Effects of liming on height growth of loblolly pine

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Limestone applied to a silt loam soil in southern Illinois over a 50-year period, or hydrated lime applied 2 years before planting an area with shortleaf pine in 1964, resulted in reduced heights of the pine through the 1974 growing season (1,2). Heights of loblolly pine *(Pinus taeda* L.) at the end of 10 growing seasons planted on an adjacent area that was treated in a similar manner as the shortleaf pine, are reported in this note.

Loblolly pine from an eastern Tennessee seed source was planted at a spacing of 1.83 by 1.98 m (6 x 6.5 feet) in 1965 on a plot that had only crop residue produced in an agronomic rotation from 1912-1962 returned to it. A second plot was planted that received, in addition to the crop residue, a total of 33 metric tons of limestone per hectare during the same 50-year period. Both plots were subdivided in 1962 before loblolly pine was planted, and three replicated treatments of 0, 2.2, 4.4, and 8.8 metric tons of hydrated lime per hectare were applied to each plot. In addition to the hydrated lime, 134 kilograms of nitrogen, 25 kilograms of phosphorus. and 111 kilograms of potassium per hectare were applied uniformly to both plots in the spring of 1962. A more complete description of the experimental area is given in an earlier paper (1).

Results and Conclusions

At the end of 10 growing seasons, mortality was practically nil and crowns of the pines were almost touching on both plots. More than likely the canopy will close within a few years. It is assumed that roots from trees in one treatment area are not extending into another treatment area since roots of young loblolly pine normally extend only a short distance beyond the canopy drip line.

Hydrated lime applied in 1962 resulted in higher soil pH values (table 1), but there was no difference in height of the trees at the end of the 1974 growing season that could be attributed to hydrated lime. These results do not agree with results of a similar experiment with shortleaf pine (2). In that study a negative relationship was found between total height of shortleaf pine and increasing amounts of hydrated lime.

Table 2 shows the average height of loblolly pine at the end of each of the first four and the tenth growing seasons by plots. The average height of trees on the plot that received no lime prior to 1962 was significantly (1 percent level) greater at each time of measurement than trees on the corresponding plot that received 33 tons of lime prior to 1962. The results show that the retardation of height of loblolly pine was correlated with soil pH; they also indicate that the increase in pH must be gradual over a long period of time if height growth of loblolly is to be affected. This assumption is supported by Plass (3) who reported that loblolly pine showed a tendency toward slower growth on mine spoils having a pH of 5.0 or higher.

Conclusions to be drawn from this study are that high soil pH will have a deleterious effect on the height growth of loblolly pine, but loblolly can tolerate a wider range in pH than shortleaf pine before height growth is affected. These conclusions are substantiated by Plass (3) who found that loblolly pine was better adapted to a wider range of surface-mine spoils than shortleaf pine.

TABLE 1.—Average height of loblolly pine and soil pH according to lime treatment

Lime applied Before 1962	In 1962	Soil pH 1964	Height 1974
Metric tons/ha			*Meters*
None	0.0	4.8	6.79
None	2.2	5.0	6.86
None	4.4	5.3	6.73
None	8.8	6.0	6.73
33	0.0	6.8	6.00
33	2.2	7.1	6.00
33	4.4	7.2	5.88
33	8.8	7.3	6.12

TABLE 2.—Average height of loblolly pine by plots and years

Lime applied Before 1962	1965	1966	1967	1968	1974
Metric tons/ha			*Meters*		
None	0.67	1.07	1.55	2.35	6.77
33	0.52	0.82	1.16	1.65	6.00

Literature Cited

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