are still to be discovered. Perhaps time of fertilization should be tied to soil moisture level or rainfall, rather than to a fixed date. Other grass species may be superior for rapid cover on many sites. However, the results demonstrate that combined plantings are feasible for both rapid and long-terra site protection if competition between species is controlled.

Literature Cited

1. McClurkin, D.C. 1967. Vegetation for erosion control in the Southern Coastal Plain of the United States. Proc., Int. Symp. For. Hydrol. Pergamon Press. New York, p.655-660.
2. McClurkin, D.C., and V.E. Ahlrich 1967. Longfingergrass covers bare sites quickly. Crops and Soils 20(3):18-19.
3. Ursic, S.J. 1963 Planting loblolly pine for erosion control in north Mississippi. USDA For. Serv. Res. Pap. SO-3, 20 p. South For. Exp. Stn., New Orleans, La.

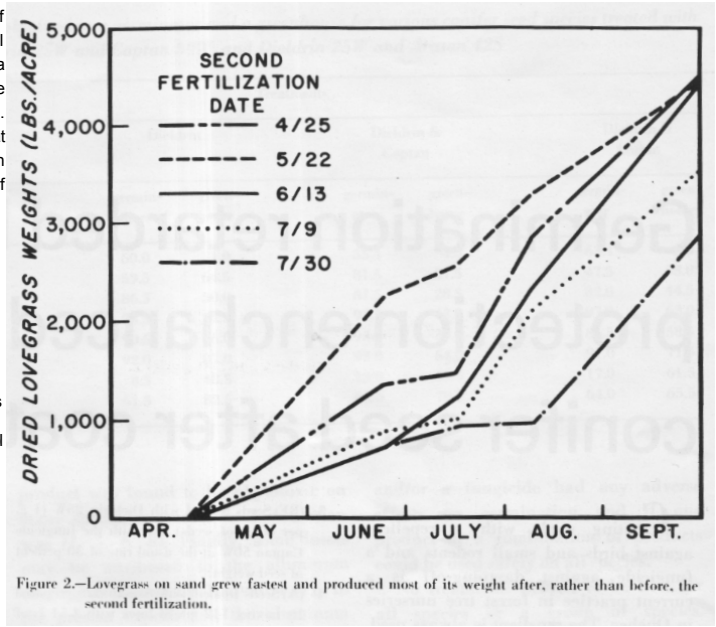

Figure 2.—Lovegrass on sand grew fastest and produced most of its weight after, rather than before, the second fertilization.

News & Reviews

"FDR's Trees" Still Standing

President Franklin D. Roosevelt saw with his own eve.. the black blizzard of dust that whirled across the Great Plains in the '30s.

his response was an audacious experiment to slow the wind and hold the blowing topsoil and swirling sand of the dust bowl on the vast, mostly treeless, prairies. He ordered the planting of "shelter belts" of trees and shrubs-222 million were put in-in a 200-mile-wide swath stretching from the Dakotas south a thousand miles into the Texas Panhandle.

Now, more than 30 years later, many of "FDR's trees" still stand-a living memorial to one of man's greatest efforts to control nature.

Although tanners and foresters would plant windbreaks somewhat differently today than was done in the "dirty thirties;" most say, the shelter belts have helped protect crops, cattle and human, from high winds, the arctic cold and the burning heat which the volatile seasons bring to the unsheltered plains.

In July of 1934, the nation's chief forester, F.A. Silcox said: "This will be the largest project ever undertaken in this country to modify climate and other agricultural conditions…"

The operation was known as the Prairie States Forestry Project and it ran from 1934 into 1942.

The 100-foot-wide belts, usually consisting of 10 to 15 rows, contained many species of trees. There were evergreens such as junipers and pines, as well as deciduous varieties such as honey locust, sycamore, green ash, Russian olive, cottonwood, Siberian elm, and white willow.

In May of 1935, the program's first trees were planted in the sandy soil of a 160-acre cotton faun S miles sea of Willow in southwestern Oklahoma. Those trees are standing today.

The government provided the seedlings and paid for the planting; the farmers provided the land. In some cases, farmers planted their own belts.

After the program began, the drought on the plains eased and the dust subsided somewhat. The nation became much more concerned about the prospects of a second world war than about blowing dust.

(Continued on p. 18)

TABLE 1.—*Determining numerical rating of rust infestation*

Estimate of leaf infection		Estimate of infected leaves on tree	Estimate of infected leaves on tree	
Descriptive rating	Numerical rating	Percent	Numerical rating	Numerical rating
Light	1	Less than 25	1	1
		25 to 50	2	2
		50 to 75	3	3
		More than 75	4	4
		Less than 25	1	5
Medium	5	25 to 50	2	10
		50 to 75	3	15
		More than 75	4	20
		Less than 25	1	25
Heavy	25	25 to 50	2	50
		50 to 75	3	75
		More than 75	4	100

Discussion

Schreiner reported that clones with a rust rating of 10 or higher at midseason for 4 years or 25 or higher at the end of the growing season for 2 years should not be recommended for plantings in the vicinity of the test area. one of the clones in this collection showed susceptibility to rest at midseason, except number 5261, *Populus* 'Northwest.' Otherwise, the earliest that variation in rust susceptibility could lee scored was about the middle of August. The relatively high resistance of all of the clones is not surprising inasmuch as they were obtained from *Populus* breeders who had selected them for a number of positive traits, including rust resistance, at their respective locations.

In most of the clones, growth had greatly slowed by the third rating date, and in all eases had essentially stopped by the fourth rating date due to phenological or other factors not related to the rust. Therefore, it seems the degree of infection on the first three rating dates is more significant as a selection criterion than the degree of infection on the fourth. However, 13 clones were rust-rated above 25 at the end of the season, indicating the need for further, more precise testing before clonal material is planted extensively in the area. Only one clone, Populus 'Northwest,' rated above 10 on the first rating date.

The comparative ratings indicate greater variation within species or taxonomic groups than between them. For example, Populus deltoids clone number 5318 was almost completely free of rust until the last rating date. Conversely. P. deltoides clone number 5273 was severely infected by the second rating date. Similarly. P. euramericana clones showed great variability in rest susceptibility. However, both clones possessing P. alba heritage, numbers 4877 and 5334, were virtually rust free.

Degree of rust infestation way not always related to growth rate. For example, clone number 5351 is obviously one of the fastest growing clones in the group in terms of both diameter and height growth. However, it is relatively susceptible to rust.

If these clones are to be grown in other areas, rust susceptibility should he conducted near the planting site. Also, rust evaluations on the most resistant and otherwise most desirable clones should be carried on for several seasons before widespread planting is attempted.

News & Reviews

(Continued from p. 13)

Not long after the U.S. entered the war, the Prairie States Forestry Project was ended. General responsibility for the trees was passed from the U.S. Forest Service to the 1.5. Soil Conservation Service, and farmers no longer received major federal help to plant trees.

Mann younger people in the shelter belt area now do not know why and when the trees were planted. Memories oft he drought and dust have faded.

There is less feeling; on the plains these days that trees are needed to stop wind erosion. Farmers now are much more liken to use stubble mulching,. strip cropping, crop residue management and other methods to help keep the soil in place.

Forestry experts now say that the 10to 15-row-windbreaks were unnecessarily wide; windbreak plantings of one to three rows have been found effective and take much less land.

John Muehlbeier lived through the period 40 year· ago on the plains when the sun was blackened by clouds of dust and grasshoppers and when the duststorms became too heavy for auto traffic, even in midday.

"Times were bad; we couldn't wait to know everything about what to do to stop these dust storms," Muehlbeier said, "and there's nothing like the shelter belt project that's ever been done in this country – 1,000 miles north to south. That's something." (from a report in The Washington Post. Oct. 21, 1973)

In search of the American Chestnut

Do you know of a mature, healthy American chestnut tree? If you do, you can help the Soil Conservation Service in its search for a blight-resistant chestnut. Let your local conservation district or the nearest SCS office know about the trees, or write to the woodland conservationist at the SCS state office.

(Continued on p. 23)

and 250 ppm., the greatest amount of roots was developed on cuttings treated top and basally (.21g). Following in descending order were basal only (.15g), top only (.12g.) and least with untreated controls (.09g.).

Literature Cited

1. Bilan, M.V. and A.K. Kemp. 1960. Effect of gibberellin on height growth of one-year old seedlings of Loblolly pine. Forestry 58:35-37.

2. Duncan, D.B. 1955. Multiple range and multiple F tests. Biometrics, 11:1-42.

3. Leak, W.B. 1960. Gibberellin reduces root growth of yellow birch seedlings. J. Forestry 58:321.

4. Nelson, T.C. 1957. Early responses of some southern tree species to gibberellic acid. J. Forestry 55:518-520.

5. Polscer, K.F. 1960. The effects of gibberellic acid on three eastern forest tree species. Unpublished. M.S. Thesis in Forestry, 63 pp. The Pennsylvania State University.

6. Westing, A.H. 1959. Effect of gibberellin on conifers: generally negative. J. Forestry 57: 120-122.

Undercutting depth may affect root-regeneration of lodgepole pine seedlings

G. F. Dykstra
Research Forester

British Columbia Forest Service
Victoria, B.C.

Toppling and taproot malformation of transplanted lodgepole pine has been observed in research and production plantations in British Columbia. Tree toppling is a term used to define instability in young stands; trees are not completely windthrown but lean at carious angles and continue to grow. lodgepole pine may form a basal sweep or sabre form which is apparently interrelated with toppling and windfall. Racal sweep and toppling tray he caused by the lack of development and growth of a dominant taproot after the primary taproot has been severed, such as in root pruning, undercuttings and lifting. The study discussed in this article may help determine the extent of pseudo taproot regeneration and show- the growth and development of the root system in relation to the common nursery practice of undercutting.

The objective of this study was to determine the distribution of dry matter in relation to depth of undercutting.

Methods

The lodgepole pine was grown from seeds planted in 4-inch diameter perforated, polyethylene tubes. The potting mixture was a 4:2:1 parts by volume ratio of loam, Kind, and peat respectively. The tubes were 2 feet long and supported by a wooden framework. The undercutting treatment was made 6 weeks after germination while the trees were making active shoot growth. Cutting depths were at 3, 6, and 12 inches below the root collar. The seedlings were then allowed to grow for 2 months. At harvest, the length of taproot was measured. The root system was then cut into 3-in eh sections starting at the root collar, aril the oven dry weight of the sections was determined.

Results and Discussion

At harvest there were no significant differences in total root weight, shoot weight, or shoot-root ratio among undercutting depths. However, there were significant differences after undercutting in taproot growth (figs. 1 and *2)* and the 3-inch depth grew most in length and dry weight subsequent to

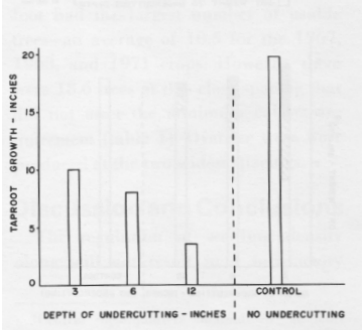

Figure 1.—Taproot length growth of lodgepole pine seedlings in relation to depth of undercutting.

economically and ecologically than removing the litter.

Even if the vegetation is only temporarily set back, it provides an opportunity for the small trees to successfully compete. Species with relatively fast juvenile growth-such as jack pine-will probably outgrow the reinvading vegetation in most instances. The use of species-such as red pine-with a much slower juvenile growth presents a different problem. Red pine simply does not grow fast enough to compete with the vegetation even with intensive site preparation. The current trend is toward use of a larger container-or containerless system which provides greater rooting volume. This should result in somewhat more flexibility in selection and preparation of planting sites.

TABLE 4.—*Average shrub stem density at various time intervals after treatment*[1]

Vegetative Treatment[2]	Shrub Stem Count (Stems/Acre) By Date		
	July 1, 1969	July, 1970	July, 1972
B	162,500	112,250	95,250
C	91,250	63,750	30,000
D	43,750	38,500	37,000

[1]Average shrub stem density on plots before treatment was 88,500. Basis = 4 mil-acre quadrats in each of four replications of each treatment

[2]B = Shrub stems removed
C = All vegetation removed
D = Mineral soil exposed

Literature Cited

1. Alm, A.A. and R. Schantz-Hansen. 1972. Five-year results from tubelings plantings in Minnesota, J. For. 70(10):617-619.

News & Reviews

(Continued from p. 24)

Solving Shade Tree Growing Problems

Shade trees lead a sort of precarious existence these days because of air pollution. One of the best things that can be done to help them, other than eliminating the cause, is fertilizing them with nitrogen fertilizer every year.

Nitrogen can be applied with a lawn spreader in November after most of the leaves have fallen, or in April or May. Either should produce good results.

Fertilizing can help maintain mature trees in a vigorous growing condition, according to plant pathologists of the Illinois Natural History Survey, in a long-term report about tree fertilization experiments.

According to the report:

"Established trees weakened by leaf diseases, insect defoliation, mechanical injury, soil compaction, drought, or other causes often show poor growth or dying of branch ends. Fertilization may stimulate additional growth so that the plant can compensate for the conditions that cause decline."

Little nitrogen remains in the soil from year to *year,* most of it is used by plants or carried away by water. This is why it should be applied even year. Phosphorus and potassium fertilizers are chemically hound in the soil and become available slowly throughout several growing seasons. They should be added to the soil every 3 to S years in either spring or fall. Since phosphorus mostly remains where it is placed, and potash nearly the same, these elements should be applied down in the root zone, through holes 12 to 15 inches deep. spaced about 2 feet apart under the spread of the branches. Two level tablespoons of superphosphate (0-20-0) and one level tablespoon of muriate of potash (0-0-60) should be placed in each hole.

Nitrogen fertilizers applied to the soil surface are just as effective, or more so than those applied by any other method. With rainfall or watering, nitrogen will run readily down into the soil.

Nitrogen should be spread evenly with a lawn spreader over the area under the spread of the branches, about 2 feet away from the trunk.

Apply at the rate of 6 pounds per 100 square feet when the grass is dry to avoid risk of burning. After spreading, hose off any fertilizer that might remain on grass blades.

For 1,000 square feet use 13 pounds of Urea (45-0-0), or 18 pounds of Ammonium nitrate (33.5-0-0) or 29 pounds of Ammonium sulfate (21-0-Ol. (from Washington Post, Friday, Nov. 9. 1973)

Tree-Mendous success

One of the objectives of Pennsylvania's Monroe Conservation District is to encourage tree planting, so district directors decided to have a seedling sale. Not knowing what the public response might be, the district ordered 10,000 seedlings. Boy Scouts agreed to sell and distribute. Announcements and

news releases went out, and orders started to come in. By the time sale-day arrived, it was necessary to order 5,000 more trees to satisfy actual and anticipated sales. Sales were so overwhelming that the district extended the sale period and accepted orders for an additional 17,000 seedlings.
(from Soil Conservation Oct. 1973)

Tree Planting

The Rocky Mountain Station recently "got it all together." They produced two planting pamphlets. One is intended as an aid to the forest manager. The other is a field guide for foremen and planters. Titled "Planting Engelmann Spruce," both are well written and illustrated. They are the first new guides on planting in a long time. They should help you who have foremen and field crews who nerd training or those whose planting skill: need upgrading. The information is appropriate to almost any species of conifer planting anywhere. The publications can be obtained by requesting:

USDA Forest Service Research Papers
RM89andRM89A "Planting Engelmann Spruce" by Frank Ronco
of the
Rocky Mountain Forest and Range Experiment Station
240 West Prospect Street
Fort Collins, Colorado 80521
(from Forestation Notes, PNW)

Union Carbide's Nets Soil Amendment

Union Carbide's Creative Agricultural Systems is currently introducing a re-volutionary new soil amendment called Agricultural Hydrogel Concentrate 50G. This material is a hydrophilic non-ionic polymer which is able to hold more than 20 times its weight in water. The polymer holds the water by swelling into a gel when wetted. Roots are able to grow into the gel particles and extract water and nutrients from these water reservoirs. At "field capacity" 90 percent of the water in the polymer is held at water potentials from -0.1 bars to -2 bars.

Such a product may have potential value for reforestation as the material may be able to increase: growth rates of seedlings and increase survival rates of bare root and container grown seedlings.

Safety Lights or Healthy Trees?

New York Times say the high intensity sodium street lights recently installed here, in Manhattan" and in other metropolitan areas in effort to reduce crime in the streets may actually end up by killing city trees. Quoted as authority is USDA's Dr. Henry Cathey (ARS at Beltsville), who avers the lamps make the trees more susceptible to air pollution. The lights are said to be particularly harmful to young trees.

Problems With Foreign Requests For Seed?

No need to have. The USDA Forest Tree Seed Center will come to your rescue ... in fact, that's why it was established, to provide a central location for handling foreign requests for tree seed. Only small lots of seed are available, or course ... they have to be used for experimental purposes. The program doesn't compete with commercial seed dealers in any way. Next time you get a request for seed from foreign countries, forward it to the Seed Center and they'll handle it for you. For a descriptive folder on the Center, write to USDA Forest Tree Seed Center" USDA Forest Service, P.O. Box 819, Georgia 31202.

New Trees: What's At Stake?

An age-old horticultural belief that a newly planted tree, 5 feet tall or more, should be staked has been severely shaken.

Research by the University of California, Davis, U.S. Forest Service, Berkeley, and by Florida Agricultural Center, Fort Lauderdale, has shown that staking may not he a good idea unless the tree is top-heavy and very likely to be toppled over without support.

A young tree standing alone with its top free to move usually becomes a strong tree better able to withstand the elements, says the University of California report. "Many trees do not need and should not have support stakes. 'frees having tops that are large in proportion to their roots may he an exception, although many of these can stand alone with some thinning out of branches in the crown."

The Fort Lauderdale report says studies indicate stronger and more stable trees can be grown if trunks are allowed to flex in the wind.

A University of Wyoming professor of botany reported on Australian studies in which young, free-swaying trees were compared with staked ones that could not be moved by the wind. Those left free developed stronger, thicker trunks and heavier roots. Those that remained staked for 2 years were blown down soon after stakes were removed.

When support of the tree is essential, says the University of California report, make the stakes as short as possible, but high enough to hold the tree upright under calm conditions because the tree should return to vertical after the wind has bent the top. Support (tie) the tree at just one level - near the top of the stakes. Pruning practices for this tree class should include leaving shoots along the trunk, thinning the top, and, in extreme cases, cutting back long willowy leader and shoots. (from a report in The Washington Post, Dec. 1973)