

DODDER CONTROL IN CLOVER GROWN FOR SEED IN WESTERN OREGON

G.W. Mueller-Warrant

Dodder control tests were conducted in two red clover fields in spring and summer of 2000. The tests compared Prowl 3.3 EC, Treflan TR10, two formulations of the biocontrol agent Smolder, and an untreated check. Prowl and Treflan were intended to be applied at rate of 4 lb ai/acre after hay harvest, but a calibration error increased the rate of Prowl to 4.7 lb a.i./acre (Table 1). A granular, "time-release" formulation of the biocontrol agent Smolder, an *Alternaria destruins* fungus, was applied prior to hay harvest in the standing clover crop. A WP formulation of Smolder mixed in water and oil was sprayed on individual dodder patches in early August. Roundup was not tested in 2000 because it had consistently reduced yield in tests conducted in 1998 and 1999.

Table 1. Timing of herbicide applications and management operations in two red clover test sites, 2000.

Treatment or operation	Bayley Road	N. Valley Road
Smolder granules applied	May 12	NA
Hay harvest	May 19	May 20
Pendimethalin & trifluralin applied	May 24	May 24
Smolder WP applied postemergence	Aug. 2	Aug. 2
Swathing	Aug. 30	NA
Combining	Sept. 12	NA

Global Positioning System (GPS) coordinates of dodder patches found in 1999 at the Bayley Rd. site were used to locate and align plots in 2000. There were 573 dodder patches in 1999 within the 4-acre section of the field used for testing in the year 2000. Prowl, Treflan, and the untreated check were all replicated five times, while granular preemergence Smolder was replicated 15 times. The postemergence spray application of Smolder WP was applied on Aug. 2 to five patches at Bayley Rd. and six patches at N. Valley Rd.

Germinating dodder was found at the Bayley Rd. site on April 20 near the center of the area of the densest patches in 1999. Newly germinated dodder seedlings were seen growing along the moist soil surface then. Dodder seedlings were found again on May 12 and May 15, and some were attached to small weeds and red clover. No dodder was found at the N. Valley Rd. site in April, May, or June. The soil surface was dry when Prowl and Treflan were applied on May 24, but subsurface moisture was good. Rainfall in the first two weeks after Prowl and Treflan applications was very light, and neither new nor old dodder seedlings could be found on June 2. Some stunting and leaf distortion was visible in early June on red clover in Prowl-treated plots, especially at the Bayley Rd. site, but

stunting was no longer detectable by the end of June. The soil surface remained dry from hay harvest until rains on June 6-12. Newly emerged seedlings were found on June 8. Clover regrowth was rapid, and the canopy shaded the ground and kept the soil surface moist for two weeks after the rain. Dodder was found attached to a young sowthistle plant on June 8 and attached to red clover on June 21. By July 6 red clover was in early bloom, and dodder patches were 3 inches wide. By July 20 dodder patches were up to 3 feet wide and were attached to dozens of clover stems. The first patch was found at the N. Valley Rd. site on July 27. Dodder was just beginning to flower in late July. Flowering and seed production by dodder continued until swathing on Aug. 30.

Prowl and Treflan both provided 100% control of dodder in 2000, the same as they had in 1998 and 1999. A total of 61 patches were found within the test area at Bayley Rd., 36 in Smolder-treated plots and 25 in the untreated check. This represented a frequency of patch recurrence of 13.6% in areas treated with Smolder granules and 32.9% in the untreated check. The limited rainfall in late May and June undoubtedly influenced our results, and much higher numbers of dodder seedlings would have emerged if normal rainfall had occurred. Additional rainfall might have also improved the performance of the biocontrol agent, as secondary infections would have spread the disease. Weather was very dry before and after the Aug. 2 application of Smolder WP, and the only effect observed on dodder from its application was a slight stunting by late August. While the 59% control by Smolder granules exceeded the performance of Smolder WP in 1999 and 2000, Prowl and Treflan clearly gave the best weed control.

Prowl and Treflan were the highest yielding treatments, although the difference between them and the untreated check was not statistically significant. Granular Smolder treatment was lower yielding than Prowl and Treflan, but it did not differ statistically from the untreated check. A substantial portion of the yield differences between Smolder and Prowl or Treflan may have been caused by trampling and physical removal of the crop when the dodder patches were cut out by hand in August. Yield differences between Smolder and Prowl or Treflan were greatest in reps 3 and 4, which was also the location of most of the dodder patches. However, it is possible that there were other unidentified reasons for the small yield advantage to Prowl and Treflan. Moisture was in short supply in the summer of 2000, and any changes in rooting patterns and shoot to root ratios caused by Prowl and Treflan might have been beneficial in this environment.

No treatment effects on clover seed germination have been found, although some samples remain to be tested. The Oregon Clover Commission and clover growers should encourage BASF Corporation and Dow AgriSciences to pursue registration of Prowl EC and Treflan TR10 after hay harvest for dodder control. Both herbicides are safe to use on established clover grown for seed and provide good control of dodder germinating after hay harvest. Roundup remains useful for spot

spraying of dodder patches at rates causing crop destruction. especially the granular formulation.
 The biocontrol agent Smolder merits some additional testing,

Table 2. Dodder patch frequency of recurrence and density and red clover seed yield, 2000.

Herbicide treatment (lbs ai/acre)	Number of dodder patches in 1999 within 2000 test area (total in all plots)	Frequency of recurrence from 1999 to 2000 (%)	Dodder patch density in 2000		Red clover seed yield at Bayley Rd. (lb/acre)
			Bayley Rd. (#/5670 ft ²)	N. Valley Rd. (#/6300 ft ²)	
4.7 Pendimethalin	147	0.0 a*	0.0 a	0.0 a	862 a
4.0 Trifluralin	85	0.0 a	0.0 a	0.0 a	893 a
Smolder granules	265	13.6 b	2.4 ab	NA	778 b
Untreated	76	32.9 c	5.0 b	0.9 b	812 ab
Probability level		0.0001	0.1297	0.0529	0.023
CV(%)		21.7	157.1	154.5	9.0

* Means followed by the same letter do not differ at the $P=0.05$ level of significance. Frequency of recurrence was $\log(x+1)$ transformed for analysis of variance and means separation, and then converted back to raw units.