New Soil Fumigant

increased growth of crop plants with weed killer of low toxicity to humans

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A new soil fumigant—Vapam—proved to be an effective weed killer in column stocks—*Matthiola incana*—in Santa Barbara County tests conducted during the fall and winter of 1954–55.

The soil was prepared for planting, and Vapam applied with a hose proportioner at the rates of ½, 1, and 1½ pounds per 100 square feet—approximately one pound of material is contained in each quart of liquid.

For each 100 square feet of soil, 15 gallons of water were applied with the material; within 30 minutes' time another 30 gallons of water were applied to soak the material into the soil. This was equivalent to 6,534 gallons of water to apply the Vapam and 10,895 gallons of water to wash it down into the root zone. This material is not effective unless it is soaked or worked into the soil.

The soil temperature at the time of application was 63F at a 4″ depth and 77F at the surface.

The soil application was made on August 16, 1954, and column stock—Avalanche A3098, sown at the rate of two pounds per acre in single rows 30″ apart—was planted on August 26 and 27. Each plot was 10′ × 40′ and replicated four times in a Latin square design.

The field was hand weeded twice and each time a representative weed count was made. The first count was made September 20, and the second was made November 22.

The control of weeds was excellent. As the dosage rate was increased, more species of weeds were killed, but filaree and burr clover were not controlled at any rate.

Weeds Controlled

Variety	Dosage lbs./100 sq. ft.
Wild radish	1½
Lambs quarter	1½
Bermudagrass	1, 1½
Dandelion	1, 1½
Malva	½, 1, 1½
Wild mustard	½, 1, 1½
Common chickweed	½, 1, 1½
Mouse ear chickweed	½, 1, 1½
Spanish thistle	½, 1, 1½
Nightshade	½, 1, 1½
Filaree	No control
Burr clover	No control

The rate of 1½ pounds per 100 square feet was the only application rate that completely killed bermudagrass. In plots of lower dosages this weed rerooted and continued to grow. A complete kill of bermudagrass with the lower dosages may be obtained by spraying with an oil immediately before or after treating with the fumigant.

On October 18, 1954, a representative count of the column stock stand was made throughout all the plots. All the treated plots had a greater stand—and the plants were about twice the size—than the check plot.

Column stocks were picked in the field twelve times from December 22, 1954 until February 3, 1955. The plots treated with the one-pound dosage produced the most No. 1 stocks and the check plot produced the least. Conversely, the check plot produced the greatest quantity of No. 2 stocks, and the plot treated with the one-pound dosage produced the least. The average date of harvest did not vary greatly among plots. The greatest difference among plots was only four days' time.

The Column Stock Stand and Weed Counts after Various Application Rates of Vapam to the Soil

Treatment	Av. no. of weeds per sq. yd. Sept. 20 1954	Av. no. of weeds per sq. yd. Nov. 22 1954	Av. no. of column stocks per lineal feet of row Oct. 18, 1954
½ lb. Vapam/ 100 sq. ft.	6.8	44.5	25.0
1 lb. Vapam/ 100 sq. ft.	4.8	34.5	23.0
1½ lbs. Vapam/ 100 sq. ft.	3.2	36.2	22.5
Check no Vapam	74.8	126.0	16.8

Production of No. 1 and No. 2 Stocks per Plot and Average Date of Bloom

	Av. no. 1 stems per plot	Av. no. 2 stems per plot	Av. date of bloom
			Jan.
½ lb. Vapam/ 100 sq. ft.	405.50	238.75	12
1 lb. Vapam/ 100 sq. ft.	416.00	185.75	16
1½ lbs. Vapam/ 100 sq. ft.	364.75	212.50	14
Check No Vapam	170.00	250.50	14

The reason for the reduction of No. 1 stocks in the check plots compared to the one-pound rate plot was the increased incidence of cottony rot—*Sclerotinia sclerotiorum*—in the check plots. The sclerotinia was abundant in the check plots and was reduced considerably as the treatment dosage was increased. This disease was especially ruinous during the two rains which occurred at harvesting time. Both the one-pound and the 1½-pound rates proved effective in curbing this soil-borne disease, but more work should be conducted on control of the cottony rot disease.

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***Left:* Check plot with abundance of weeds. *Right:* Treated plot. Photos taken December 19, 1954.**