HYBRID PINE FOR TOUGH SITES[1]

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Abstract: A test planting of 30 first- and second-generation pitch x loblolly pine(pinus rigida x P. taeda) hybrids was established on a West Virginia minesoil in 1985. The site was considered orphaned because earlier attempts at revegetation were unsuccessful. The soil was acid (pH 4.6), lacking in nutrients, and compacted. Vegetation present at the time of planting consisted of a sparse cover of tall fescue (Festuca arundinacea) and poverty grass (Danthonia spicata) and a few sourwood (Oxydendrum arboreum) and mountain laurel (Kalmia latifolia) seedlings. In the planting trial, 30 different hybrids were set out in 4 tree linear plots replicated 5 times. The seedlings had been grown in containers for 1 yr before outplanting. Evaluations made after 6 growing seasons showed overall plantation survival was 93 %; six hybrids and one open-pollinated cross survived 100 %. Individual tree heights ranged from 50 to 425 cm with a plantation average of 235 cm (7.7 ft). Eleven of the hybrids had average heights that exceeded the plantation average. Another test planting of tree and shrub species on this site has very poor survival. Therefore, pitch x loblolly hybrid pine can be recommended for reclaiming this and similar sites.

Additional Key Words: pitch x loblolly pine, West Virginia, reclamation, revegetation.

Introduction

There is a high interest in pitch x loblolly pine hybrids both as a pulp species and increasingly as a lumber species. On moderate to good sites, the hybrids can grow exceptionally fast. Even on poorer sites the hybrids survive well and, comparatively speaking, will outgrow most other species. In an earlier test on minesoils, it was shown that the hybrids were adversely affected by excess moisture (Davidson 1984). The site for the current study was chosen to avoid excessively moist conditions.

The Study

In 1985 we planted 494 first- and second-generation seedlings of pitch x loblolly hybrid pine on an abandoned minesoil in Wyoming County, WV. This planting is part of a regional study to evaluate pitch x loblolly hybrid pines. There are 67 plantings in 22 states of these first- and second- generation hybrids (Garrett 1988). Most of the test plantings are on unmined lands.

Our planting plan was a completely randomized design of four tree linear plots replicated six times. Before the planting was completed, however, some of the seedlings were stolen. As a result, the final planting arrangement was 20 hybrids and 1 pure loblolly in 5 or 6 replications, and 10 hybrids in 1, 2, or 3 replications. For this report, only the 20 hybrids and 1 pure loblolly present in replications 1 to 5 are compared.

At the time of planting the seedlings had been grown in paper tubes for 1 yr. The tubes were removed before planting. A four-in-diameter hole about 5 in deep was made with a soil auger. As a seedling was placed in the hole, soil was

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[1]Poster presented at the International Land Reclamation and Mine Drainage Conference and the Third International Conference on the Abatement of Acidic Drainage, Pittsburgh, PA, April 24-29, 1994.

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Proceedings America Society of Mining and Reclamation, 1994 pp 313-315
DOI: 10.21000/JASMR94030313

firmed around it with a small mattock. The seedlings were planted on June 5 and 6. Conditions were excellent: light rain each night (June 4, 5, and 6), cloudy days, and temperatures from 70° to 80° F.

The site was a reclaimed surface mine area that had been graded and seeded to a reclamation grass mix. At the time of planting, there was a sparse cover of poverty grass and tall fescue with scattered mountain laurel and sourwood seedlings. Soil analysis showed pH 4.6, low nutrients, and no high levels of toxic elements. The soil was compacted and had a clay texture. No bulk density measurements were made.

Results

Survival was 99 % after one full year, and remained at that level until age 4 when it dropped to 98 %. Three seedlings died in the 1988 growing season. The next measurements were taken in April 1991 before growth had started for the season. The plantation was 6 yr old. Between the 1988 and 1991 measurements, survival declined to 93 %. There were 30 fewer seedlings. Some of the recorded losses were due to pilferage for Christmas trees and landscaping. At the time the 1991 measurements were taken, it was noted that 3 trees had been cut and 14 trees had been dug from the ground. There may have been additional pilferage during the period since the 1988 measurements were taken; if so, the evidence was no longer conspicuous.

Survival rates were computed as though the pilfered trees were alive. Six of the hybrids and one open-pollinated cross had 100 % survival. The poorest survival rate, 80 %, was shared by three hybrids.

Heights of individual trees ranged from 50 cm (1.6 ft) to 425 cm (13.9 ft). Average height for the plantation was 235 cm (7.7 ft). Eleven of the hybrids had average heights that exceeded the plantation average. Survival and average height by hybrid crosses are shown in table 1.

Discussion

All of the hybrid pines used in this test planting performed well. Even the poorest hybrid had 80 % survival after 6 yr in the field and averaged 170 cm (5.6 ft) tall.

Another test planting adjacent to the hybrid pine plots was established in 1982. Among the species in that test was shortleaf pine (Pinus echinata). After nine growing seasons, the shortleaf pine had 30 % survival and averaged 245 cm (8.0 ft) in height (data on file).

Conclusions

Pitch x loblolly pine hybrids have excellent potential for disturbed areas following fire, hurricane, or mining. They will survive well and grow satisfactorily on these tough sites. On better sites they are capable of producing pulp or saw timber on a relatively short rotation (Little and Wolf 1980).

At the present time outstanding hybrids have been identified; the problem is seed availability. Two techniques are being explored for seed production (Garrett 1988): (1) single-clone orchards that will be mass pollinated, and (2) clonal orchards of superior first-generation hybrids that will produce wind-pollinated second-generation hybrid seed.

Tree planters should be watchful for pitch x loblolly hybrid pine seedlings as they become available from State and private nurseries.

Table 1. Pitch X loblolly pines, Wyoming County, WV. (7 yr old from seed, 6 yr on-site, twenty seedlings planted per hybrid cross).

Hybrid cross code	Survival %	Average height, cm
22 X 15 - 54	100	210
22 X 16 - 269	100	265
25 X 66	95	195
(62 X 11 - 9) X (71 X 4 - 32)	100	275
66 - OP	95	190
(71 X 4 - 32) X (71 X 4 - 32)	90	175
(71 X 4 - 32) X OP	90	240
75 X 19 - 10	95	255
(75 X 15A) X (71 X 22)	90	195
77 X 1 - 66	95	270
(77 X 4 - 32) X (71 X 4 - 32)	80	170
77 X 4 - 43	100	240
77 X 19 - 10	100	285
78 X 4 - 43	90	245
(78 X 23) X (71 X 22)	100	250
(78 X 23) X OP	100	220
78 X OP	80	230
80 X 19	90	205
81 X 11 - 700	90	320
K - P X L	80	210
NL LOB	85	305

Literature cited

Davidson, W. H. 1984. Excess moisture decreases survival and retards growth of hybrid pine seedlings. p.135-139. In Proceedings of the Fourth Annual Better Reclamation With Trees Conference. (Owensboro, Ky, June 7-8, 1984.)

Garrett, P.W. 1988. Pitch pine and hybrids. p.35-38. In K.K. Carter, et al. Tree Improvement in the Northeast: interim summary and recommendations for selected species. Maine Agri. Expt. Sta. Tech. Bul. 131.

Little, S and W. E. Wolf. 1980. Pitch x loblolly hybrids...fast growing hard pines for PA? Pennsylvania Forests 70(3): 6-7.