PLANTING HARDWOODS FOR STAND IMPROVEMENT IN NORTH MISSISSIPPI

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A study in northern Mississippi demonstrates that valuable hardwood species can be successfully underplanted to improve low-grade upland hardwood

stands. The degree of success attained is affected by at least 3 factors: species, topographic position of planting site, and release from undesirable overstory hardwoods.

During each of three consecutive years beginning in 1949, five species of hardwoods (1-0 stock) were planted beneath low-grade hardwoods on upper, middle, and lower slopes, and on minor bottoms. The planted hardwoods were white ash, black walnut, white oak, yellow-poplar, and black locust. For comparison, loblolly pine was also included. On half of the plots, all overstory hardwoods larger than 0. 5 inch d. b. h. were removed or killed to release the underplanted seedlings.

This report summarizes the second-year results from all three annual replications, and mentions some of the fourth-year data from the earliest replication.

Species. - All but one of the hardwoods show promise of being useful for underplanting.

Yellow-poplar has made a particularly good showing. Its 2-year survival (table 1) has been satisfactory and its height growth has been exceeded only by black locust, a species of less value. Yellow-poplar has kept up with loblolly pine even on upper slopes --- sites to which loblolly is usually better adapted. After 2--years' growth, released plantings of yellow-poplar on lower slopes averaged 3. 6 feet tall. (Table 2.) Two-year-old released black locust on similar sites averaged 4. 2 feet in height.

White ash on all sites and black walnut on minor bottoms have made satisfactory if not spectacular height growth. In addition, white ash had the best survival of any species tested (including pine) regardless of site or treatment. Survival of black walnut was good on minor bottoms but only fair on the three slope sites.

Survival of white oak has been only fair and early height growth was the poorest of any species tested.

On the one set of plots that has been growing for 4 seasons, released black locust is 9. 2 feet tall on minor bottoms and lower slopes, while released yellow-poplar has attained a height of 8. 5 feet on minor bottoms and 9. 3 feet on lower slopes. Even on upper slopes, 4-year-old released yellow-poplar is 7. 6 feet tall, as compared with 7. 8 for loblolly pine. After a slow start, released white oak picked up somewhat and averaged about 2 feet tall on all sites.

Table 1.--Average survival of underplanted hardwoods at the end of the second growing season, by species, treatment, and site

Species and treatment	Site			
	Upper slope	Middle slope	Lower slope	Minor bottom[1/]
	- Percent of seedlings alive - -			
White ash:				
Released	95	99	99	97
Unreleased	97	93	97	94
Black walnut:				
Released	55	53	61	79
Unreleased	75	73	67	73
White oak:				
Released	75	69	61	53
Unreleased	58	73	62	37
Yellow-poplar:				
Released	83	80	89	76
Unreleased	73	83	71	76
Black locust:				
Released	85	70	69	75
Unreleased	47	51	48	21
Loblolly pine:				
Released	81	81	80	43
Unreleased	74	61	63	17

1/ Minor bottoms are those which, with their terraces included, are less than one-quarter mile wide.

Table 2.--Average height of underplanted hardwoods at the end of two growing seasons, by species, treatment, and site

Species and treatment	Site			
	Upper slope	Middle slope	Lower slope	Minor bottom
	- - - - - - - - Feet - - - - - - - -			
White ash:				
Released	1.8	1.7	1.9	1.8
Unreleased	1.1	.9	1.0	1.2
Black walnut:				
Released	1.5	1.3	1.4	2.1
Unreleased	1.5	1.4	1.7	1.8
White oak:				
Released	.8	.8	.8	.9
Unreleased	.8	.8	.8	.8
Yellow-poplar:				
Released	2.8	2.6	3.6	3.4
Unreleased	1.1	1.0	1.1	1.1
Black locust:				
Released	3.2	3.5	4.2	4.9
Unreleased	1.5	1.2	1.2	1.1
Loblolly pine:				
Released	2.8	2.6	2.5	2.2
Unreleased	1.2	1.0	1.2	.8

Topographic position. - Indications are that planted hardwoods will do better on minor bottoms and lower slopes than on middle or upper slopes. The height differences noted between lower and upper slopes at 2 years are tending to increase. Pine has not done well in minor bottoms.

Release from overstory hardwoods. - Overstory competition is intense on minor bottoms and lower slopes, so release from it is absolutely essential. Even after such release, accelerated growth of grass; vines, and shrubs reduces survival somewhat, and may retard the young hardwoods until their crowns rise well above the jungle of low vegetation. The better moisture and fertility of the lower sites will eventually be reflected in much superior hardwood growth, however.

On middle and upper slopes the effects of release were somewhat inconsistent, but similar trends are indicated. Other studies show that in the first few years after planting release affects height growth more than it does survival. After several years, survival differences also become quite pronounced. Released seedlings suffer their greatest losses in the first few years after planting, whereas loss of non-released seedlings continues until only a few fortunately placed individuals remain.

No hardwood (or pine) underplantings should be made unless early release is contemplated.