Spraying Tarweed Infestations on Ranges Newly Seeded to Grass

A. C. HULL, JR.²


Highlight

A high elevation, tarweed-infested range which had been newly seeded to grass was sprayed with 3 rates of 2,4-D at 2 growth stages of the seeded grass. 2,4-D at 0.5 lb./acre killed over 97% of the tarweed and 1 and 2 pounds killed 99 and almost 100, respectively. Rate of spraying when grasses had 1 to 2 leaves did not affect numbers of grass plants but killed more tarweed than did spraying when grasses had 2 to 4 leaves.

Herbicides are often recommended for control of undesirable plants in range seeding (Plummer et al., 1955; Eckert and Evans, 1967; McGinnies, 1968; Hull and Cox, 1968). However, some workers claim that herbicides also damage desirable species, especially seedlings. Teel (1952) noted injury to grass seedlings during the 1- to 3-leaf stage with 0.75 lb./acre of 2,4-dichlorophenoxy acetic acid (2,4-D). Phillips (1949) reported damage to three warm-season grasses and three cool-season grasses when they were sprayed with an amine form of 2,4-D at 0.5 and 1 lb./acre at emergence. No injury occurred when they were sprayed 2, 4 and 8 weeks after emergence.

McGinnies (1968) found that 3 lb./acre of 2,4-D did not damage grass seedlings sprayed when weeds growing with the grasses were 6 to 12, 18 or 24 inches tall. Klomp and Hull (1968) sprayed grass seedlings in the greenhouse with 2,4-D at 1, 2, and 4 lb./acre. The higher the rate of 2,4-D the greater the reduction in number of grass plants. The present study was to determine how different rates of 2,4-D affected grass seedlings when sprayed at different stages of growth in the field.

Procedures

Studies were conducted in a natural opening dominated by annual plants in the spruce-fir type at Franklin Basin in southeastern Idaho. The area is at 8,400 feet elevation and the annual precipitation averages 46 inches. The dominant species on the area is tarweed (Madia glomerata Hook.), with considerable bushy knotweed (Polygonum ramosissimum Michx.) and collomia (Collomia linearis Nutt.). A thick growth of fleshy-rooted plants such as bicolor biscuitroot (Lomatium leptocarpum (Torr. and Gray) C. and R.) and lanceleaf spring beauty (Claytonia lanceolata Pursh) occurs in the spring.

We tested the eight spraying and seeding treatments listed in Table 1 for 3 years (fall 1965–spring 1968) with 4 replications. An isooctyl ester of 2,4-D (low volatile) was applied to the 8 treatments at 3 rates: 0.5, 1, and 2 lb./acre, acid equivalent.

Three grasses: intermediate wheatgrass (Agropyron intermedium (Host) Beauv.), slender wheatgrass (Agropyron trachycaulum (Link) Malte), and smooth brome (Bromus inermis Leyss.), were drilled 1/2 inch deep with a cone seeder at 25 seeds per foot in rows spaced 12 inches apart. Spring seedings were in early June, as soon after snow melt as possible. Fall seedings were in late September. The three species had similar seedling growth stages and were averaged to evaluate treatments.

A hand sprayer was used to apply 2,4-D at the required rate. Stands were sprayed and spring seedings were made in early June. At this time the fall-seeded grass had 1 to 2 leaves and tarweed plants were 0.2 to 0.4 inch high with 2 to 4 leaves and an average of 157 plants/ft². Sprayings when grass had 2 to 4 leaves were about 4 weeks later. At this time tarweed was 1 to 1.5 inch tall and had 6 to 12 leaves. Sprayings for the spring-drilled grass were delayed to late June or early July. When spring-drilled grass had 1 and 2 leaves, tarweed was 1 or 1.2 inches with 6 to 12 leaves. Spraying when grass had 2 to 4 leaves was about 3 weeks later. For this spraying,
Table 1. Grass seedlings (per ft²) in second year and tarweed plants (per ft²) the first year from different seeding treatments and from spraying 2,4-D at 3 rates (lb./acre). Average of three years (1965-8).

<table>
<thead>
<tr>
<th>Treatment and stage of growth of grass seedlings</th>
<th>Spray rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Grass Tarweed</td>
</tr>
<tr>
<td>Spray spring, drill fall, spray spring</td>
<td>0.7</td>
</tr>
<tr>
<td>1-2 leaves</td>
<td>0.5</td>
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<tr>
<td>2-4 leaves</td>
<td>0.5</td>
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<tr>
<td>Drill fall, spray spring</td>
<td>0.7</td>
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<td>1-2 leaves</td>
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<tr>
<td>2-4 leaves</td>
<td>0.5</td>
</tr>
<tr>
<td>Drill and spray spring</td>
<td>0.7</td>
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<tr>
<td>1-2 leaves</td>
<td>0.5</td>
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<tr>
<td>2-4 leaves</td>
<td>0.5</td>
</tr>
<tr>
<td>Spray immediately before drilling</td>
<td>1.1</td>
</tr>
<tr>
<td>Spray immediately after drilling</td>
<td>1.2</td>
</tr>
<tr>
<td>Average of above</td>
<td>0.9</td>
</tr>
<tr>
<td>Drill fall without seedbed treatment*</td>
<td>0.5</td>
</tr>
</tbody>
</table>

* Not sprayed.

Tarweed was 3 to 5 inches tall with 16 to 30 leaves and 90% in bud.

Grass seedlings and tarweed on each treatment and on the check were counted in the spring, in late summer, and near the end of the second growing season.

In addition to the 3-year study, several methods of seeding tarweed infested areas are being tested in an 11-year study at this area. The spraying treatments and a check are presented here for comparison.

Spraying in the long-time study has been with 1.5 lb./A 2,4-D when grasses had 1 to 2 leaves.

Results and Discussion

Rate of Spraying

All rates of 2,4-D controlled tarweed plants. A rate of 0.5 lb./acre 2,4-D killed 97.2% of the tarweed and 1 and 2 lb./acre killed 98.6% and 99.8%, respectively when compared with the check (Table 1).

Most surviving tarweed plants were small and low in vigor.

The number of grass plants varied with years and treatments, with no significant differences between rates of 2,4-D.

Stage of Spraying

Tarweed sprayed when grass had 1 to 2 leaves averaged 1.6 plants/ft² surviving compared to 2.7 when grass had 2 to 4 leaves, and 157 where not sprayed. An average of 0.9 grass plants/ft² survived when sprayed at the 1–2 leaf stage, 0.8 at the 2–4 leaf stage and 0.5 on the check where tarweed was not sprayed.

Spraying Treatments

Grass plants surviving the various sprayings varied with years, with no significant differences among treatments. Spraying immediately before or after drilling in the spring killed most of the tarweed and more grass plants survived. However, spring seedlings were made early with hand drills, and heavy machinery for large-scale seeding could not have been used this early.

Grass seedlings emerging the first year for all treatments were double those surviving to the second year, except for the no treatment plot where emergence was over four times the survival.

The spraying and seeding treatments on the adjacent 11-year methods study averaged fewer grass seedlings. However, they have the same trend (Table 2).

Conclusions

Tarweed can be successfully controlled by spraying with as little as 0.5 lb./acre 2,4-D in early spring, and tarweed control almost doubles the survival of grass seedlings when compared to no control.

Literature Cited


HULL, A. C., JR., AND HALLIE COX.
Establishment of Subclover in Relation to Nodulation, Time of Seeding, and Climatic Variations¹

MILTON B. JONES, PATRICK W. LAWLER, AND ALFRED H. MURPHY

Agronomist, Laboratory Technician, and Specialist, Hopland Field Station, University of California, Hopland.

Highlight

Pellet inoculated subclover (Trifolium subterraneum) seed planted at various autumn dates on a site where effective nodulation was known to be a problem, produced healthy plants when mean ambient air temperature in the 6 weeks following germination was between 49 and 62 °F. When mean temperature for the 6-week period was about 45 °F, very poor clover stands developed. Seed planted September 10, about one month before a rain, produced a good stand of vigorous clover. This indicated that sufficient viable inoculum had survived in dry soil on the pelleted seed until the rains came. It is recommended that where subclover is adapted, plantings be made in October rather than waiting until after the soil is wet. More vigorous clover grew from seed which was in the ground at the time of the first rain than from seed drilled soon after the rain.

California annual ranges are completely dry during the late spring, summer, and into the fall until the first rain of about an inch occurs. During this long dry season, protein levels are generally too low for even dry adult sheep maintenance levels. After the fall rains when pastures begin to grow they are almost universally deficient in nitrogen.

The establishment of subclover (Trifolium subterraneum) on California ranges is a highly beneficial method of increasing winter and spring production and summer protein levels (Love, 1952; Williams et al., 1957; Jones, 1967; Jones and Wintaus, 1967). However, establishment of subclover stands has not been completely successful in many instances. Williams et al. (1957) recommended seeding during October just prior to the first fall rain. But in some years the rain is late in coming, and many bacteria applied in the inoculant die in the warm, dry soil. Holland (personal communication) therefore, recommended that planting be delayed until after the soil is moist.

Hely et al. (1957) attributed the failure of subclover to establish in certain Australian soils to antagonism from native soil microorganisms. With an abundance of native clovers and their N-fixing bacteria, this antagonism is also a problem in California range soils (Holland et al., 1969). Burton (1964) pointed out that far greater numbers of rhizobia are needed to bring about effective nodulation than was formerly suspected. Thousands, rather than the often quoted 50 to 100 viable rhizobia per seed are needed. Brockwell (1962) reported that the inoculant remained viable on subclover seed stored up to 4 weeks when the inoculant was applied in a solution of gum arabic, and the seed was coated with calcium carbonate. However, such pelleted seed, sown in November into wet soil, has still failed to establish satisfactory subclover stands in some instances. These failures may have resulted from the onset of low temperatures soon after germination.

The purpose of this experiment was to determine the effect of planting date and variations in rainfall and temperature on the establishment of healthy subclover plants.

Procedure

The experimental site was located on a Sutherlin loam soil (Gowans, 1958) on the University of California's Hopland Field Station. The site was characterized by soil with poor internal drainage, a pH 6.1–6.5, a slope 10% to the southeast, and was at an elevation of 600 feet. Plants on the site were annual grasses, such as fox-tail fescue (Festuca megalura) and soft chess (Bromus mollis), filaree (Erionium botrys) and a number of native clovers (Trifolium sp.). The site was mowed, raked, disked, and ring-rolled prior to planting each year.

The plantings were made in the fall of three different years as follows: October 3, 10, 17, 24 and November 7, 1966; September 15,