OREGON VEGETABLE Digest

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Herbicides Tested for Residues

Herbicide studies for control of weeds in vegetable crops have been approached with greatest possible selectivity as the primary objective. Another important consideration is longevity of control. If one pre-plant or pre-emergence application of a herbicide can provide weed control through the crop season, the program is much simplified. With increased residual life of the various herbicides used in vegetable crops, or other crops, the problem of possible injury to the crop following becomes greater. A related problem results from application of herbicides for control of specific weeds sometime before a crop is planted. Often the reason for a pre-planting application in these situations is lack of crop selectivity.

Basically, the problem is one of determining time required for herbicide residues in the soil to diminish to the point that they will not affect crop production or result in an unacceptable residue in the harvested crop. Decay curves will vary widely among soils with different chemical properties and biological activities. It is desirable to determine what factors influence the rate of breakdown and to what degree. It is also necessary to determine levels of herbicide that will permit normal crop growth and will not result in excessive residue in a crop.

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Vegetable Insect Problems Summarized

The 21st Annual Pacific Northwest Vegetable Insect Conference was held in Portland, Oregon, January 22-24, 1962. At this meeting, entomologists from the Pacific Northwest assembled for discussion of mutual problems concerning the control of vegetable insects during the 1961 season.

Insect resistance, insecticide residues, symphylids, development of improved equipment for applying chemicals to crops, and safety of insecticides to bees were the principal topics of discussion. A brief summary of the two-day meeting follows.

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A study was started in fall 1960 to obtain information about some of these problems. A number of herbicides that could potentially result in injurious soil residues were applied in fall 1960, just before plowing in early spring 1961, and a month later, immediately prior to planting. No reapplication was made on some of the plots at the 1961-62 application time, and the 1962-63 applications will complete the series, giving a range of one to three applications. In 1961, test species included bush snap beans, red beets, carrots, and sweet corn. These were rated by visual evaluation of injury (Table 1) and crop samples were collected for residue analysis in plots where plant growth was reasonably normal and residue information was not available. Soil samples for residue analysis were collected from all treatments.

Of the herbicides included in this test, only amitrole resulted in practically no injury to any of the crops at any time of application prior to planting. Avadex caused a slight amount of injury when applied immediately before planting sweet corn. The 6 pounds per acre rate of EPTC was used for control of some of the perennial grass species. Applied a month before planting this application resulted in possible injury to carrots, but only beans were tolerant to the application made immediately before planting. The lower application rate of dalapon caused some injury to sweet corn while the heavier rate also resulted in some injury to carrots in the late-spring application.

A notable difference in longevity of TBA and Banvel D is apparent, while they appear to show about equal toxicity to test species when compared in late-spring applications. The high application rate of these materials is from recommendations for field bindweed control. Atrazine appeared to have considerable persistence at both application rates. The extreme tolerance of sweet corn to atrazine and simazine was evident in this test. Simazine and diuron showed similar effects, with some variations in species tolerance. One apparent anomalous effect of simazine was the relatively lower activity from early-spring applications. This might be explained by the possibility that the fall application had leached into the soil sufficiently so that when the soil was plowed in the spring it was fairly well mixed in the plowed layer. On the other hand, the early-spring application, made just prior to plowing, remained concentrated at the bottom of the plow layer and was relatively ineffective in that position.

In addition to the test just described, the longevity of atrazine, diuron, and simazine are being studied by determining amount of material that must be applied to maintain a level of plant toxicity in the soil. Fall, spring, or fall and spring applications are made with a logarithmic variable dosage sprayer with application rates varying from 20 to 2 pounds active material per acre. The various herbicide treatments and response of bush snap bean plants following the first year of application are shown in Table 2.

In this study atrazine showed considerable greater herbicidal activity than the other materials, regardless of time of application. Beans were injured by the combined fall and spring application of atrazine at the lowest application rate. As would be expected, herbicides showed greatest activity with combined applications, intermediate with the spring application and least activity with the fall application.

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Table 1. Crop Response to Residual Herbicides

		Average crop response ratings*											
		Beans			Beets			Carrots			Corn		
Chemical	Rate (lb active/A)	Fall	Early spring	Late spring	Fall	Early spring	Late spring	Fall	Early spring	Late spring	Fall	Early spring	Late spring
TBA	20	7	10	10	4	8	10	7	9	10	3	7	9
Banvel D	20	0	7	10	1	6	10	6	8	10	0	3	10
Simazine	4	7	7	7	9	5	9	8	2	9	0	0	0
Atrazine	4	10	9	9	9	8	9	8	8	10	0	0	0
Atrazine	8	10	10	10	10	10	10	10	10	10	0	0	0
Diuron	4	1	4	5	1	1	9	0	1	9	0	4	8
Dalapon	5	0	0	1	0	1	0	0	0	0	0	0	3
Dalapon	10	0	0	0	0	0	4	0	0	0	0	2	7
Amitrole	5	0	0	0	1	1	0	0	0	0	0	0	1
EPTC	6	0	1	5	0	2	7	0	0	0	0	1	8
Avadex	6	0	0	0	0	1	0	0	0	0	1	0	4
Check	-	0	0	0	1	1	1	0	1	0	1	0	0

* Visual response rating scale 0 = no effect, 10 = all plants completely killed.

Herbicides Tested . . . (Continued from page 3)

Table 2. Bean Response to Residual Herbicides

Chemical	Time of applications	Lowest application rate (lb active/A) at which bean plants survived	Lowest application rate (lb active/A) with no visual injury to beans
Atrazine	Fall	6.5	2.9
"	Spring	5.6	2.5
"	Fall + spring*	4.3	---
Diuron	Fall	10.9	3.8
"	Spring	9.8	3.6
"	Fall + spring	7.8	2.8
Simazine	Fall	12.2	3.5
"	Spring	8.5	2.8
"	Fall + spring	7.4	2.9

* Application rates refer to amount applied each time of application so that the total would be twice this amount in the fall + spring applications.

One important difference in this study from the one previously described is that all applications were made prior to a relatively deep rotary tilling before planting. This resulted in dilution of herbicides with more soil than surface tillage following plowing. Although a strict comparison cannot be made, herbicides applied in spring and mixed into the soil in this test showed less activity on beans than the same materials applied to the soil surface and incorporated shallowly before planting, and somewhat greater activity than applications made before spring plowing.

Although data collected in the first phase of these studies can be useful in formulating recommendations for the use of herbicides before planting certain crops, long-term studies to determine accumulative effects are needed to give a complete understanding of the situation. Also, if a broad base of information is to be obtained for making generalizations with this type of information, it will be necessary to test herbicide residue longevity in soil under a wide range of environmental conditions. When effects of various factors influencing breakdown of herbicide residues in soil are better understood this general information will be useful as a base from which to predict rates of loss of activity under a specific set of conditions.

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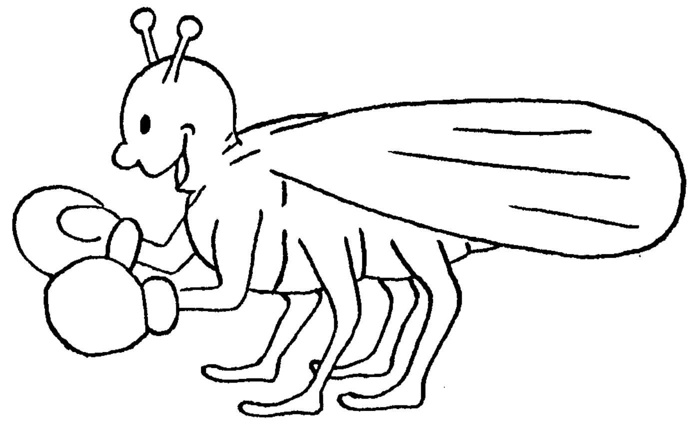
Correction

In Vol. XI, No. 1 of the Oregon Vegetable Digest, "Summer Squash Varieties Tested," the captions Storr's Hybrid (page 8) and Long Green Bush (page 7) should be interchanged.

Insect Problems . . . (Continued from page 1)

1. Cabbage maggots. Definite resistance of the cabbage maggot to chlorinated hydrocarbon insecticides has been determined in several areas of British Columbia and four different areas of western Washington. A similar condition is suspected, but not verified, in Multnomah County, Oregon.



V-C 13, Guthion, Trithion, Diazinon, Zinophos, Di-Syston, and phorate showed promise of control of the resistant strain of cabbage maggot. However, results varied with residual activity of the insecticides and their method of application. Oddly, the materials showing promise for control of the resistant strain of maggots were generally inferior to chlorinated hydrocarbons against the nonresistant strain.

At Puyallup, Washington, studies have been undertaken to test resistance of various varieties and selections of root and leafy crucifers to cabbage maggot attack.

2. The carrot rust fly. It has been demonstrated that the carrot rust fly is resistant to preplanting aldrin soil treatments in western Washington and in Canada (British Columbia to Ontario). British Columbia workers reported that Diazinon (1 to 2 pounds toxicant per acre) has been effective in control of the resistant form. A 10% granular formulation was used either with the seed or applied in the furrow at the time of seeding at the rate of 5 to 10 oz. per 1,000 lineal feet. This material is now registered for use with the USDA on a "no residue" basis.

3. Onion maggot. In all areas of the Pacific Northwest, the federally registered materials, ethion, V-C 13, Diazinon, and Trithion, gave satisfactory onion maggot control during 1961. This pest developed resistance to chlorinated hydrocarbon materials several years ago.

Under Oregon conditions, a Trithion-captan granular mixture protected onions from both onion maggots and smut. This combination was slightly better for insect and disease control than combinations of thiram fungicide with ethion and V-C 13.

4. Cabbage aphids and green peach aphids on cole crops. Effective control was reported on these aphids with federally registered insecticides such as TEPP, Diazinon, and phosdrin. Promising controls were obtained with Di-Syston, dimethoate, and phosphamidon.

5. Caterpillars on leafy crucifers. There were reports of a possible resistance of the imported cabbage worm to DDT in British Columbia. Good control of this pest was obtained with Phosdrin, DIBROM, and parathion. These materials, and DDVP, were also effective against the diamond back moth.

For the second successive year, the combination of malathion and *Bacillus thurigensis* was found to be effective on aphids and caterpillars on leafy cole crops.

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Insect Problems . . . (Continued from page 5)

6. Phytotoxicity studies on cucurbits. In Oregon it was learned that a slight degree of phytotoxicity could be obtained on certain varieties of cucurbits with Sevin, Kelthane, phosphamidon, Trithion, and demeton. DDT, used as a standard for comparison, produced severe chlorosis of the foliage of most varieties.

7. Nitidulid beetles, flower thrips, and Diabrotica beetles were effectively controlled on bush beans in Oregon with Sevin at the rate of one pound toxicant per acre. Both the Nitidulid beetle and flower thrips may, on occasion, contribute to blossom drop of beans.

8. Pea aphids. For the third consecutive season, the USDA Laboratory at Walla Walla, Washington, reported that Di-Syston granules applied to peas at the time of seeding were very effective in controlling pea aphids. Control extended from the time of planting to the time of full bloom and even to the time when peas reached canning maturity. Dimethoate granules, tested for the first time this past year, did not appear as promising as Di-Syston.

9. Tuber flea beetle on potatoes. British Columbia workers report that aldrin preplanting soil treatment continues to be very effective for controlling the tuber flea beetle. In Clackamas County, Oregon, in an area representing about 200 acres, even 5 pounds of aldrin per acre was not effective in 1961. Tests using Zinophos, phorate, parathion, and Trithion as preplanting soil treatments indicated that these materials did not have sufficient residual action for adequate crop protection. V-C 13, at 15 pounds toxicant per acre, has been promising on experimental trials, but has not been registered for use on potatoes.

10. Green peach aphid on potatoes. Parathion and DDT, once very effective for control of the green peach aphid on potatoes, are no longer satisfactory. The addition of an anti-resistant compound to DDT did not improve results.

Thiodan, demeton, endrin, and Di-Syston (USDA registered materials) continued to be effective in 1961. Promising new materials included phosphamidon and dimethoate.

11. Bee protection. Since there is a certain degree of incompatibility between beekeeping and the use of essential insecticides for crop protection, Washington State workers have spent considerable effort in an attempt to solve this complex problem. Consideration was given to: (1) movement of bees during critical times of the year; (2) zoning of areas for production of crops requiring the use of crop protectants which might be toxic to bees; and (3) the use of bee repellants on crops requiring pest control.

12. Development of new equipment. The USDA Laboratory at Forest Grove, Oregon, reported on their studies of distribution patterns provided by various modifications of nozzle arrangements on two types of aircraft (Cessna 182 high wing monoplane and Piper PA 25 Pawnee).

British Columbia workers reported on the design, nozzle arrangement, pressure, speed of travel, and distribution pattern of a ground sprayer for application of insecticides and fungicides to potatoes at various stages of growth.

Agricultural engineers from Oregon State University reported on a method of injecting insecticides into the nozzles of sprinkler irrigation systems.

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Insect Problems . . . (Continued from page 6)

13. Symphylids. Considerable attention was given to the symphylid problem. There are now seven workers in the western states devoting part of their time to symphylids. The range of these pests has now expanded into Utah, British Columbia, and eastern Colorado.

Work in Washington, California, and Oregon, in 1961, was concentrated on two promising materials, Zinophos and V-C 13 Nematocide.

The effective dosage of Zinophos for symphylid control was determined at between 2 1/2 and 5 pounds toxicant per acre. Chemical tests have indicated that decomposition is practically complete in 90 days after the chemical is mixed with the soil. Its effective time in the soil for pest control has been estimated at between 3 and 4 weeks. Chemical residue and flavor evaluations have been sufficiently promising to warrant the application for an experimental permit for use on soil being planted to corn, beans, and mint.

The effective dosage of V-C 13 for symphylid control has been established at between 5 and 10 pounds toxicant per acre. Information is lacking on its rate of decay in the soil. Field observations indicate it may remain effective for 10 to 12 weeks. Chemical residue studies have been favorable on about 12 vegetable crops. Satisfactory flavor evaluations have been obtained on corn, eggplant, and muskmelons. Because of undesirable flavors found in tomatoes which were grown on V-C 13 treated soil, additional testing of this kind on other crops is needed in 1962.

At Puyallup, Washington, laboratory tests with five different insect pathogens mixed with soil were not promising for symphylid control.

Interest has continued in Oregon in the use of soil fumigants. Subsoiling practices to break up the plow sole or hard pan prior to preparation of fields for applications of soil fumigants have improved symphylid control.

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Pickling Cucumber Varieties Tested

Pickling cucumber varieties, with emphasis on new or disease resistant introductions, were grown in a single plot, nonreplicated trial on the Vegetable Research Farm near Corvallis.

Varieties were planted May 26 in 12-foot plots in rows 10 feet apart and adjacent to summer squash and melon varieties. Plants were thinned to 12 plants per plot. Approximately 500 pounds of 8-24-8 commercial fertilizer was band-applied prior to planting, and irrigation was sprinkler applied every 10 days to 2 weeks as needed.

Pickles were harvested 10 times at twice-weekly intervals from July 18 to August 19. They were picked down to a size of about 2 inches. Weights and counts were obtained for usable pickles and for culls. Pickles were culled arbitrarily on the basis of bad constrictions, extreme curves, deformities, uneven development, and doubleness. No size grading was done; the best available indication of size grade is the average fruit weight given in the table.

In Table 1, taper and constriction are given as a 1-5 rating with the more desirable at the lower end of the scale. Smoothness and straightness are expressed as a 1-5 rating with the most desirable at the upper end of the scale. The symbol T indicates a trace--or less than 1.

Sources of seed were as follows:

1. Northrup King & Co.
2. Seed Research Specialists
3. Asgrow Seed Co.
4. Horticulture Dept., Michigan State University
5. Horticulture Dept., University of Arkansas

Comments

The Michigan State lines, as a group, were very high in yield but tended toward too much constriction and general roughness. Although the net yield was high, in spite of a large percentage of culls, it would appear that some improvement will be required before these lines can be economically grown in this area. This conclusion is based on the assumption that the necessary sorting of the fruit, either in the field or in the processing plant, would reduce the net return. Recent information from Michigan State University, however, indicates that under favorable growing conditions the shape of the hybrids has been acceptable to the processors. The hybrid 713-5 X Spartan 27 has been released as Spartan Dawn. It is reported by MSU to have a high early yield and a small average fruit size. It was also reported that frequent picking reduced the amount of deformity of the crop.

Arkansas #1 was low in vigor and poor in yield, although the percentage of culls was low and the quality good, except for a strong taper. SMR 15 appeared to be the best variety for a combination of high yield and good quality ratings.

It should be recognized that a single season with single plot tests may not be sufficient to conclusively evaluate variety performance.

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Pickling Cucumbers . . . (Continued from page 8)

Table 1. Pickling Cucumber Variety Trials
Oregon State University, 1961*

Variety	Source	Total wt.	Good			Culls									
			Wt.	No.	Av. wt.	Wt.	No.	% (Wt.)	C[a]	St.[b]	Gen. sm.[c]	Taper	Color	General shape	Notes
Chicago Pickling	1	48.7	45.0	360	.12	3.7	36	7.6	2	3	3	2	Dark	Med. pointed	Distinctly lobed or triangular cross section, medium large mature size.
Snow's Perfection	2	50.1	46.4	331	.14	3.7	37	7.4	2	4	3	1	Med. dark	Blunt, plump	One of smoothest and most uniform
MR-17	2	47.6	40.6	325	.12	7.0	64	14.7	2	3	3	1	Med. dark	Med. long, blunt	
SMR-12	2	40.1	35.4	356	.10	4.7	59	11.7	1	2	2	4	Light	Med. sht., tapered	Distinctly lobed cross section
Producer	2	56.2	50.0	427	.12	6.2	76	11.0	T	4	5	2	Bright med. dark	Plump, tapered	Sharp taper on both ends; somewhat rough, matures small
SR-6	2	49.7	45.2	339	.13	4.5	44	9.0	1	3	3	2	Med.	Med. blunt	Matures somewhat large
SMR-15	2	61.9	57.6	462	.12	4.3	46	6.9	1	4	4	2	Med.	Short, blunt	
Packer	2	52.5	46.5	360	.13	6.0	57	11.4	2	3	3	2	Med.	Med. blunt	Matures medium large
RxSMR-58	2	54.2	49.8	363	.14	4.4	48	8.1	3	2	2	3	Med.	Med. long, blunt	Lobed cross section. Matures medium large.

* All weights given in pounds and based on totals for 10 pickings of a single plot. Taper, smoothness, constriction, and straightness are expressed as a 1-5 rating (see preceding page).

a = Constriction.
b = Straightness.
c = General smoothness.

Pickling Cucumbers . . . (Continued from page 9)

CUCUMBER VARIETIES

SMR 12

MR 17

Model

SMR 15

MR 25

Producer

SMR 58

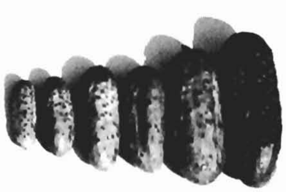
Spartan 27

Arkansas #1

SR 6

Chicago Pickling

National Pickling



Snow's Perfection

Packer

--James R. Baggett
Horticulture Department

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