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BLUEBERRY PLANT RESPONSE TO NITROGEN AND PHOSPHORUS

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INTRODUCTION

Nitrogen (N) and phosphorus (P) are the two most deficient plant nutrients in East Texas sandy, acid soils. This study was initiated to evaluate 'Tifblue' rabbiteye blueberry response to rates of each of these nutrients applied to a soil-peat planting medium in a glasshouse pot culture experiment.

MATERIALS AND METHODS

Gallon size plants were potted in 9.7 lb of a 1:1 v/v peat:loamy sand mix. Each pot of peat:loamy sand mix was fertilized with 1.9 gms of a fertilizer blend containing 16% potash, 9.44% calcium, 8% magnesium, 8% sulfur, 1% zinc, 1% iron, 0.2% copper, 0.03% boron, and 0.01% molybdenum. Phosphorus rates of 0, 40, 80, 120, and 160 lb P₂O₅/Ac-equivalent were applied to appropriate pots of media and mixed. Plants were potted, watered, and grown for one month at which time the first of four applications of 0, 25, 50, and 75 lb of N/Ac equivalent was applied. Three additional applications of these same N rates were made at bimonthly intervals during the study. Each pot was uniformly irrigated with 500 ml of deionized water. Plants were harvested 8 months following initiation of the experiment.

RESULTS AND DISCUSSIONNitrogen

The 300 lb/Ac maximum N rate used in this study was selected as a safe but adequate level of fertilizer N based on a previous study. However, in this study, 300 lb of N split-applied four times did not appear to optimize plant growth as leaf, stem, and total top fresh weight were still increasing linearly at this level of applied N. Increasing rates of N had no effect on the number of stems less than 2 mm diameter or on leaf yellowing. The number of stems greater than 2 mm diameter was significantly increased from 3 to 4.76 per plant as N rate increased from 0 to 300 lb N/Ac. Leaf reddening began in fall after the glasshouse temperature was decreased by a cold snap prior to

the heaters being lighted. Increasing N rates decreased the level of redness in the plant leaves.

Phosphorus

The zero to 80 lb P_2O_5 /Ac rates had no significant effect on leaf, stem, or top fresh weight. There was a tendency for these parameters to decrease as the P_2O_5 rate increased. Rates of P_2O_5 at or above 120 lb/Ac were required to significantly increase leaf, stem, and top fresh weight. Phosphorus had no effect on stem diameter less than 2 mm, but the 120 lb P_2O_5 /Ac rate increased stem diameter greater than 2 mm. Leaf reddening was decreased by increasing phosphorus. Leaf yellowing was increased at the lower P_2O_5 applications, but declined as P_2O_5 was increased above 80 lb/Ac.

Additional factors evaluated included plant vigor which was increased by N and P at the higher rates. Root weight was not affected by N rate increases, but was increased by the 120 lb P_2O_5 /Ac rate compared to the 80 lb rate.

SUMMARY

A glasshouse evaluation of nitrogen and phosphorus fertilizer rates on blueberries was conducted using N rates from 0 to 300 lb/Ac and P_2O_5 rates from 0 to 160 lb/Ac. The highest rates of N and P_2O_5 evaluated in this study appear to be safe rates for repotted 'Tifblue' rabbiteye blueberry plants. Extension of the higher rates of N and P_2O_5 for use in the field would appear to also be safe. The N could possibly be applied at slightly higher rates in the field. Both N and P at the higher rates reduced the leaf reddening of the leaves indicating that blueberry plants adequately fertilized with these nutrients could have a longer growth period in fall.

Table 1. Response of 'Tifblue' blueberry plants to fertilizer nitrogen and phosphorus in a glasshouse study.

Nitrogen Rate ¹ lb/Ac	Plant growth responses evaluated							
	Leaf fresh wt ²	Stem fresh wt	Top fresh wt	Stems < 2 mm	Stems > 2 mm	Leaf Redness ³	Leaf Yellowing ⁴	
0	28.91 a	38.77 a	67.68	11.20 a	3.00 a	3.76 c	2.20 a	
100	39.32 b	45.77 ab	80.09	12.84 a	3.97 ab	3.05 b	2.13 a	
200	46.97 b	52.08 b	99.05	10.52 a	5.18 b	2.32 a	2.24 a	
300	58.56 c	62.84 c	121.70	14.12 a	4.76 b	2.24 a	2.24 a	
Phosphorus ⁵ (P ₂ O ₅) rate lb/Ac								
0	36.42 a	45.44 a	81.86	12.35 a	3.30 a	3.15 b	2.05 a	
40	31.13 a	40.35 a	71.48	13.25 a	3.27 a	3.29 b	2.64 b	
80	28.60 a	37.59 a	66.19	10.55 a	3.35 a	3.15 b	2.35 ab	
120	63.61 b	65.29 b	128.90	12.30 a	6.51 b	2.22 a	2.01 a	
160	57.42 b	60.64 b	118.16	12.40 a	4.70 a	2.40 a	1.95 a	

1. Rate of urea nitrogen split-applied 4 times at 2-month intervals.
2. Responses for each plant nutrient, within a column, followed by a similar letter are not significantly different at the p=0.05 probability level.
3. A rating of 5 is all red - 1 is none red.
4. A rating of 5 is all yellow - 1 is none yellow.
5. All rates of phosphorus were incorporated into the soil-peat mix prior to planting.