FERTILIZATION OF AN EIGHT-YEAR-OLD SLASH PINE PLANTATION THINNED FOR SEED PRODUCTION

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In 1968, Buckeye established a 300-acre slash pine (P. elliottii Englm.) seedling seed orchard. To provide an interim seed supply, a nearby eight-year-old slash plantation was converted to a seed production area. A fertilization experiment was initiated in the thinned stand to set up flower induction guidelines for later operational use.

PROCEDURES

Study Area

The flower induction experiment was installed in a 200-acre slash pine plantation thinned five months earlier for seed production. The thinning involved removal of alternate rows, and one-half of the trees in remaining rows. Crop trees were selected on the basis of size, form, and apparent disease resistance. The residual stand contains 200 trees per acre.

Experimental Design

The statistical design was a 4x3x2 NPK factorial with single tree plots. Plots were spaced at least 25 feet apart to reduce inter-plot feeding. Within each replication, stem sizes were purposively held to a one-inch dbh range to decrease variation in tree size.

Fertilizer Application

In May 1967, the 24 treatment combinations of NPK levels shown in table 1 were applied to 15 replications.

In June 1968, five replications were again fertilized with the complete factorial treatments. Each year the fertilizer was hand-distributed within the drip line of the tree crowns. Nutrient sources were NH_4NO_3, superphosphate, and KCL.

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Table 1. Nutrient levels used in the flower induction experiment

Levels	N	P_2O_5	K_2O
	----------Lbs/Tree----------		
1	0	0	0
2	1	2	2
3	2	4	-
4	4	-	-

Data Collection

Total conelet counts were made from a truck-mounted ladder during March of 1968 and 1969.

Statistical Analysis

Conelet counts were transformed by the square root of the count plus one. Analysis of variance was performed to test for significance. An orthogonal set was chosen in advance to contrast nitrogen levels.

The treatment effects on "ripeness to flower" were tested by the chi-square analysis.

RESULTS

Trees with Conelets

The only nutrient significantly affecting "ripeness to flower" was nitrogen. In 1968 and 1969 nitrogen treated trees produced conelets 83 and 87 per cent more often than did the controls. Treatment effects by year are illustrated in figure 1. Chi-square comparisons among the second, third and fourth levels were insignificant both years.

Trees fertilized in 1967 but not in 1968 regressed to inherent conelet status in 1969.

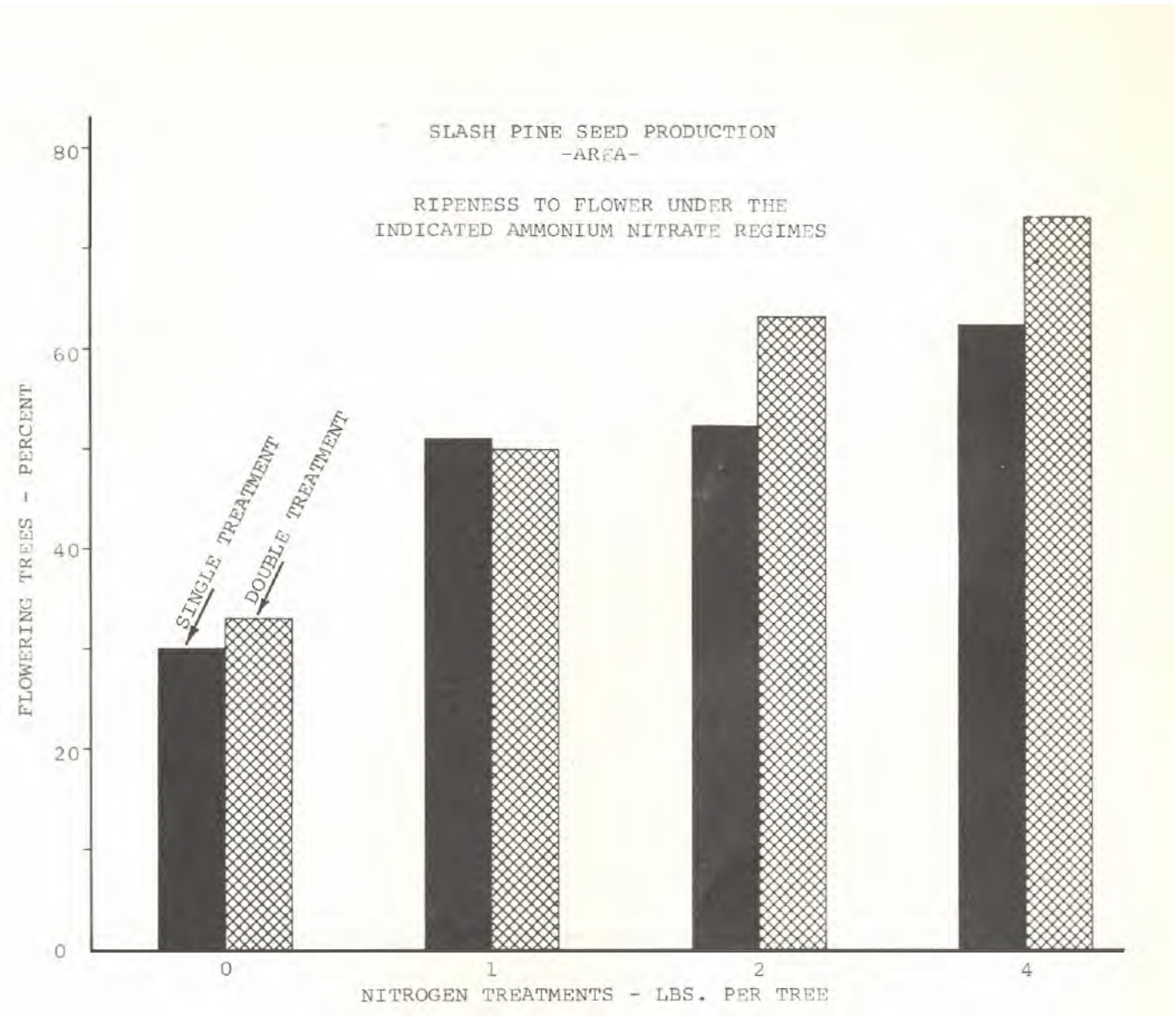

Figure 1. The effect of indicated nitrogen treatments on percentage of trees flowering in a slash pine seed production area.

Conelets per Tree

Nitrogen stimulated the 1968 conelet crop by 87 per cent and the 1969 crop by 540 per cent. Orthogonal comparisons among the second, third and fourth levels were insignificant the first year. In 1969, however, the fourth level induced 109 per cent more conelets than the average of the intermediate levels. Figure 2 illustrates conelet data by treatment and year.

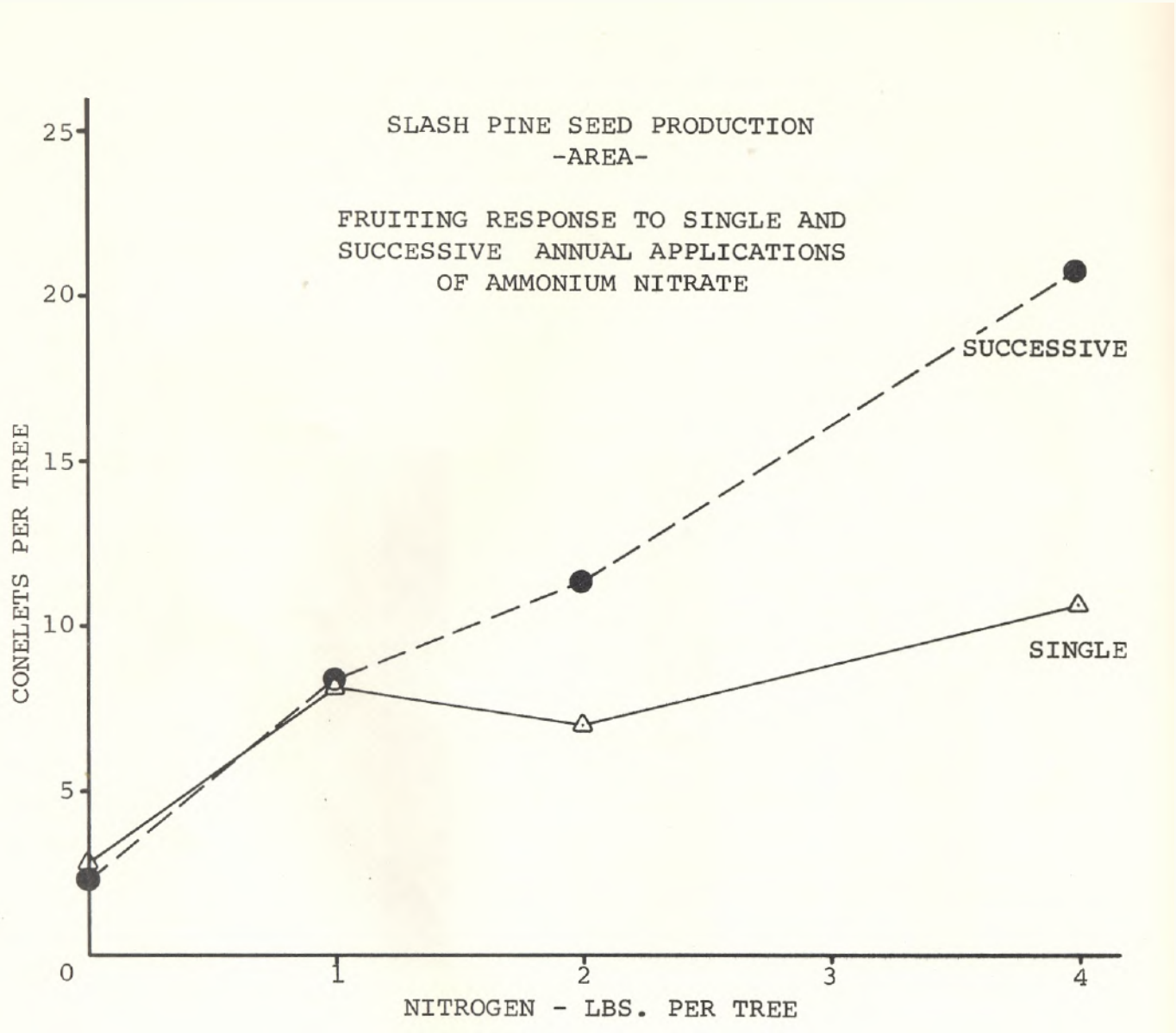

Figure 2. The effect of indicated nitrogen treatments on fruiting in a slash pine seed production area.

The residual flowering effect in 1969 was not meaningful for trees fertilized in 1967 only.

Phosphorus and potassium did not affect flowering.

DISCUSSION

Stimulation of slash pine conelet crops by nitrogen fertilization has been reported previously (Barnes and Bengtson 1968, Hoekstra and Mergen 1957, Shoulders 1968). This study confirms the above, and shows in addition that nitrogen rates as high as 800 pounds per acre may be economically applied to young seed production areas.

Costs of fertilization, cone collection and processing are nearly absorbed in the $5.25 per pound value of unimproved seed. Any genetic gain in volume, then, may be considered as profit. Perry and Wang (1958) calculated an increase in value of approximately $9 per pound for each unit genetic increase. Updating this calculation to reflect current stumpage value, a one per cent increment in volume is now worth about $20. Assuming a one per cent genetic gain, a fertilization expenditure of $30 per acre will return $400 worth of seed per acre. This cost benefit ratio will widen in subsequent years. On this basis, it is clear that flower induction is a profitable operation.

LITERATURE CITED

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