CONSERVATION RESERVE PROGRAM TREE PLANTING IN THE NORTHEASTERN U.S.; 1989 UPDATE

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In 1989, the Conservation Reserve Program became the largest land retirement program in U.S. history. At the end of the eighth sign-up period, a total of 30.6 million acres of farm land had been enrolled for withdrawal from agricultural production, exceeding the 28.7 million acres in the Soil Bank program in 1960. About 6.4 percent of the land enrolled in the Conservation Reserve Program (CRP), or 1.96 million acres, is being planted to trees. By the end of its authorized five year enrollment period in 1990, the CRP is expected to exceed the highest 5-year acreage of any federal tree planting program, including the Soil Bank (2.0 million A.), the CCC tree planting program (1.4 million acres), and the National Forest System (1.5 million acres).

This paper summarizes the CRP tree planting program, with special emphasis on the 20-state area of the northeastern U.S.

NATIONAL OVERVIEW

Of the 30.6 million acres in CRP, half (50.8%) is in the western U.S., about one-quarter (26.7%) is in the southeastern U.S., and about one-quarter (22.5%) is in the northeastern U.S. However, of the 1.96 million acres planted to trees, 1.80 million acres (91.8%) are in the southeastern U.S., 145,000 A. (7.4%) are in the northeastern U.S., and only 16,530 A. (0.8%) are in the western U.S. Plantings in the southeast are made up almost entirely of southern pines, while both hardwoods and conifers are used in the northeast.

The large regional differences in the proportion of CRP acreage planted to trees are primarily due to differences in the type of land being enrolled in the program and in the strength of regional markets for small timber. In the West, CRP acreage is primarily in prairie areas that are too arid to support trees. In the Northeast, the majority of eligible CRP land is in the Lake States and Central States, and the western states in these regions also contain arid prairie areas. In addition, in most of the Central States, the lack of markets for short rotation forest products, e.g., pulpwood, reduces landowner interest in tree planting. The largest concentrations of tree planting in the Northeast have been in the Lake States, where eligible land borders large forested regions that have good markets for forest products. The Southeast's large tree planting program is due to the fact that much of the CRP acreage there is within the commercial range of southern pine, and a strong pulpwood market exists throughout the region.

CRP TREE PLANTING IN THE NORTHEAST

State and regional CRP tree planting acreages are summarized in Table 1. Of the 144,678 acres planted to trees in the area, only about 8,400 acres (5.8%) were planted in the New England and Mid Atlantic States. This lack of tree planting is largely a reflection of the smaller amount of eligible agricultural land in these regions. In addition, many of the states in these regions are already heavily forested.

Table 1. Summary of CRP Tree Planting Acreage in the Northeastern Area (NA) by State and Region.

State/Region	CRP Land Accepted for Tree Planting: 1st Sign-up (Acres)	2nd Sign-up (Acres)	3rd Sign-up (Acres)	4th Sign-up (Acres)	5th Sign-up (Acres)	6th Sign-up (Acres)	7th Sign-up (Acres)	8th Sign-up (Acres)	TOTALFOR STATE/REGION (Acres)	(% of NA Total)
NEW ENGLAND										
Connecticut	0	0	0	0	0	0	10	0	10	0.01
Maine	9	142	195	348	531	469	519	264	2,477	1.71
Massachusetts	0	0	0	10	0	0	0	0	10	0.01
New Hampshire	0	0	0	0	0	0	0	0	0	0.00
Rhode Island	0	0	0	0	0	0	0	0	0	0.00
Vermont	0	0	0	0	0	0	0	0	0	0.00
TOTAL New England	9	142	195	358	531	469	529	264	2,497	1.73
MID ATLANTIC										
Delaware	0	0	0	0	0	116	5	52	173	0.12
Maryland	5	6	9	251	182	389	99	190	1,131	0.78
New Jersey	0	0	0	0	0	0	0	5	5	0.00
New York	**199**	**444**	127	614	451	295	216	259	2,605	1.80
Pennsylvania	40	159	474	327	84	535	181	136	1,936	1.34
West Virginia	0	16	0	0	13	0	5	0	34	0.02
TOTAL Mid Atlantic	**244**	625	610	1,192	730	1,335	506	642	5,884	4.07
CENTRAL STATES										
Illinois	678	527	421	3,283	819	2,736	1,859	5,729	16,052	11.09
Indiana	**168**	346	447	**1,444**	927	1,343	1,001	1,872	7,548	5.22
Iowa	693	817	989	2,728	412	1,284	865	1,865	9,653	6.67
Missouri	283	364	329	1,430	168	1,610	348	3,609	8,141	5.63
Ohio	132	456	578	1,923	1,126	1,581	1,120	1,001	7,917	5.47
TOTAL Central States	**1,954**	2,510	2,764	10,808	3,452	8,554	5,193	14,076	49,311	34.08
LAKE STATES										
Michigan	253	228	771	2,024	595	2,606	1,400	1,039	8,916	6.16
Minnesota	2,083	3,219	5,622	12,315	4,138	5,312	3,434	3,586	39,709	27.45
Wisconsin	1,830	2,401	2,016	8,571	5,656	9,087	5,054	3,746	38,361	26.51
TOTAL Lake States	4,166	5,848	8,409	22,910	10,389	17,005	**9,888**	8,371	**86,986**	60.12
SIGN-UP TOTAL (Acres)	6,373	9,125	11,978	35,268	15,102	27,363	16,116	23,353		
(% of NA Total)	4.40	6.31	**8.28**	24.38	10.44	18.91	11.14	16.14		
								NORTHEASTERN AREA TOTAL =	144,678 A	

The eight states in the Central and Lake States regions account for 94% of the CRP tree planting in the Northeast. In these regions, Wisconsin and Minnesota each have about 25% of the total acreage, Illinois has about 11%, and the remaining five states each have about 5-7% of the acreage.

Following the initial three sign-up periods in 1986, spring sign-ups, i.e., sign-ups 4, 6, and 8, have resulted in the largest enrollments for tree planting. The fourth sign-up, in February, 1987, resulted in the largest enrollment (35,268 A.) for the area as a whole. However, the eighth sign-up, in February, 1989, resulted in the largest enrollment (14,076 A.) for the Central States. The eighth sign-up also the only one when the acreage enrolled in the Central States exceeded that in the Lake States.

State nurseries in the Central and Lake States increased production to provide seedlings for CRP tree planting programs. However, seedling shortages have developed for some species and in some states as a result of the increase in demand. Shortages are most severe in Illinois, but have also been reported in Iowa and Wisconsin. Among the hardwoods, black walnut and red oak are in the most demand, and poor oak seed crops have limited production of seedlings in many states. States have attempted a number of actions to alleviate seedling shortages, including: (1) planting fewer trees per acre, (2) requiring mixed species plantings stretch the supply of scarce species, (3) increasing the time period for establishing CRP plantations, (4) contracting with private nurseries for planting stock, (5) increasing the cost share amounts for planting stock purchased from private nurseries, and (6) increasing production in State nurseries, where possible.

Surveys of CRP tree plantings in the Central and Lake States were conducted by the USDA Forest Service and State forestry agencies in five states in 1988 and in four states in 1989. The results of these surveys can be summarized as follows:

About 80% of seedlings in new plantings were properly planted, i.e., tightly packed, proper depth, no J- or L-rooting, no culls, etc.

The most common planting error was shallow planting. This was especially noticed on hardwoods, where large tap roots made in impossible to J-root trees when planting holes were not deep enough.

Inadequate weed control was judged to be the most serious threat to survival and establishment of CRP plantations throughout the area. Although management plans prescribed weed control, many landowners were failing follow these prescriptions. In addition to directly affecting survival and growth through competition, weeds provided habitat for rodents, which further damaged seedlings.

First and second year plantations suffered severe losses due to drought in 1988, although hardwood seedlings appeared to be resprouting from the root collar in some areas. Overall damage estimates are not yet available for CRP tree plantings due to the 1988 drought.

FUTURE CRP TREE PLANTING PROGRAMS

The ninth CRP sign-up is currently underway, and one additional sign-up is anticipated before the authorized enrollment period for this program ends in 1990. Both these sign-ups will increase the tree planting acreage in the Northeast.

Eligibility for CRP enrollment was extended to scour erosion areas in the eighth sign-up. The intent of allowing these lands to be enrolled was that they be planted to trees if soils were suitable to support trees. However, the interpretation of the regulations regarding these sites has varied from state to state. Scour erosion areas, being bottomland sites, offer great potential for tree planting. In addition, proposals are now being considered that would allow the *use* of natural regeneration on bottomland areas. About 22,000 acres of scour erosion areas, 15,250 acres of which were in Iowa, were enrolled in the eighth sign-up in the Northeast. The addition of scour erosion areas could greatly increase CRP tree planting programs, but their actual impact will not be known until the regulations pertaining to these areas are clarified.

Proposals for continuing the Conservation Reserve Program are now being developed for the 1990 Farm Bill. It appears that tree planting will be continue to be an integral part of the program, and perhaps be even more strongly promoted, especially in light of the increasing concern over water quality and global warming. Some options being considered to increase tree planting include extending the length of rental contracts on tree plantings, expanding eligibility to include marginal pasture land, and reducing erosion requirements for enrolling land under tree planting practices.

CULTURAL PERSPECTIVES

Root culturing in bareroot nurseries - Tree seedlings are a unique crop. We spend most of our time and effort in the nursery to produce a healthy, vigorous shoot, and most cultural activities are scheduled according to shoot phenology and growth. This is understandable as the shoot is the part of seedling that we can easily observe. Roots are the "business end" of a seedling, however. Because the seedling root system is not readily accessible it is much less understood. One of the sayings that I frequently use in training sessions is that "tree seedlings are a root crop". While it may seem technically inaccurate to compare seedlings to carrots or potatoes, I think that the analogy is useful in getting growers to consider the culture of the lowly root.

You may have noticed that I have been using the term "root culturing" instead of "root pruning". Because seedling roots can be trimmed in the seedbed or on the grading table, the following terms has been suggested to avoid confusion:

root culturing - a general term for nursery cultural practices designed to modify root growth or morphology while the seedling is still in the nursery bed.

undercutting - severing seedling roots in the horizontal plane of the nursery bed, using a sharp blade drawn parallel to the soil surface at a regulated depth.

sidecutting - severing lateral seedling roots in the nursery bed by drawing sharp blades or coulters between the rows.

wrenching - passing an angled horizontal blade beneath a nursery bed at a specified depth to cut newly penetrating roots and to loosen and aerate soil.

root pruning - root trimming after the seedling has been removed from the soil.

Nursery managers have been culturing seedling roots for many years, but the published research on this subject has been mixed. The classic nursery manual "Nursery Practice on the National Forests", which was printed in 1917, has an entire section on root pruning. Although they endorse the practice, they also state that results of root culturing trials have been inconclusive. Things haven't changed much in the past 80 years. The Forest Nursery Manual: Production of Bareroot Seedlings (1984) states that the response of most. species to root culturing practices has been variable, and also discusses some of the reasons for this variation. In my mind, there is no doubt that root culturing works - the problem is using the right tool, in the right way, and at the right time. Some of my thoughts on the subject:

1. Define your objectives - Root culturing operations can have variable effects, and many nursery managers make the mistake of trying to achieve several different objectives with one operation. Root culturing can affect seedling morphology and physiology in several ways: control height growth, modify root:shoot ratio, increase root fibrosity, induce seedling moisture stress, etc. Your objective will define what implement you use, how you use it and, most importantly, the timing of the operation. A root

culturing treatment that is being applied to control shoot height may not increase root fibrosity at the same time.

On the other hand, don't apply root culturing treatments *as a matter* of general policy. If you don't know why you are doing an operation, then don't do it - any root culturing treatment induces some measure of stress, which can be harmful. Cultural operations that are applied "for good measure" usually do more harm than good.

2. Properly time root culturing practices - This is the tough one. Don't try to schedule cultural operations by the calendar, because of variations in weather from year to year and species/weather interactions. Get away from your desk and computer and go take a look at your seedlings. Yes, the root system is difficult to observe but take a shovel with you and dig up some seedlings every few weeks during the growing season. Observations of phenology and measurements of relative shoot and root growth should be recorded and plotted to provide a permanent record. Shoot growth and root growth are often inversely related so, after a few years of collecting these measurements, you should have enough personal experience and data to permit estimation of root activity based on shoot phenology.

3. Synchronize root culturing with other nursery activities and soil conditions - Root culturing should not be viewed as an independent operation. Irrigation, in particular, will affect the success of root culturing operations. Again, get out and check the soil profile with a shovel rather than guess whether the soil is at the proper moisture content because the surface appears wet. The proper moisture content will also vary depending on your objectives: wrenching requires relatively dry soils for thorough fracturing, whereas undercutting or sidecutting are most efficient when relatively moist soils promote smooth movement of the blade.

4. Select the right implement for the job - In my mind, wrenching does not do a good job of cutting seedling roots in many situations. If the objective is to promote a more fibrous root system, I would consider undercutting rather than wrenching. Because of the thickness and angle of the blade, root wrenching equipment will often drag seedling roots instead of clearly cutting them. It is often necessary to undercut seedlings with a thin sharp blace before attempting a wrenching operation, particularly with tap-rooted species or older seedlings. If the objective is to induce moisture stress to control top growth, I would try wrenching and pass the blade completely under the root zone to fracture the soil and break soil-root contact.

5. Follow-up and evaluate the operation - Both undercutting and wrenching require follow-up irrigation to avoid damaging moisture stress. Wrenching, in particular, creates a severe moisture stress and heavy irrigation is normally required to repack the soil particles around the seedling root system. The timing and amount of irrigation will depend on cultural objectives, weather, soil type, and individual species response.

Nurseries are busy places, and many times growers will go on to the next activity without ever checking back to see if the root culturing worked or not. It's hard to assess the effects of any cultural operation at the end of the growing season if you haven't taken the time to observe the physiological and morphological effects following the operation.

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