RESEARCH NOTES

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RESEEDING TARWEED-INFESTED RANGES

by

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Cluster tarweed (Madia glomerata) infests many livestock ranges in eastern Oregon, using soil moisture and nutrients that should be producing plants more valuable as forage and more effective in stabilizing watersheds. No completely satisfactory method of eliminating this obnoxious plant and replacing it with forage has yet been found. Recent experiments in the Wallowa Mountains, however, show that simple cultivation at the proper stage of plant growth will eliminate most of the tarweed and permit the establishment of a good stand of grass.

The tarweed has become established on depleted ridgetops and openings scattered throughout the mixed conifer forest. These sites are preferred by cattle for grazing and on some national forests constitute a large part of the range. The openings are believed to have been grasslands at one time, but the more palatable grasses and forbs have been destroyed. Attempts to restore the perennial grass have generally been unsuccessful where cluster tarweed forms a dense cover. Experience indicates that severe spring competition from tarweed prevents the grass seedlings from becoming established.

To develop some satisfactory method of planting on these sites, a study of methods of reseeding in dense tarweed was undertaken by the Pacific Northwest Forest and Range Experiment Station in the fall of 1945 in cooperation with the Wallowa National Forest. The site chosen for this study is typical of many of the tarweed infested openings in the ponderosa pine zone of eastern Oregon. The vegetative cover is largely tarweed with lesser amounts of Sandberg bluegrass (Poa secunda), wild onion (Allium spp.), shooting star (Dodecatheon spp.), spring beauty (Claytonia spp.), Idaho fescue (Festuca idahoensis), and rush

pussytoes (Antennaria luzuloides). The soils are variable in depth because of their hummocky surface. They are as much as 2 feet deep on the hummocks, but only 2 to 6 inches deep and very rocky in the swales. The rocks preclude the use of plow and disk equipment.

Five planting treatments were compared. These were:

(1) Cultivate and broadcast seed in the spring when tarweed is 1-2 inches high. Harrow lightly to cover seed.

(2) Cultivate thoroughly in early summer when tarweed begins to bloom; then broadcast the next fall and harrow to cover seed.

(3) Cultivate thoroughly in early summer when tarweed begins to bloom; then broadcast and harrow to cover seed the following spring.

(4) Broadcast seed in the fall and harrow thoroughly to cover the seed.

(5) Drill in the fall with no seedbed preparation.

Harrowing was done with a light pipe harrow and cultivation with the spring-mounted tiller attachment on a wheel tractor. The plots were cultivated by going over the ground twice, the second time at a right angle to the first. Plantings of eight species in pure stands were started in the fall of 1945 and concluded in the spring of 1948. The species used and the rates of planting were:

Species	Common Name	Rate of Planting Lbs per acre
Agropyron cristatum	Crested wheatgrass	8
Agropyron trachycaulum	Slender wheatgrass	8
Arrenatherum elatius	Tall oatgrass	10
Bromus inermis	Smooth brome	10
Dactylis glomerata	Orchardgrass	4
Phleum pratense	Timothy	4
Poa compressa	Canada bluegrass	4
Poa pratensis	Kentucky bluegrass	4

At the height of the growing season in 1946, 1947, 1948, and 1949, the plots were rated on the basis of density, vigor, plant height, uniformity of distribution, and basal area of the seeded plants. These ratings were compared to determine the most successful method of planting and the most satisfactory species. Also, a census of the tarweed population on each plot was taken the first year after planting to determine the effect of treatment on tarweed plants.

Spring Cultivation and Planting is Preferred

Cultivation and seeding in the spring (treatment 1) resulted in the best grass stands. Analysis of the 1948 ratings (table 1) of those plots which were seeded in the fall of 1946 and spring of 1947[1/] indicates that spring cultivation and planting were significantly better than all other treatments. There was no consistent difference between ratings of the plots receiving early summer cultivation (treatments 2 and 3). Fall broadcasting and harrowing (treatment 4) did not include provision for elimination of tarweed and gave poorer results than any other treatment. Drilling in the fall with no seedbed preparation (treatment 5) was discontinued after the first year because the site proved too rocky for the equipment.

Table 1. Average 1948 ratings.[1/] (Plots planted fall 1946 and spring 1947.)

Species	Treatment 1[2/]	Treatment 2	Treatment 3	Treatment 4
Agropyron cristatum	5.5	0	1.0	0
Agropyron trachycaulum	4.5	1.5	2.0	0.5
Arrhenatherum elatius	6.5	2.5	2.0	2.0
Bromus inermis	8.0	2.0	1.5	0
Dactylis glomerata	6.5	7.0	4.5	4.5
Phleum pratense	8.0	5.5	4.0	3.0
Poa compressa	7.5	2.0	2.5	0
Poa pratensis	1.5	0	2.0	0

1/ Relative rating, values assigned are: 0 = failure, 1 & 2 = very poor 3 & 4 = poor, 5 & 6 = medium, 7 & 8 = good, 9 & 10 = very good.
2/ Numbers refer to treatments described on page 2.

Based on the average ratings for each treatment including all years of planting (table 2), spring cultivation and planting (treatment 1) was as successful in 1946 as it was in 1947. For stands of comparable ages, this treatment produced better results than any other treatment, regardless of year of planting.

1/ Fall 1946 and spring 1947 plantings are discussed because they are the only ones in which all treatments are comparable as to growing season.

Table 2. Average ratings for each treatment by years planted and age of stand.

Age of stand	Treatment 1		Treatment 2		Treatment 3		Treatment 4	
	Time Planted							
	Spring 1946	Spring 1947	Fall 1946	Fall 1947	Spring 1947	Spring 1948	Fall 1945	Fall 1946
1 yr.	1/ 8.0	8.0	6.1	1.1	5.3	3.0	1.3	0.9
2 yr.	7.8	6.1	2.6	0.6	2.1	1.0	2.6	1.3
3 yr.	5.1	6.3	2.7	0.6	3.6		1.7	1.1
4 yr.	5.4						2.5	

1/ Average ratings of eight species on two blocks.

Elimination of Tarweed Competition is Important

One advantage of spring cultivation and seeding is that tarweed competition is effectively controlled during the critical period when the grass is germinating and becoming established. Cultivation in the spring, after tarweed was 1 to 2 inches high, reduced the tarweed in 1946 to an average of 13 plants per square foot as compared with 184 on untreated plots, and in 1947 to 6 plants per square foot as compared with 96 on untreated plots. Thus, the tarweed population was reduced 93 percent by spring cultivation (treatment 1).

Early summer cultivation before tarweed sets seed resulted in reductions in tarweed numbers the following growing season of 65 percent for treatment 2 and 73 percent for treatment 3. Even though early summer cultivation is effective in reducing tarweed that same summer, the tarweed plants remaining after cultivation produce enough seed to cause critical competition the following season when the grass is in the seedling stage. Broadcast seeding and harrowing in the fall (treatment 4) reduced tarweed an average of only 24 percent, the least of any treatment.

Summer cultivation followed by fall seeding may be necessary even though it does not reduce tarweed competition during the seedling stage of the grass as effectively as spring cultivation and seeding. Difficulties in transporting equipment and in cultivating when the ground is wet may prevent spring cultivation and planting on large-scale administrative projects. If this is the case, cultivation during early summer to destroy the tarweed before it sets seed, followed by fall planting, will improve the possibility of obtaining a stand of grass, particularly if the most aggressive grass species are used. However, summer cultivation and fall planting should not be considered as entirely dependable.

Selection of Species Depends on Site and Method of Planting

Timothy and orchardgrass gave better results than the other species used in this study, especially on those plots where considerable tarweed remained. Tall oatgrass, smooth bromegrass, and Canada bluegrass became established fairly well on the plots cultivated and planted in the spring but made only thin stands under the less favorable planting conditions. Kentucky bluegrass was a failure on most of the plots, becoming established only in spots where soil conditions were most favorable.

The fact that orchardgrass and timothy produced better stands than other species in this study is partly due to the slightly more favorable summer rainfall and lower severity of frost heaving that occurred on the study area. In other parts of eastern Oregon the ponderosa pine zone receives less summer moisture, and newly seeded plants are more subject to frost heaving than in the Wallowa Mountains. Experimental plantings on the Whitman and Umatilla National Forests have shown pubescent wheatgrass (Agropyron trichophorum) to have outstanding ability to become established on the more droughty sites.

Species such as pubescent wheatgrass, timothy, and orchardgrass generally produce better stands than other species where frost heaving occurs because they have vigorous seedlings that become established rapidly. Pubescent wheatgrass has the additional advantage of being rhizomatous, which may further aid in resisting frost heaving.

When to Graze

Reseeded grasses on badly depleted openings in the ponderosa pine zone are slow to become established because of the shallow, infertile soil and unfavorable growing conditions. Most of the species used in this study did not mature until the third or fourth growing season, so that on such sites grazing will need to be deferred longer than is ordinarily recommended. Premature grazing may weaken the root system and cause the plants to be especially susceptible to frost heaving. Three years protection should be considered a minimum and more may be needed on more severe sites.

Conclusions

This study of methods of seeding in tarweed furnishes tentative guides that should be of value in future reseeding efforts where tarweed offers competition. These guides may be summarized as follows:

(1) Satisfactory control of tarweed is necessary to establish a good stand of grass.

(2) Cultivating and seeding in the spring when tarweed is from 1 to 2 inches high produces the best grass stands, probably because the tarweed is effectively controlled at the time when grass seedlings are becoming established.

(3) If conditions are such that spring seeding cannot be done, cultivation in the early summer before tarweed sets seed will reduce competition and increase the probability of obtaining a stand of grass from fall plantings.

(4) Of the species tested, orchardgrass, timothy, smooth brome, tall oatgrass, and Canada bluegrass became established about equally well by spring cultivation and planting, but by other methods, orchardgrass and timothy seemed to produce better stands than the other species tested.

None of the methods of planting developed are really satisfactory for large-scale administrative use. The best treatment, spring cultivation and seeding, is handicapped by inclement spring weather and difficult working conditions. Consequently, the Pacific Northwest Forest and Range Experiment Station has started a new study in which several methods of eradicating tarweed, including spraying with 2,4-D, will be compared on fall-seeded plots. Also, trials are under way which will yield information on additional species adapted to these openings dominated by tarweed.