

A SYSTEM FOR EVALUATING EFFECTIVE WEED CONTROL IN FOREST NURSERIES

Harry W. Anderson
Soils Forester
Washington Department of Natural Resources
Olympia, Wash.

Introduction

Nurserymen are continually testing the effectiveness of new materials as weed control agents. However, a good evaluation of these chemicals is not always easy to obtain. This is usually because the experimentation is done on small plots with limited application rates.

There are three basic methods for determining weed control. The most common is visual observation. This method usually involves only a notation of the presence or absence of weeds (1, 2). The second method, a refinement of visual observation, consists of a systematic rating system. Here the presence or absence of weeds is not only noted, but an attempt is made to classify their presence by a number (6, 7). The last, and most accurate, method is a weed count. The number of weeds is usually expressed per unit area (3, 5, 8, 9). A refinement of the count method is to weigh the weeds (4). This also is expressed per unit area.

Of the three methods described, the rating system probably offers the most information for the least effort. A good rating system shows the degree of weed infestation but does not require the tedious work involved in counting or weighing weeds. More plots can be established since the time needed for plot evaluation is greatly reduced.

The purpose of this paper is to describe a rating system utilized at the L.T. "Mike" Webster Nursery near Olympia, Wash., for evaluating weed control and plant damage on a series of fumigation trials.

Methods and Procedure

Two fumigants were tested for weed control effectiveness. Trizone¹ was applied at 260 pounds per acre and Trifume² at 250 and 350 pounds per acre. The fumigants were applied through soil chisels mounted on a tractor drawbar (fig. 1). The chisels released the fumigant 6 to 8 inches below the soil surface.

Prior to fumigation, one edge of a 2-mil polyethylene tarp was buried. As the chemical was injected, the chisel furrows were sealed with a drag. Immediately after fumigation the tarp was spread over the area and completely sealed on all sides. Any holes in the tarp were patched. The areas remained sealed for 24 hours to allow complete dispersion of the fumigant (fig. 2).

The fumigated strips were laid out at right angles to the seedbeds so that after sowing, portions of 56 beds were in the fumigated area.

To evaluate weed control and plant damage, thirty-six 5- by 4-foot plots were established in the fumigated portions of 16 beds. Plant damage was evaluated on Douglas-fir, Norway spruce, Noble fir, Ponderosa pine, Pacific silver fir, and Austrian pine seedlings.

Results and Discussion

The 36 plots located in the fumigated portions of the seedbeds were rated four times during the summer of 1960 for weed control and plant damage. The rating, based on visual observation, numerically rated weed control and plant damage-

¹ Dow Chemical Co. product containing methyl bromide, 61 percent; chloropicrin, 31 percent; and propargyl bromide, 8 percent.

² Neil MacLean Co. product containing methyl bromide, 43 percent; and chloropicrin, 57 percent.

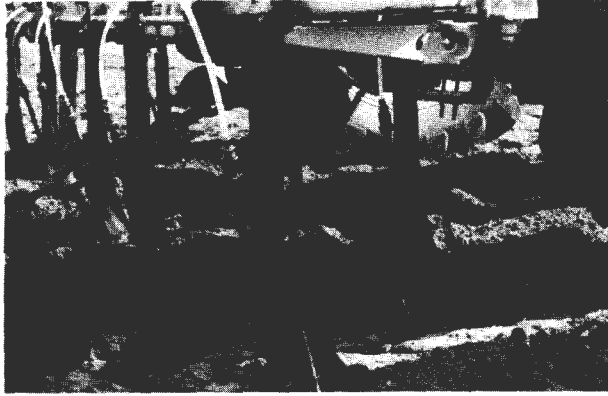


Figure 1.--Soil chisels for injecting fumigants below soil surface.

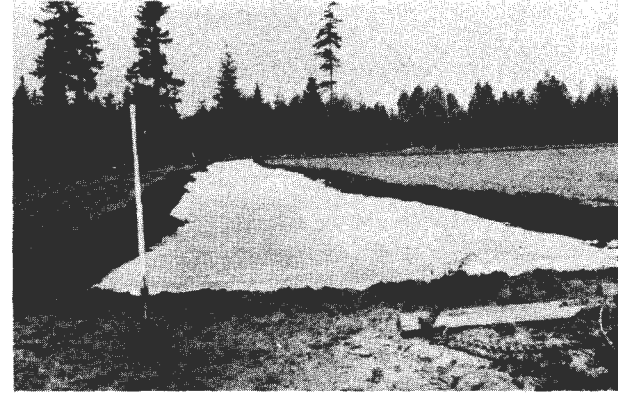


Figure 2.--Fumigated area covered with polyethylene tarp.

The rating system shown below is an adaptation of Meyhre's (10) system for weed control evaluation:

Plant Damage:

- 10 No damage.
- 7-9 Slight damage; plants will recover and make good growth.
- 4-6 Moderate damaged; plants will recover but will show effects from chemicals and-will have less growth.
- 1-3 Severe damage; some plants will survive, and some plants will be stunted and discolored.
- 0 Dead plants.

Weed Control:

- 0 No control; many vigorous weeds.
- 1-3 Slight control; some reduction in weed stand.
- 4-6 Moderate control; reduction in stand greater than 1-3 above.
- 7-9 Good to excellent control; few weeds present.
- 10 All weed growth eliminated.

As an example, a plot rated 5-5 would show moderate weed control and moderate plant damage.

Since negligible plant damage was noted in the plot ratings, this effect was no longer considered in the evaluation.

The four weed control ratings for each fumigant can be seen in table 1. Because of the variable pattern of weed seed infestation, the individual plot ratings have little meaning. However, by taking the average rating for each fumigant, a pattern emerges. By plotting the average weed control rating from table 1 against time and assuming an effective level of weed control as 8, the length of effective weed control can be shown (fig. 3).

The seedbeds at the Webster Nursery were sown on June 1, 1960, and weed control was rated 10. As weeds invaded the area, the rating decreased (fig. 3). Both Trizone at 260 pounds per acre and Trifume at 250 pounds per acre dropped to a rating of 8 by August 23, or after 84 days of effective weed control. Trifume at 350 pounds per acre dropped to a rating of 8 by September 21, providing 113 days of effective control.

Apparently effective weed control may last 3 to 4 months, depending on the fumigant rate (fig. 4).

TABLE 1.--Average weed control rating for Trifume at 250 pounds and 350 pounds per acre and Trizone at 260 pounds per acre

Treatment	Plot No.	July 14	August 1	September 1	October 17
Trifume (250 pounds per acre)	1	10	5	5	4
	3	10	5	3	1
	5	10	10	10	9
	8	10	10	10	8
	13	10	10	9	9
	16	9	9	6	3
	19	10	10	10	10
	22	10	10	10	9
	25	8	6	5	4
	28	9	8	5	3
	30	10	10	6	5
	32	10	10	10	9
	34	10	10	9	9
	36	10	10	10	10
Total.....		136	123	108	93
Average.....		9.7	8.8	7.7	6.6
Trifume (350 pounds per acre)	2	10	8	8	8
	4	9	6	6	4
	6	10	10	10	9
	9	10	10	9	9
	14	10	10	10	9
	17	9	6	4	1
	20	10	10	9	8
	23	10	10	9	9
	26	10	7	6	5
	27	10	9	9	8
	29	10	10	9	8
	31	10	10	9	9
	33	10	10	9	9
	35	10	10	10	9
Total.....		138	126	117	105
Average.....		9.9	9.0	8.4	7.5
Trizone (260 pounds per acre)	7	10	10	10	10
	10	10	10	10	10
	11	10	10	9	8
	12	10	8	5	1
	15	18	7	5	5
	18	10	10	9	8
	21	8	7	3	1
24	10	10	10	10	
Total.....		76	72	61	53
Average.....		9.5	9.0	7.6	6.6

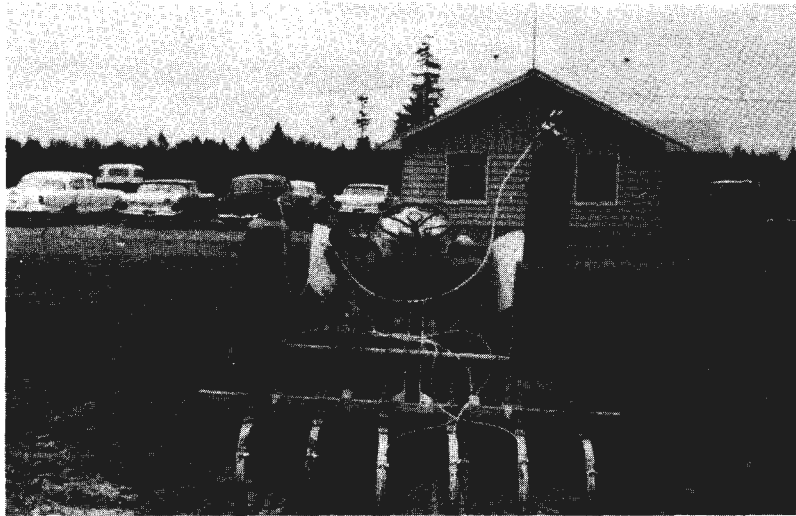


Figure 3.--Equipment used for soil fumigation.

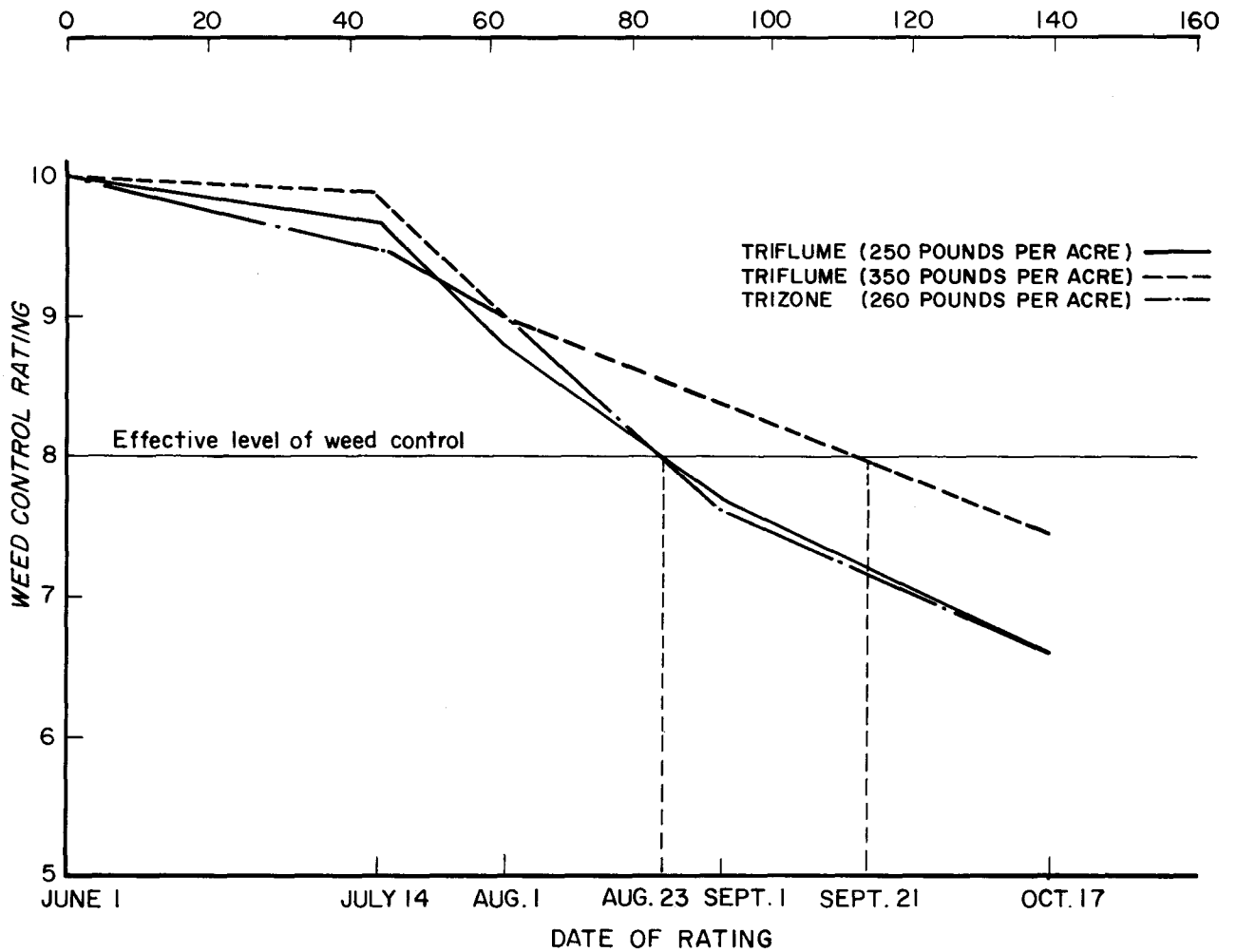


Figure 4.--Effective weed control for three fumigants assuming a rating of 8 as the desirable level of weed control.

Although the rating system described above was used to evaluate the effectiveness of fumigation on weed control, it could be utilized to assess other materials, such as herbicides. The system is easy to use, rapid, and gives a fair evaluation of weed control.

Summary

The assessment of weed control for fumigants or herbicides is not always easy to determine. This paper describes a rating system, based on visual observation, that numerically rates weed control and plant damage. Using this system, the evaluation of two fumigants' weed control properties is described. The length of effective weed control is shown to be 3 to 4 months as determined by plotting an average plot rating against time.

Literature Cited

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