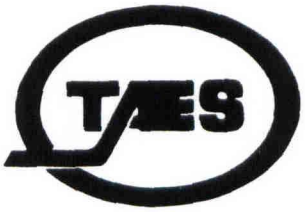

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FERTILIZATION, IRRIGATION, AND MULCHING EFFECTS ON RABBITEYE BLUEBERRIES IN TEXAS

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INTRODUCTION

The rabbiteye blueberry (Vaccinium ashei Reade) is native to the southeastern United States and is adapted to Texas. Blueberries are a commercial crop in the acid soil areas of East Texas.

Differences in both soils and climate exist between Texas and the current major rabbiteye producing regions in the South (primarily Georgia). East Texas soils are sandy and relatively infertile with low organic matter and poor water holding capacity. Although East Texas receives 45 in. annual average rainfall, distribution is poor, often with little or no rainfall between July and September. Due to the infertile, droughty nature of East Texas soils and less than ideal rainfall distribution, these studies were initiated to determine the effects of irrigation, plant mulching, and fertilizer source, rate, and timing of application on production and quality of Tifblue rabbiteye blueberries.

METHODS AND MATERIALS

Tifblue blueberrries were planted on a 6 x 12 ft. spacing in March 1978 at the Texas A&M Agricultural Research and Extension Center at Overton. The soil was a Darco series sandy loam with a pH of 5.3. Pollinator cultivars were interspersed throughout the planting. At the time of plant establishment, 1/2 bushel of peat moss was incorporated into each planting hole.

Fertilization study: A slow release 13-13-13 fertilizer (Osmocote®) and a readily soluble 13-13-13 granular fertilizer formulated by blending ammonium sulfate, super phosphate, and muriate of potash were used as nutrient sources. All plots received the same total amount of N, P, and K each year, except one treatment which received one-third rate of P and K by applying only N during the last two of the three split applications. Total rates of actual N, P, and K used during each year are shown in Table 1. The slow release fertilizer was applied in a single application in March each year. The readily soluble fertilizer was applied once or split into two or

three applications each year. Fertilization treatments and the times of application are presented in Table 2.

All plots were mulched with sawdust extending 2 ft. on either side of the plant and all fertilizer treatments were surface applied by hand uniformly over the primary rooting zone of the plant. All plants were drip irrigated as needed during the growing season. The study was a randomized complete block with three replications of four plant plots.

Mulch and irrigation study: All plants were established as described above and either not mulched or mulched with hay or sawdust under the plant. All plots received the same amount of supplemental drip-irrigation except one treatment (with sawdust mulch) which received no irrigation. Readily soluble granular N was applied in three split applications in March, May, and July each year and P and K were applied only once a year (March) at one-third the total yearly rate of N. Fertilization rates were the same as used in the above study (Table 1). The experimental design was a randomized complete block with three replications of four plant plots.

In both studies, plants were pruned to facilitate harvest mechanization and bushes were mechanically harvested using a Model "R" Blueberry Equipment, Inc. mechanical harvester. Plants were large enough for the first mechanical harvest in 1981 and two or three harvests were required each year at 10-day to 2-week intervals to pick the entire crop. Plot yields were first recorded in 1981, and beginning in 1982, fruit samples for quality analysis were collected from each plot at each harvest and frozen for later quality analysis.

For quality analysis, berry weight was determined, samples were thawed and blended, and percentage of soluble solids and titratable acidity was measured. Color was determined by measuring absorbance at 520 nm of an acidified ethanol extract of the homogenate.

RESULTS AND DISCUSSION

Fertilization rates were increased from 24 lb/ac actual N, P, and K during the year of establishment (1978) to a high of 108 lb/ac in 1982 (Table 1). Because of over-fertilization symptoms (leaf scorch and reduced plant growth) in 1982, fertilization rates were reduced to

72 lb/ac in 1983.

Fruit yields were not significantly affected by fertilization treatments 3 out of 4 years, however, specific trends occurred (Table 3). Applying the total allotment of N, P, and K in a single application using the soluble form was most detrimental to production. Plots which received split applications of the readily soluble granular fertilizer with N, P, and K applied at equal rates increased in yield with each additional split application. Plants which received 3 split applications of N with reduced rates of P and K produced highest through 1983. A single application of slow release NPK was comparable to 3 split applications of N-P-K. Fertilizer source and timing of application had little effect on fruit quality (Table 3).

Both mulch and irrigation affected blueberry survival and production. Plants not receiving supplemental irrigation, even though they were mulched, did not survive beyond the 1981 season and the nonirrigated plants that were alive in 1981 had essentially no fruit production.

Nonmulched plots which received the same amounts of irrigation each year as mulched plots produced inferior fruit yields compared to plots mulched with either hay or sawdust (Table 4). The nonmulched plots would have had higher evaporational losses of soil moisture and since irrigation rate was not adjusted to compensate for differences in evaporative moisture loss, nonmulched plots may have encountered higher soil moisture tensions, which would adversely affect yield. Also, mulch decomposition ties up N, and since fertilization rates were not adjusted to compensate for biological N utilization, over fertilization could have occurred in nonmulched plots. The hay and sawdust mulches also tended to prevent soil crusting, thus improving soil aeration and overall plant performance.

The mulch treatments had only slight, but occasionally significant, effects on fruit quality (Table 4). However, the magnitude of these fruit quality effects would not be considered commercially important.

SUMMARY

Results of this study indicate that single applications of a slow release or split application of a soluble fertilizer may be superior to single applications of a readily soluble fertilizer. Mulch was necessary to obtain maximum fruit production under the conditions of this study; however, adjustments in irrigation and fertilization rates could reduce the need for a mulch. Hay and sawdust worked equally well as a mulching material and irrigation was essential for plant survival and continued production.

Table 1. Rates of fertilizer elements applied by year.

Year	Actual N, P, K*	
	lbs/ac	oz/plant
1978	24	0.63
1979	48	1.27
1980	72	1.90
1981	72	1.90
1982	108	2.87
1983	72	1.90
1984	72	1.90

*Actual P and K rates were reduced by one-third in some treatments which are noted in the text.

Table 2. Fertilizer source and timing of application.

Fertilizer source	Application		
	March	May	June
Slow release	NPK		
Soluble fertilizer	NPK		
Soluble fertilizer	NPK	NPK	
Soluble fertilizer	NPK	NPK	NPK
Soluble fertilizer	NPK	N	N

Table 3. Effect of fertilizer source and timing of application on yield and quality of Tifblue blueberries.

Fertilizer treatment		Yield (lbs/ac)				Quality (2 year $\bar{x}$)			
Source	Application	1981	1982	1983	1984	Berry weight (g)	Soluble solids (%)	Tit. acid. (%)	Color (A_{520})
Slow release	1-NPK	2473a*	4295a	7607ab	14589a	1.28a	12.6a	0.50a	.332a
Soluble	1-NPK	1705a	2759a	5866b	9482a	1.28a	12.9a	0.47a	.380a
Soluble	2-NPK	1437a	3545a	6964ab	12330a	1.25a	12.2a	0.52a	.357a
Soluble	3-NPK	2670a	4402a	7634ab	13330a	1.31a	12.6a	0.51a	.349a
Soluble	3-N, 1-PK	2929a	4714a	8170a	13527a	1.27a	12.9a	0.52a	.364a

*Means separation within columns by Duncan's multiple-range test, 5%.

Table 4. Effect of mulch treatment on yield and quality of Tifblue blueberries.

Mulch treatment	Yield (lbs/ac)				Quality (2 year $\bar{x}$)			
	1981	1982	1983	1984	Berry weight (g)	Soluble solids (%)	Tit. acid. (%)	Color (A_{520})
None	696b*	1795b	2214b	7598b	1.23a	12.7a	0.53b	.390a
Hay	2348a	3893a	4777a	12071a	1.19b	12.4b	0.48a	.380a
Sawdust	2929a	4714a	5446a	13527a	1.27a	12.8a	0.52ab	.364a

*Means separation within columns by Duncan's multiple-range test, 5%.