
TECHNICAL NOTES

Mortality of Rock Goldenrod in Sagebrush Stands Sprayed With 2,4-D

WILLIAM A. LAYCOCK

Plant Ecologist, Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Logan, Utah

Highlight

Rock goldenrod, an undesirable range plant, was sprayed with 2,4-D incidental to a sagebrush-control project on the Ashley National Forest. One-half to two-thirds of the rock goldenrod plants sprayed at the rate of 2 pounds per acre were killed. This application killed all mature sagebrush.

Sagebrush-control projects on the Ashley National Forest north of Vernal, Utah, provided an opportunity to determine if 2,4-D will kill rock goldenrod (*Petradoria pumila* (Nutt.) Green). Rock goldenrod is an undersirable range plant that grows in a wide altitudinal range (3,500-11,000 ft) extending from Wyoming and southeast Idaho, south into northern Arizona and New Mexico, and west to the mountains of California's Mohave Desert (Anderson, 1963). Rock goldenrod is not eaten by livestock or big game (U.S. Forest Service, 1964), nor is it a good soil binder because it has a taproot with few laterals near the surface.

Some cattlemen believe that rock goldenrod has increased in amount

and distribution on the south slopes of the Uinta Mountains during the last decade. However, quantitative records are not available to confirm this belief. The form of rock goldenrod in this area is *P. pumila* ssp. *pumila* (Anderson, 1963). It grows with other forbs and with grasses in the understory of big sagebrush (*Artemisia tridentata* Nutt.) communities, and is most abundant on rocky ridges and other areas with shallow soils. It is also abundant in some areas on deep soils that have been cultivated and seeded to introduced grasses.

This paper does not report a "study" of the usual sort—merely some observations incidental to the sagebrush control projects mentioned above. Since rock goldenrod

Table 1. Density of rock goldenrod one year after spraying with 2,4-D.

Spray date	Site description	No. of 9.6-sq.-ft. plots	Av. no. plants per plot		Percent kill
			Live	Dead	
June, 1962	Scattered sagebrush shallow soil	20	2.6	4.4	63 ¹
June, 1963	Scattered sagebrush shallow soil	40	3.6	5.4	60
June, 1963	Moderate sagebrush deep soil	100	4.2	4.4	51

¹ Counts 2 years after spraying showed 66% kill.

is often found in association with big sagebrush, there may well be some interest in the fact that 2,4-D may be used to control both plants simultaneously.

Methods

Two areas were sprayed with 2,4-D in an oil base at the rate of 2 lb/acre—one in June 1962; the other in June 1963. Both are on gentle, southeasterly-facing slopes at approximately 8,000 ft elevation.

On the area sprayed in 1962, live goldenrod plants were counted on 20 permanent 9.6-ft² plots just before, 1 year after, and again 2 years after spraying. The plots were on shallow soil with only scattered sagebrush plants. The rock goldenrod plants killed by the 1962 spray could be easily identified and counted in 1963. A slightly different technique was used to determine mortality of rock goldenrod on the area sprayed in June 1963. On this area, both live and dead plants were counted on 140 randomly located 9.6-ft² plots in 1964, a year after spraying. No count was made prior to spraying. Forty of the plots were on rocky, shallow soils with scat-

tered sagebrush plants; the remainder were on deep soil with a moderate stand of sagebrush.

Numbers of live and dead sagebrush plants were also counted in the plots on both areas. Sagebrush plants were arbitrarily grouped into two classes: seedlings—4 inches or less in height, and mature—over 4 inches.

Results and Discussion

Rock goldenrod had reached its full vegetative growth, but had no flower stalks when sprayed in 1962. The sprayed plants produced a few distorted stalks without flowers later in the summer. Unsprayed goldenrod plants in adjacent areas flowered the first week in August 1962.

In 1963, 63 percent of the rock goldenrod plants sprayed the year before were dead (Table 1). Portions of many live plants also appeared to have been killed by the spray, and some of these plants died by 1964. Spraying killed all mature sagebrush, but one-fourth of the sagebrush seedlings survived.

In 1964, 60% of the rock goldenrod plants sprayed in 1963 were dead on shallow soils with little sage-

brush cover; 51% were dead on deep soils with more sagebrush (Table 1). The spray killed all the sagebrush in the plots on shallow soil and 90% of the sagebrush on the deep soils. All live sagebrush plants were less than 4 inches in height, and many appeared to be seedlings that had sprouted after the area had been sprayed. The lower mortality of rock goldenrod and small sagebrush plants in the area that had the most sagebrush suggests that large sagebrush plants may have shielded some of these low-growing plants from the spray. On adjacent unsprayed areas, no dead rock goldenrod plants and only occasional dead sagebrush plants were observed in 1964.

Conclusions

Perhaps a greater proportion of rock goldenrod plants would be killed by (1) spraying at a heavier rate in June, (2) spraying all plants directly, including those under large sagebrush plants. Whether such a control program would be practical is not known.

Rocky ridges where rock goldenrod is most abundant are often excluded from areas sprayed for sagebrush control because the sagebrush cover is often quite sparse. If further study reveals that removing rock goldenrod increases grass yields, these rocky areas probably should be included in future spray programs.

LITERATURE CITED

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