

# EARLY GROWTH OF BLACK CHERRY, OAKS, AND YELLOW-POPLAR IN SOUTHERN APPALACHIAN PLANTINGS

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*Planting of black cherry in the old fields of the southern Appalachians is successful given the right postplanting cultural treatment. Planting of oak and yellow poplar is generally not successful unless seedlings are cared for longer than 3 years.*

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Operational-scale plantings of Appalachian hardwoods to date have had only mixed success mainly because of poor planting stock, inadequate culture, and poor species-site combinations. In this study, I evaluated the performance of good stock given 2 years of adequate postplanting culture on suitable sites.

## Methods

Nurserybeds near Norris, Tenn., were fall-seeded to open-pollinated families of yellow-poplar (*Liriodendron tulipifera* L.), black cherry (*Prunus serotina* Ehrh.), northern red oak (*Quercus rubra* L.), white oak (*Q. alba* L.), chestnut oak (*Q. prinus* L.), and bear oak (*Q. ilicifolia* Wangenh). The bed area, which had supported a cover crop of ryegrass for one season prior to use, was prepared in September and treated with methyl bromide after incorporation of 300 kilograms per hectare of commercial

(13-13-13) fertilizer. Two additional fertilizations with ammonium nitrate at a rate of 50 grams per square meter were made in mid-May and July. After germination was completed, beds were thinned to 45 seedlings per square meter. They were irrigated about twice weekly throughout the growing season.

At the end of the growing season, seedlings of all species had root starch levels of 40 to 50 percent (2) and oven-dry weights ranging from 11 grams for white and bear oaks to 135 grams for black cherry. Seedlings were lifted from beds in late February 1976 and packed in damp sphagnum for transport to planting sites. Some large yellow-poplar and black cherry seedlings were pruned to 1 meter high. Heights at planting are presented in table 1.

Seedlings of each species were divided into 17 replications of two treatments. The first was the control and the second treatment was nitrogen and phosphorus fertilization. A split-plot design was used at each location with species as main plots and fertilizer treatments as subplots. Treatment plots contained 12 seedlings from two to three open-pollinated families.

Four planting areas in the southern Appalachian mountains were chosen, and replications were assigned to them as outlined in table 1. Clearcut sites

were planted on the Tusquitee Ranger District in western North Carolina, on the Tellico Ranger District in Tennessee, and on the Norris City Watershed in Tennessee. All were cove sites with reasonably good soils and already occupied by the species being planted. Two old-field sites were included on the Mount Rogers National Recreational Area in Virginia. Seedlings were planted in March 1976 at 3-by-3-meter spacing in holes prepared with a posthole digger or shovel. The fertilization treatment applied at planting consisted of 200 grams of ammonium nitrate and 100 grams of high-analysis superphosphate (23.8% P) in dibble holes 0.3 meter from seedlings. All seedlings were cultivated by hand during the first two growing seasons to remove competing vegetation in a 1-meter-wide circle around plants. Height of seedlings was measured at planting and after each of the first three growing seasons.

## Results

With the exception of the yellow-poplar and white oak planted at the Tellico site, survival of all species was over 70 percent at 3 years (table 1), as one would expect given relatively good planting conditions. Black cherry exhibited the highest average survival (92%), and northern red oak the lowest (77%).

**Table 1.—** *Three-year survival and height of planted hardwoods on four southern Appalachian sites*

Site	Number replications	Black cherry				Yellow -poplar				Northern red oak			
		Survival	Height			Survival	Height			Survival	Height		
			Initial	Control	Fert.		Initial	Control	Fert.		Initial	Control	Fert.
		%	...	cm	...	%	...	cm	...	%	...	cm	...
Mt. Rogers National Recreation Area, Va.	6	98	83	123	210	97	79	111	152	75	49	61	54
Norris Watershed, Tenn.	3	81	82	180	213	93	78	147	160	80	56	70	79
Tusquitte Ranger District, N. C.	5	100	84	139	227	95	78	97	130	75	69	60	87
Tellico Ranger District, Tenn.	3	90	76	185	207	58	74	100	124	77	60	93	83

  

Site	Number replications	White oak				Chestnut oak				Bear oak			
		Survival	Height			Survival	Height			Survival	Height		
			Initial	Control	Fert.		Initial	Control	Fert.		Initial	Control	Fert.
		%	...	cm	...	%	...	cm	...	%	...	cm	...
Mt. Rogers National Recreation Area, Va.	6	78	20	36	39	88	54	70	85	74	33	41	46
Norris Watershed, Tenn.	3	78	18	40	41	92	54	77	75	86	36	58	55
Tusquitte Ranger District, N.C.	5	97	22	49	51	86	60	82	77	77	34	43	52
Tellico Ranger District, Tenn.	3	63	25	53	71	71	58	84	87	-	-	-	-

Oak growth was poor, with total height increment for the 3 years totaling less than 20 centimeters on the average. This response was partly because of severe late frost in 1977 and 1978, which killed new shoots. Fertilization at planting did not stimulate shoot growth of oaks.

Both yellow-poplar and black cherry grew to heights of about 1.5 to 2.0 meters in three seasons and responded significantly (0.05

level of probability) to fertilization by increasing 3-year height 24 and 36 percent, respectively, relative to controls. Yellow-poplar height increment was repeatedly reduced by unseasonably late spring frost, while black cherry, the first species to begin spring shoot elongation, was not affected by frost. Response of black cherry to fertilization was especially noteworthy at the Mount Rogers and Tusquittee

sites where 71- and 63-percent increases over controls were observed. These results are similar to those reported by Auchmoody (1) for black cherry on the Allegheny plateau of Pennsylvania.

**Conclusions**

Without further fertilization and competition control, the oaks in this test will probably continue to grow poorly and

eventually most of the plants will probably die or become part of an understory to natural regeneration. The successful old-field plantings of oak in the southern Appalachians (3, 4, 5) have all resulted from care beyond the first 3 years. Thus, more work on several aspects of the oaks' early growth under these field conditions will be required. On the other hand, planting black cherry after regeneration cuts is believed to be a currently feasible practice, given high-quality stock, fertilization, and at least one season's vegetation control. Yellow-poplar has been shown previously to be a suitable species for planting under these conditions (6).

### Literature Cited

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