Rayless Goldenrod—A Poisonous Range Plant in Texas

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RAYLESS goldenrod (*Aplopappus heterophyllus*), has been recognized as a poisonous plant on Texas ranges for more than forty years. In some areas it is called jimmy weed, in others alkali weed. Rayless goldenrod is a member of the composite family; a bushy halfshrub with numerous upright branches arising from a perennial woody root crown, but not a true goldenrod. Most branches, which range in height from 2 to 4 feet and give rise to numerous yellow flower heads, die back to the crown each year. Growth on Texas range areas starts in early spring and flowering begins in late summer. Figure 1 shows a plant in full bloom in August.

Distribution

Marsh (1921) and Marsh et al. (1926) gave the distribution range of rayless goldenrod from Northern Colorado to the Texas Panhandle, south and west to Sonora and Chihuahua, Mexico and Arizona. It grows around springs, waterways, and in irrigated areas of southwest Texas and has been observed or collected in the Panhandle, the Edwards Plateau and is abundant in the Pecos river valley and around watered sites of the Trans Pecos. Figure 2 is a distribution map showing field observation records and herbarium collections in Texas.

Toxicity

Rayless goldenrod is poisonous to cattle, horses, and sheep. On heavily grazed ranges and during snow and ice storms it has caused much sickness and a high mortality. Tremetol ($C_{16}H_{22}O_3$) is the toxic principle found in rayless goldenrod, both in green and dry plant material (Couch 1929, 1930). Cattle have become sick from eating 1.5 pounds daily per 100 pounds live weight over a period of 11 days. Sheep require the consumption of 1.25 pounds of material per 100 pounds body weight daily over a period of 3 weeks to become sick. Horses were made sick on a daily dose of 1 pound per 100 pounds of body weight over a period of 18 days (Marsh et al., 1926). It is evident that the poison is cumulative even though there is some elimination (Marsh et al., 1926). The poison may be transmitted through the milk or meat of the animal, and thus endanger the consuming human, who may develop the disease known as milksickness or trembles (Couch, 1930).

The internal symptoms as given by Marsh and co-workers (Marsh et al., 1926) are a congestion of the digestive tract, usually a congested spleen and an abnormal supply of blood in the pancreas. The liver is generally pale while the bile is thick and dark and the gall bladder distended.

The external symptoms are well described by several workers (Marsh, 1921, Marsh et al., 1926, Couch, 1933). The most obvious symptoms are noted in the inactivity of the animal which often stands in a humped-up position and moves with a stiff gait. The inactivity increases and the animal becomes weaker as the disease progresses. The trembling of the muscles, especially after exercise,

FIGURE 1. Rayless goldenrod in full bloom, August 1950

FIGURE 2. Map showing herbarium (solid dots) and field observations (x) of rayless goldenrod in Texas. Other infestations undoubtedly exist over much of the western part of the State.

and the development of coma is noticeable before death.

MANAGEMENT

The management and control of rayless goldenrod is essential in all areas of infestation. One of the more common practices is to fence off hazard sites which may be limited to localized areas or may involve several sections of land. Such isolated areas are thus producing a good crop of rayless goldenrod every year whereas these respective sites could produce a good grass crop. Some ranchmen keep animals off infested areas during late fall and winter, the periods when poisoning is most apt to occur, but this practice is hazardous as animals have been observed browsing the weed at all seasons of the year.

An average condition existent in much of the infested range area is shown in Figure 3 (left). Over 75 percent, by ocular determination, of the herbaceous vegetation in this area was rayless goldenrod. Figure 3 (right) was taken a few miles away and shows a good cover of alkali sacaton (*Sporobolus airoides*). This latter site is somewhat isolated but does show that protection and management could be applied to much of the area and thus produce much forage for livestock.

Irrigated farming is carried on in parts of the area infested with rayless goldenrod. When row crops such as cotton are raised, the weed can be fairly well controlled, but when alfalfa is grown on the areas the plant becomes a serious pest. When rayless goldenrod is fed in hay to animals, it will kill them as readily as if eaten green. It must thus be grubbed out of the alfalfa fields before mowing. Seeds are carried by water following heavy rain and by irrigation, and infestation on areas retired from irrigation is often very severe. Several areas which had been out of cultivation for several years have been examined and no apparent retreat of the weed has been noted. Eradication is apparently needed in addition to deferment in these areas. Since most of the original grass cover has been lost through cultivation and overgrazing, reseeding

will be necessary in addition to eradication, to bring about productivity. More field experimental work is necessary to establish the most adaptive species for reseeding but it appears to the writer that species native to the area should be given first consideration. In addition to alkali sacaton, black grama (*Bouteloua eriopoda*), pink pappus (*Pappophorum bicolor*), sand dropseed (*Sporobolus cryptandrus*), and buffalo grass (*Buchloe dactyloides*) are the most frequently observed.

Grubbing is practiced by some operators to clear hazard sites. Two precautions must be taken when grubbing is done. First, the plant must be grubbed to several inches below the soil surface since any remaining part of the crown will resprout. A second precaution is to move animals from the pasture for 2 or 3 months as several cases of poisoning have occurred by animals eating the freshly grubbed plants. Grubbing is effective, but laborious and expensive. One ranchman in Ward County stated that he had spent a thousand dollars in grubbing plants from about 30 acres in 1947 and 1948. This operator also found

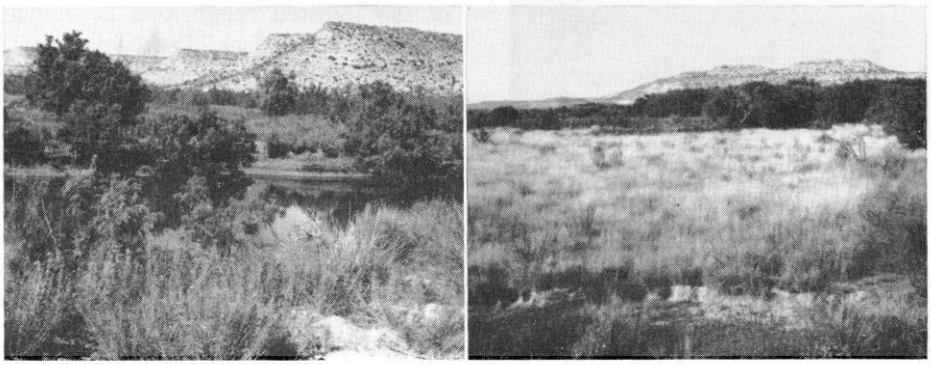

FIGURE 3. (Left) Infestation of a heavily grazed area along the Pecos River in Pecos County. (Right) Alkali sacaton in control of an area along the Pecos River in Crockett County.

FIGURE 4. Results of grubbing rayless goldenrod in Ward County in August 1947. No resprouts or seedling were observed on the area in November 1949.

that when plants were grubbed during the summer, no seedlings appeared the following year. The plants shown in Figure 4 were on a site grubbed in August 1947. The area was examined and the picture taken in November 1949. No resprouts or seedlings could be found and from this field information and observation it is reasonable to assume that the seeds are short-lived, which is an important consideration in control work with rayless goldenrod.

EXPERIMENTAL CONTROL WITH HERBICIDES

The use of herbicides appears to be an economical and effective method of control. A project was set up in January

1949 to determine the value of 2,4-D as a control measure. The first treatment was applied on January 31 while the plants were leafless and dormant. Subsequent treatments were applied on March 4, April 12, May 11, and June 9. An ester of 2,4-D was applied in water at the rates of 2000 and 4000 parts per million by weight (PPM) at each treatment. The object was to determine the concentrations and season of growth for the most effective kill. The plots were 7.5 × 75 feet each and the area had an average of 9055 rayless goldenrod plants to the acre on the basis of plant counts in the plots. The experimental area was also infested with mesquite. Alkali sacaton, locally called salt grass, was the predominant grass of the area. The results as based on counts made on November 21, 1949 are shown in Table 1. All plants in the plots were apparently

TABLE 1

Rayless goldenrod treated with 2,4-D at intervals from January 31 to June 9, 1949. The percent killed was determined from counts made on November 21, 1949.

PLOT NO.	2,4-D PPM	DATE TREATED	LIVE PLANTS	DEAD PLANTS	PERCENT KILLED
1	2000	1/31	31	60	66
2	4000	1/31	18	55	75.3
3	2000	3/4	28	48	62
4	4000	3/4	18	45	71.4
5	2000	4/12	7	84	92.4
6	4000	4/12	7	62	90
7	2000	5/11	1	58	98.3
8	4000	5/11	0	30	100
9	2000	6/9	16	56	77.7
10	4000	6/9	16	62	79.5

weakened, but were counted alive if any green growth was present. Since approximately 70 percent of the weeds were killed in the January and early March treatments, control work could conceivably be done with herbicides during these months in crop producing areas. The best first season kills were obtained during April and May and these data thus indicate this period of plant growth would be the best time for herbicidal control on range areas in which crop damage is not a problem. None of the plants survived the second growing season and no live plants were present on the treated plots when examined in October 1950, although normal live plants were present in the check plots and were growing normally adjacent to the treated plots.

The data obtained in 1949 indicated that the concentrations were of about equal efficiency in final kill, but treating in April and May gave better first year reductions than treatments applied at other periods. Experiments by other workers in spraying mesquite indicated that May was also the best time to apply chemical treatment in this area. With this in mind a project was set up in 1950 with formulations that could possibly be used in one application to control both mesquite and rayless goldenrod when growing together. To obtain this objec-

TABLE 2

Results of airplane treatment of rayless goldenrod

AREA 20 A.	CHEMICAL PER ACRE IN 1 GAL. #2 DIESEL OIL AND 2 GAL. WATER	AVERAGE NO. LIVE PLANTS PER PLOT*		PER-CENT KILLED
		May 13, 1950	Oct. 30, 1950	
1.	1 lb. ester of 2,4,5-T	66	33	50.0
2.	1 lb. BK 64 (Butoxy ethanol esters of 2,4-D znd 2,4,5-T)	73	1	98.6
3.	½ lb. ester of 2,4-D	85	11	87.0
4.	1 lb. ester of 2,4-D	145	70	51.7
Check Area	None, on leeward side, thus no drift	57	51	1.0

* Five, 4′ x 100′ plots were placed in each 20 acre area to obtain plant counts.

tive, four areas of 20 acres each were treated by airplane on May 13, 1950. Table 2 gives the data obtained from the check plots located on each of the 20 acre areas. Due to the location of the experimental area and costs of treatment, a complete screening of all probable herbicides was not possible. Since the ester of 2,4,5-T had shown the greatest promise on mesquite and since BK 64 had given favorable results, these were added to the previously tested 2,4-D compounds. The fastest and highest first season kill was obtained with the butoxy ethanol esters of 2,4-D and 2,4,5-T as present in BK 64. All treatments defoliated the mesquite, but the final results will be reported elsewhere.

Drought during the growing periods of 1951 and 1952 prevented final evaluation of the results of the airplane treatment as no live plants were observed in the treated areas when examined in October 1951 and again in June 1952, and there was not enough growth in the check areas to reach final conclusions. However, the report at this time seems to be in order since the data indicated that herbicides can be used successfully to control rayless goldenrod. The usual precautions in the use of herbicides must be followed, however, if areas to be treated are adjacent to or in cultivated crop areas.

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BRIEFS

A man could retire comfortably in his old age on his experience—if he could only dispose of it for what it cost him.

Success is a fraud after all. By the time you're rich enough to sleep late you're so old you wake up early.

The mind is a wonderful thing. It starts working the minute you're born and never stops—until you stand up in public.—Transit Riders' Digest, New Orleans Public Service.

Life is easier to take than you think; all that is necessary is to accept the impossible, do without the indispensable, and bear the intolerable.—*Kathleen Norris.*

A lawn is a place where hardy grasses, that flourish in empty lots and grow between the cracks in sidewalks, wither and die from the tender care of a householder.—*Burton Hillis*, Better Homes and Gardens, Sept. 1951.