in irrigation applications to nonmulched plants reduced the importance of mulching for plant productivity.

Limited response to mulching of southern highbush blueberry for individual berry weight in this study agrees with reports of Patten et al. (1989), who found no difference in individual berry weight due to mulch on rabbiteye, and Moore and Pavlis (1979), who found no mulch benefit for individual berry weight on highbush.

Plant volume response to mulch in this study differs from the lack of a mulch response on rabbiteye by Patten et al. (1989), but larger rabbiteye plants did result from mulching, as reported by Spiers (1983). However, the plant volume differences we found for southern highbush are much greater than those reported for rabbiteye.

Our data indicate that this group of southern highbush blueberry cultivars respond to mulch, and at this location mulch would be required to produce adequate yields. The data support the conclusion that southern highbush blueberry cultivars would need a cultural system similar to that of northern highbush cultivars for production on a mineral soil. Three of the four cultivars in this study have a common V. darrowi parent (Florida 4-B) and are one-fourth V. darrowi and three-fourths V. corymbosum (Austin and Draper, 1987; Ballington et al., 1990a, 1990b). New cultivars with other

Table 1. Effects of mulching on yield of four southern highbush blueberry cultivars. Values are the means for the three harvest years (1987–89).

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Mulch</th>
<th>Yt (g/plant)</th>
<th>Berry wt (g)</th>
<th>Plant vol (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Ridge</td>
<td>Yes</td>
<td>1830</td>
<td>1.36</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>249</td>
<td>1.12</td>
<td>0.15</td>
</tr>
<tr>
<td>Cape Fear</td>
<td>Yes</td>
<td>2040</td>
<td>1.21</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>112</td>
<td>1.21</td>
<td>0.18</td>
</tr>
<tr>
<td>Georgiagem</td>
<td>Yes</td>
<td>1330</td>
<td>1.76</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>198</td>
<td>1.90</td>
<td>0.27</td>
</tr>
<tr>
<td>O'Neal</td>
<td>Yes</td>
<td>986</td>
<td>0.35</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSD0.05</td>
<td></td>
<td>944</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Plant age is number of years plants had been growing in the field.*
adapted species may perform more favorably on mineral soils. A reduced amount of *V. corymbosum* in the parentage, with a concomitant increase in *V. darrowi* or other upland-adapted *Vaccinium* spp., may provide more upland-adapted cultivars. Future testing of new southern highbush cultivars for their response to mulch will be needed to determine the level of adaptation to mineral soils.

Another area that should be examined with southern highbush cultivars is to determine if increased irrigation volumes would compensate for the absence of mulch. Spiers (1983) reported that moisture stress was the dominant factor limiting the establishment of rabbiteye plants and that mulching could be replaced by increased irrigation. Moore (1990), however, believes that factors other than water relations contribute significantly to enhanced performance of highbush blueberries under mulch.

**Literature Cited**


**Acknowledgements**

We acknowledge the contributions of Gina Fernández and Don Dombek in the establishment, maintenance and data collection of the planting used for this study.