Control of Orange Sneezeweed with 2,4-D

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RECENT tests by the Rocky Mountain Forest and Range Experiment Station in western Colorado show that orange sneezeweed (*Helenium hoopesii*) may be killed with 2,4-D at lower costs than by grubbing or by the application of soil sterilants such as borax or sodium chlorate.

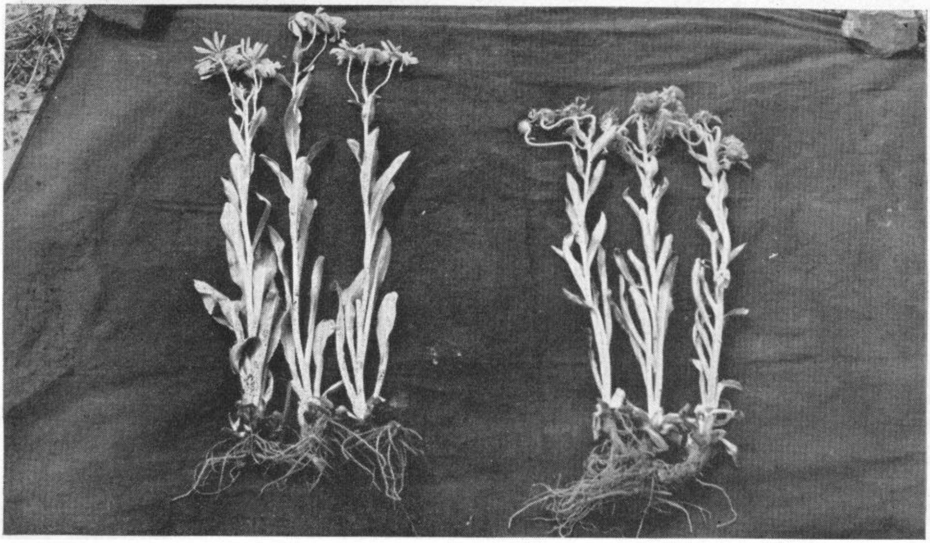

FIGURE 1. Sneezeweed is a yellow-flowered, glossy-leaved, perennial of the sunflower family. A normal plant (left) is compared with a plant recently sprayed with 2,4-D (right). Wilting and stem deformation follow spraying within a few hours, but several weeks may elapse before a plant is completely dead.

Sneezeweed (Fig. 1) is poisonous to sheep and unpalatable to cattle. Light to heavy infestations occupy more than two million acres of summer rangeland in the central Rocky Mountains. The plant reproduces prolifically by seed and by offshoots developed from adventitious buds on the taproots. Following overgrazing, sneezeweed spreads rapidly, and becomes a constant source of danger to range sheep. When sheep eat sneezeweed in quantity, they develop "spewing sickness" (*Marsh, 1924*), causing severe death losses and reduced lamb and wool crops. *Dayton et al, 1937* note that losses in Utah have been reduced by moving poisoned sheep to lower uninfested brush ranges until their condition improves. More recently a study in western Colorado (*Doran & Cassady, 1944*) has shown that if certain management practices are rigidly followed, sheep are able to utilize sneezeweed-infested ranges with very small losses. Recommended practices

[1] Maintained by the U. S. Department of Agriculture, Forest Service, in cooperation with Colorado A & M College, Fort Collins, Colorado.

include: (1) use of one-night bedgrounds and their location in uninfested areas, (2) light use of the range and avoidance of the most dense stands of this poisonous weed, (3) non-use of infested ranges in early spring or in late fall when desirable forage plants begin to dry, (4) open quiet herding, (5) uniform use of the range with as little trailing and "twice over" herding as possible, (6) never salting on bedgrounds until just before dark so sheep do not concentrate and graze with little chance of plant selection, and (7) careful culling of the flock at marketing time to dispose of all poisoned animals.

Although careful management of the flock will reduce poison losses, sneezeweed remains a problem on both sheep and cattle ranges because it produces little or no forage and occupies productive land that could and should be producing grass.

Many different methods of eradicating sneezeweed have been tried (*Doran & Cassady, 1944*). Grubbing and application of soil sterilants such as borax and sodium chlorate have proved effective, but costs vary from $15 to $30 per acre. Such costs are generally prohibitive on low-value rangelands and follow-up treatments are often required for complete control.

Good kills of sneezeweed have now been made with only one application of 2,4-D at a cost of approximately $8 per acre (Fig. 2). The development of cheaper or more effective herbicides and better methods of application may decrease costs in the future.

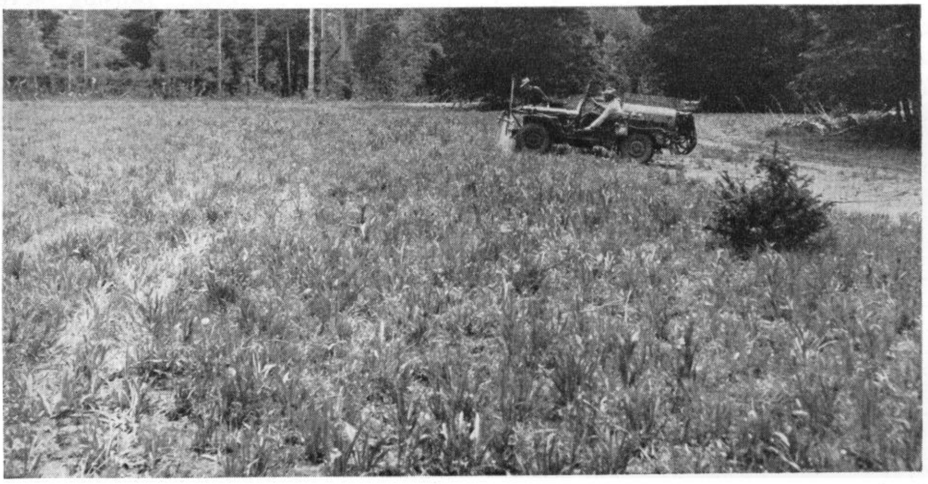

FIGURE 2. Spraying dense stands of sneezeweed with 2,4-D in mountain parks has been done efficiently with a low-pressure weed sprayer with 20-foot booms, mounted on a jeep.

Initial eradication tests with 2,4-D were made on the Uncompahgre, Grand Mesa, and White River National Forests in 1946. Hand-operated garden-type sprayers were used to apply the 2,4-D solutions to rod-square plots. Early spring, midsummer, and fall dates of application were tested, using 2,4-D concentrations of 1, 2, and 4 pounds of pure acid per acre. These initial tests showed that only the highest concentration of 2,4-D, or 4 pounds pure acid per acre, was effective in killing sneezeweed, and then only when applied in midsummer. Smaller amounts of 2,4-D or early-spring and late-fall applications caused the weed to wilt and discolor, but the old roots produced new offshoots that quickly replaced the original stand.

In 1947 additional small plots were treated at three different dates during the midsummer period, conforming to different stages of sneezeweed development: (1) pre-bloom (2) early bloom, (3) full bloom. These stages occurred about two weeks apart. Three different commercial 2,4-D formulations (ester, amine, and salt) were tested in water solutions or carriers, and in addition the ester formulation was applied in a distillate or fuel oil carrier instead of water. Table 1 indicates the average density of sneezeweed before treatment, and six weeks, one year, and two years following treatments. These tests were made only on the Uncompahgre and Grand Mesa Forests.

All the 2,4-D formulations tested produced good sneezeweed kills when applied during this midsummer period, from the pre-bloom to full-bloom stage of sneezeweed development. The esters appeared to give the most consistently good kills throughout the different periods of application, while the amines and salts appeared to be slightly more effective

TABLE 1

Average percent density of sneezeweed before and after spraying with 2,4-D

FORMULATION	CONCENTRATION (POUNDS PURE ACID PER ACRE)	STAGE OF SNEEZEWEED DEVELOPMENT WHEN APPLIED	UNCOMPAHGRE				GRAND MESA			
			Before	6 weeks after	1 year after	2 years after	Before	6 weeks after	1 year after	2 years after
Water carrier										
Ester	4	pre-bloom	3.2	0.2	0.1	0.4	2.1	0.1	T	0.3
Ester	4	early bloom	3.2	0.1	0.1	T	2.2	0.2	0.1	0.2
Ester	4	full bloom	3.4	1.0	T	0.1	1.2	1.7	0.5	0.4
Ester	8	pre-bloom	6.7	0.2	0.1	0.2	1.8	T	0.1	0.2
Ester	8	early bloom	4.4	T	T	0.0	3.0	0.5	0.1	T
Ester	8	full bloom	2.9	1.1	T	0.1	0.9	0.2	0.1	T
Amine	4	pre-bloom	2.5	T	T	0.1	2.0	0.2	0.1	0.1
Amine	4	early bloom	4.3	2.6	0.6	0.6	1.6	1.3	2.2	0.3
Amine	4	full bloom	2.8	1.6	T	0.2	1.9	2.4	0.4	T
Amine	8	pre-bloom	4.6	T	T	T	1.4	0.0	T	0.1
Amine	8	early bloom	4.6	0.5	T	0.1	3.2	1.5	0.8	0.1
Amine	8	full bloom	2.5	0.6	T	T	1.6	0.5	0.1	0.2
Salt	8	early bloom	2.4	2.4	0.6	1.5	2.8	1.5	0.6	0.3
Salt	8	full bloom	3.6	3.9	T	0.3	1.2	1.4	0.4	0.1
Distillate (oil) carrier										
Ester	4	pre-bloom	2.5	0.4	0.1	0.1	1.2	0.4	0.7	0.1
Ester	4	early bloom	4.8	0.3	T	0.1	4.0	0.2	0.4	0.1
Ester	4	full bloom	2.0	0.4	T	T	2.2	0.5	0.3	0.3
Ester	8	pre-bloom	3.9	T	0.0	T	1.8	0.0	T	T
Ester	8	early bloom	1.0	T	T	0.1	1.0	0.0	T	0.1
Ester	8	full bloom	6.1	0.5	T	0.2	2.4	3.1	0.5	0.5
No treatment										
Check		pre-bloom	3.2	3.9	1.7	2.9	1.2	1.4	1.3	1.5
Check		early bloom	2.4	2.7	0.6	2.2	0.8	1.6	2.2	2.0
Check		full bloom	2.1	2.7	0.8	1.8	2.9	3.3	2.8	2.8

T = trace.

when applied during the pre-bloom stage. A water carrier was just as effective as a distillate or oil carrier.

Later tests on a larger scale have shown that the jeep ground-spraying equipment (Fig. 2) may be effectively used for spraying sneezeweed-infested ranges. Good plant coverage can be obtained using 50 gallons of water per acre as the 2,4-D carrier. In experimental tests the jeep, equipped with 20-foot booms and appropriate nozzles, traveled about 4 miles per hour and required 15 minutes to spray an acre. Table 2 shows the number of sneezeweed rosettes before and after spraying four ½-acre plots on the Uncompahgre Plateau with the jeep ground-spraying equipment. These plots were sprayed in early July during the pre-bloom stage of sneezeweed development. 2,4-D was applied at the rate of 4 pounds pure acid per acre in an ester formulation with a water carrier.

TABLE 2

Number of sneezeweed rosettes per acre before and 6 weeks after spraying with 2,4-D[1]

TREATMENT	AVERAGE NUMBER OF SNEEZEWEED ROSETTES PER ACRE (THOUSANDS)	
	Before treatment	6 weeks after treatment
Sprayed with 2,4-D		
Plot 1	378	34
Plot 2	234	38
Plot 3	415	64
Plot 4	458	27
Check (no treatment)		
Plot 1	274	352
Plot 2	372	318

[1] Number of rosettes per acre is based on counts of 20 random sample plots within each treated plot. Sample plots were 1/20,000 acre in size. One sneezeweed plant may consist of 1 to 20 rosettes.

Spraying should be confined to the period just before the sneezeweed plants begin to bloom, when flower buds are formed and the plants are growing rapidly. At a 9,000-foot elevation in western Colorado, this period usually occurs in early July. 2,4-D should be applied on calm, warm, sunny days. If rain falls within a few hours after spraying, it is liable to wash away the 2,4-D before it is fully effective.

Killing sneezeweed with 2,4-D has some disadvantages and may create new problems. For example, most of the broadleaf plants that grow with sneezeweed are also susceptible to 2,4-D. Commonly occurring species that are killed or severely damaged by 4 pounds of pure acid per acre are as follows:

Western yarrow	Achillea lanulosa
Dandelion agoseris	Agoseris taraxacifolia
Painted cup	Castilleja spp.
Hairy goldaster	Chrysopsis villosa
Menzies larkspur	Delphinium menzeisi
Trailing fleabane	Erigeron flagellaris
Aspen fleabane	Erigeron macranthus
Richardson geranium	Geranium richardsoni
Aspen peavine	Lathyrus leucanthus
Mountain bluebell	Mertensia ciliata
Shrubby cinquefoil	Potentilla fruticosa
Cinquefoils	Potentilla filipes, P. anserina, P. glaucophylla
Buttercup	Ranunculus spp.
Niggerhead	Rudbeckia occidentalis
Groundsel	Senecio spp.
Decumbent goldenrod	Solidago decumbens
Common dandelion	Taraxacum officinale
Edible valerian	Valeriana edulis
American vetch	Vicia americana

When these plants are killed the forage crop is reduced and the soil may erode more rapidly.

Fortunately, 2,4-D sprays do not damage native grasses commonly found with sneezeweed. Native grasses tend to increase after being released from weed competition, but in many areas the grasses are so sparse that several years may elapse before they can thicken enough to provide an effective soil cover.

In spite of obvious disadvantages, 2,4-D sprays offer a promising method of controlling sneezeweed. Because of the aggressive nature of the weed, permanent control cannot be expected from a single application of 2,4-D. A good cover of perennial vegetation that will keep sneezeweed from re-invading must be established and maintained.

Studies have been initiated to determine how such a vegetation cover can be obtained and maintained most effectively and economically. Getting rid of sneezeweed is a difficult goal to attain; yet the benefits in increased forage production and reduced poison losses make the effort worth while.

Summary

Tests made by the Rocky Mountain Forest and Range Experiment Station in western Colorado show that sneezeweed can be killed with 2,4-D sprays. Sneezeweed is poisonous to sheep and unpalatable to cattle. When abundant, this noxious weed is a problem on summer ranges in the central Rocky Mountains.

A low-pressure weed sprayer with 20-foot booms mounted on a jeep, proved satisfactory for applying 2,4-D in mountain parks. Ninety percent kills were obtained at costs of approximately $8 per acre.

To be effective in controlling sneezeweed 2,4-D should be applied:

1. At the rate of 4 pounds pure acid per acre.
2. On calm sunny days, with no rain for several hours following application.
3. At the pre-bloom stage of sneezeweed development, when flower buds are formed and the plants are growing rapidly.
4. With a sufficient amount of carrier, water or distillate, to give good plant coverage.

2,4-D does not damage native grasses, but does kill most broadleaved plants commonly associated with sneezeweed. Sneezeweed rapidly re-invades treated areas, and control should be attempted only when provisions are made to restore a good cover of grass in a short time.

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