A FIELD TRIAL OF YEAR-ROUND PLANTING OF "BULLET" SEEDLINGS

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In north Mississippi for the past 20 years, seedlings for reforestation have generally been bar-planted for 4 months in late winter and early spring by seasonal, unskilled farm labor. However, as costs rise and more expensive semiskilled labor replaces the unskilled force, more economical ways of planting trees must be found. Planting methods that would increase the number of trees planted per hour by each worker would help. An alternative would be to extend the tree-planting season so that it would not compete for labor with intensive spring farming. However, extending the planting season beyond early spring would require storage of seedlings for 1 month or more. Past work (*2*) suggests that maximum storage time is about 12 weeks.

Container-grown seedlings could increase planting production and extend the planting season without storage problems. Walters (*3*) proposed a system of containerized planting that employs rigid, plastic, bullet-shaped containers. Bullet-grown seedlings can be pushed into the soil, thereby making planting holes that require no closing. This system can possibly reduce costs, extend the planting season, and eliminate the need for large crews.

Methods

A study, started in June 1968, examined the survival and growth in northern Mississippi of year-round plantings of 6-week-old loblolly pine (*Pinus taeda* L.) seedlings germinated and grown in bullets. Performance of bullet seedlings was compared with that of stored 1-0 bareroot loblolly seedlings. The main objectives of the study were to determine if the bullet-planting method is competitive with the conventional bar-planting method during the regular planting season and if bullet seedlings can be used to lengthen appreciably the present planting season. Another objective was to obtain survival and growth data on containerized seedlings past the first year.

Two sites, a depleted scrub hardwood ridgetop and a bare field, were laid out in a series of 10- by 20-foot plots. Two of the scrub hardwood plots and two of the bare field plots were randomly selected on each planting date; one of each was planted with bareroot seedlings; the other with bullet seedlings. Plantings were made on a 2- by 2-foot spacing, 50 seedlings per plot, in late winter (February and March), summer (June and August), and fall (September and November); a total of six planting dates per year for 2 consecutive years. Three to four days before a planting date, the hardwoods on the scrub hardwood plots were deadened with a tree injector containing 2, 4-D.

Bullet seedlings were raised in batches to germinate approximately 6 weeks before a planting date. The loblolly seeds were from one lot and were kept in cold storage (40° F) until used. The bareroot seedlings were lifted and baled at the nursery in February each year. One bale was used each calendar year, the same bale being repeatedly reopened during the year. The bale of seedlings was kept in cold storage (near freezing) and watered periodically until planted. Only grade 1 and 2 seedlings were planted.

The bareroot seedlings held for the summer and fall plantings were kept in cold storage well in excess of the recommended duration. As a consequence, the planting-season factor became confounded with duration of storage. Freshly lifted "wrenched" seedlings might have given more reliable results, but these seedlings are not typically available.

Annual survival and growth tallies were made on the approximate anniversary dates of the plantings. Reported here are the survival and height growth data after 3 years.

Results

Survival.

1. Regardless of planting method, seedlings planted in winter survived significantly better than those planted in other seasons.

2. Among plantings made later than March, bullet seedlings sur-

vived much better than bareroot seedlings. Even so, survival of bullet seedlings was only 36 to 46 percent.

3. Bullet seedlings, like bareroot ones, died at the highest rate during the first year after planting. For both methods, losses during the second and third year were small.

4. When the bareroot seedlings were the freshest (maximum of 1 month in storage), their survival was numerically better than that of the bullet seedlings (table 1).

5. Bullet seedlings planted under deadened cull hardwoods survived significantly better (54 percent) than those planted on the old field (39 percent). Survival of bareroot seedlings was unaffected by site.

Table 1.—*Survival rate and total height of bullet seedlings and bareroot seedlings*[1]

Planting month	Survival rate		Total height[2]	
	Bullet	Bareroot	Bullet	Bareroot
	Percent		*Feet*	
Feb.	47	85	3.0	6.0
Mar.	69	79	3.5	5.5
June	43	26	4.4	7.0
Aug.	36	10	3.4	5.4
Sept.	46	13	3.5	5.4
Nov.	37	0	2.8	—

[1]Three-year results; each value is the average of two plantings.

[2]Bullet seedlings are 3 years from seed; bareroot seedlings are 4.

Height Growth.

1. Winter plantings were no taller than plantings made in other seasons. Hence, any environmental stress suffered by the seedling at planting did not affect its subsequent growth rate.

2. At the end of 3 years, the bareroot seedlings were significantly taller than the bullet seedlings. Bareroot seedlings averaged 5.9 feet in height while the bullet seedlings averaged only 3.5 feet. On a yearly basis (allowing 1 year for nursery growth of bareroot seedlings), bareroot seedlings grew an average of 1.48 feet tall and bullet seedlings 1.15 feet.

Conclusion

Rigid, nonbiodegradable containers such as the Walters bullet may adversely affect survival and growth, possibly by constriction of roots. However, improved design and materials for containers may overcome these liabilities. Rigid containers, similar in design to the Walters bullet, allow planting rates that are not readily achieved with other methods (*1*). If such containers could be constructed of biodegradable material and marketed at reasonable prices, the multifaceted objective of reduced planting costs, high percentage survival, extended planting season, and normal height growth may be attainable.

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