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STAFF REPORT

1979 PESTICIDE USE ON VEGETABLES
IN THE NORTHWEST,
A PRELIMINARY REPORT

by

B. Ted Kuntz
and
Walter L. Ferguson

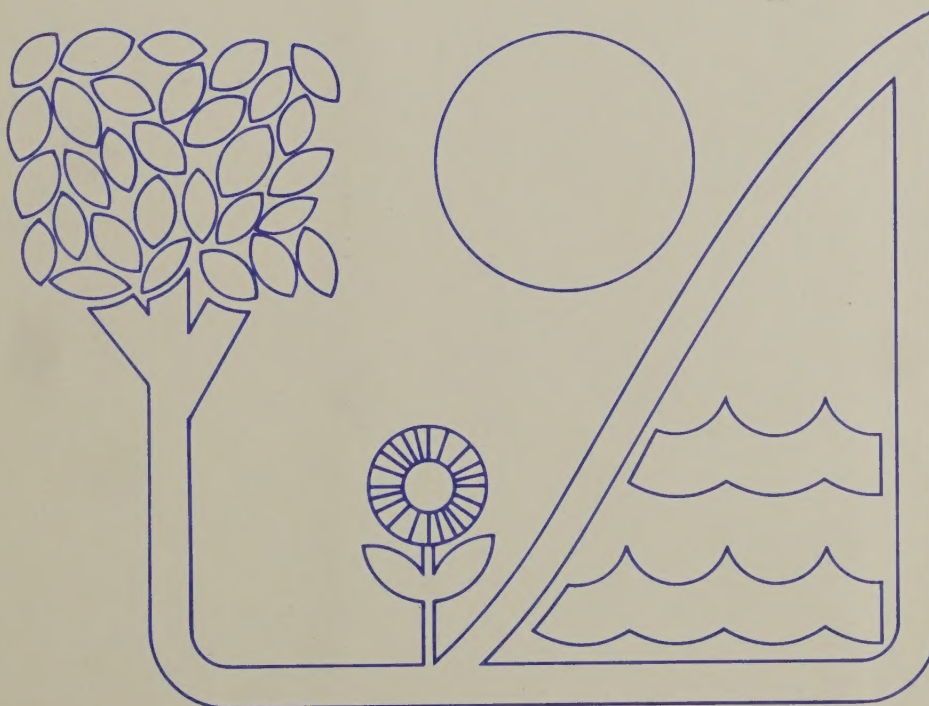
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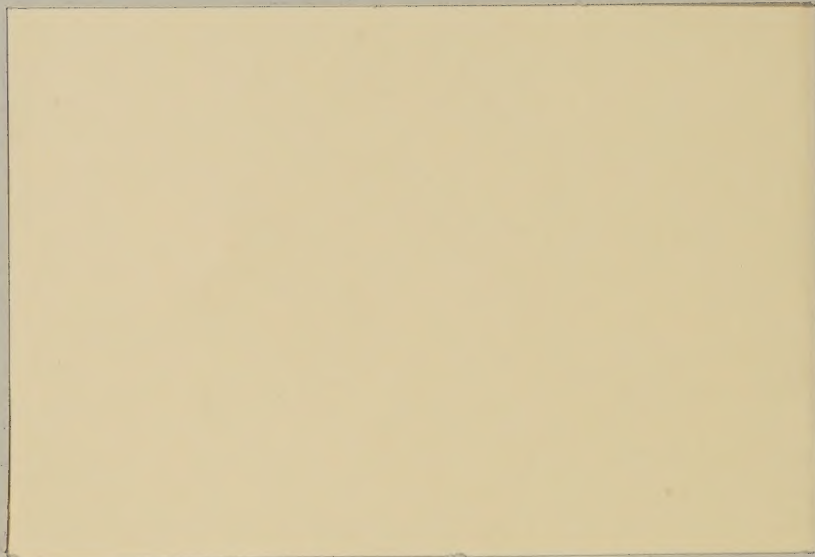
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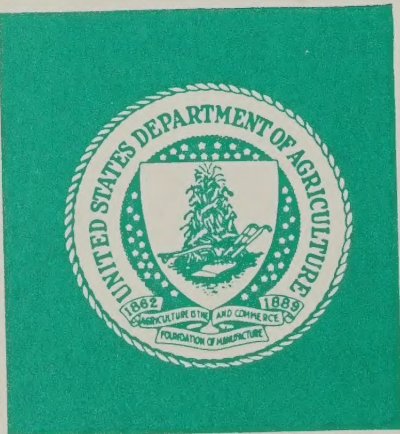




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Thomas W. Bailey, Editor
Economics of Pesticide Regulation
101 15th Street, S.W., Room 409
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The 1979 Vegetable Pesticide Survey was conducted by a predecessor agency of the Statistical Research Service, and was directed by Joseph E. Blomquist, Economic Research Service. The survey was designed and data processing services were provided by the Statistical Research Service, provided by the Economic Research Service, provided by the Statistical Research Service, provided by the Economic Research Service. The data were reviewed for accuracy by university crop specialists.

ABSTRACT

According to a 1979 Vegetable Pesticide Survey, nearly 1.3 million pounds of pesticides were used to control weeds, insects, fungi, and nematodes on seven vegetable crops in Idaho, Oregon, and Washington. The seven vegetable crops included cabbage, carrots, green peas, lettuce, onions, snap beans, and sweet corn. Approximately 671,000 acre-treatments were made ranging from 255,000 for sweet corn to 1,800 for cabbage.

Key words: Pesticides, herbicides, fungicides, insecticides, rodenticides, sprout control, nematicides, tank-mixes, acres treated, application rates, vegetables, Northwest.

* * * * *

* This paper was prepared for limited distribution to the research *
 * community outside the U.S. Department of Agriculture. The data in *
 * this report are preliminary, and consequently subject to change. *
 * The data have not been subjected to statistical reliability testing, *
 * but will be tested prior to finalization and publication. The final *
 * tabulation of the data will provide information for 6 regions which *
 * will include data for 18 States. The final tabulations are scheduled *
 * for publication in early 1982. The data are being released at this *
 * time to allow the agricultural community an opportunity to comment *
 * on the data. If you have any comments, please send them by April 15, *
 * 1982, to: *

*
 *
 * Herman W. Delvo, USDA-ERS *
 * Economics of Pesticide Regulation *
 * 500 12th Street, S.W., Room 408 *
 * Washington, D.C. 20250 *

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* * * * *

ACKNOWLEDGMENTS

The 1979 Vegetable Pesticide Survey was conducted by a predecessor agency of the Statistical Reporting Service. Larry K. Roberson and Paul W. Blackwood provided special assistance and advice in compiling the data. Joseph E. Blackwell, Economic Research Service, provided computer programming and data processing services. Herman W. Delvo and Craig D. Osteen, also of Economic Research Service, provided helpful comments and suggestions in their reviews of final drafts. The data were reviewed for accuracy by University crop specialists

having expertise for those crops in the survey. The specialists included Gene P. Carpenter and Garrett C. Wright of Idaho; Glen C. Fisher, Paul A. Koepsell, John W. Rinehold, and Ray D. William of Oregon; and Richard C. Maxwell, O. C. Maloy, Robert E. Thornton, and Venelle F. Peterson of Washington. Kathy J. Larsen and Andrea E. Lunsford typed the preliminary and final drafts of the manuscript.

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INTRODUCTION

In this report, patterns of pesticide use in 1979 are discussed for seven vegetable crops grown in Idaho, Oregon, and Washington. The seven vegetable crops include cabbage, carrots, green peas, lettuce, onions, snap beans, and sweet corn. Survey data were collected on quantities of pesticides used, acres treated, acre-treatments, number of applications, seasonal rates, and rates per acre-treatment. This report provides information useful to policymakers, researchers, extension specialists, and industry personnel. Because vegetables are highly susceptible to weeds, insects, diseases, and other pest damage, there is a continuing need for information on pesticides used in vegetable production. Regulations on the use of pesticides and review of registrations by the Environmental Protection Agency create the need for accurate, detailed information for economic studies of pesticide use.

A major factor affecting the quantity of pesticides used is the number of acres planted. For all seven crops, 1979 acreage was equal to or slightly above the 1978-80 average (Table 1). A difference of 8 percent is indicated for the seven crop total, 321,800 acres in 1979 versus 296,100 for the 3-year average. Thus, 1979 could be described as a near-typical year for acreage of vegetables planted. However, the number of planted acres is only one of several factors affecting pesticide usage. Weather conditions, pest infestations, and pest resistance to pesticides affect pesticide rates and the number of applications per season.

Planted acreage of the crops surveyed in 1979 ranged from about 139,400 acres of green peas to 1,300 acres of lettuce. Most vegetables, including all of the green pea and snap bean and most of the sweet corn acreage, were planted for the processing market. As pests not only affect yield, but also

Table 1. Acres planted in 1979 compared with 1978-80 average, 7 vegetables, Northwest a/

Crop	Fresh market			Processing market			Fresh and processing markets	
	1978	1979	1980	1978	1979	1980	1979	3-year average
----- 1,000 acres -----								
Cabbage	1.6	1.7	1.6	-	-	-	1.7	1.6
Carrots <u>b/</u>	-	-	-	-	-	-	6.7	6.3
Green peas <u>c/</u>	-	-	-	125.1	139.4	107.7	139.4	124.5
Lettuce	1.3	1.3	1.3	-	-	-	1.3	1.3
Onions <u>b/</u>	-	-	-	-	-	-	19.0	18.5
Snap beans	-	-	-	38.2	40.8	34.5	40.8	37.8
Sweet corn	3.9	3.9	3.9	108.1	109.0	90.7	112.9	106.5
Total	-	-	-	-	-	-	321.8	296.1

a/ "Vegetables, 1980 Summary," U.S. Dept. Agr., Vg 1-2(80), December 1980.

b/ Acres planted data not available for individual markets.

c/ Data for Idaho were last published in 1977 when 11,600 acres of green peas were reported planted. It was assumed that Idaho growers planted 11,600 acres annually during the period 1978-80.

quality, the appearance of the product has a considerable impact on market price. Thus, for these fresh and processing market crops, pesticides are especially important.

METHODOLOGY

As part of a national survey of pesticide use on vegetables, Northwest vegetable growers were personally interviewed to collect data on specific pesticides used, acres treated, methods of application, and target pests controlled in 1979. Approximately 150 growers were interviewed in Idaho, 350 in Oregon, and 350 in Washington.

A stratified random sample design was used to select growers. Data were expanded for individual farms in the survey to reflect all farms by multiplying the sample data by the inverse of the sample ratio for each stratum. The pesticide use data were then adjusted by the ratio of the number of acres of the crop grown in the State to the number of expanded sample acres for the crop.

INTERPRETING THE DATA

Pesticides are grouped into the following categories: (1) herbicides (used to kill plants or inhibit their growth), (2) insecticides (used to kill or inhibit insects), (3) fungicides (used to control diseases by killing or inhibiting fungi), (4) nematicides (used to kill or inhibit nematodes and other organisms in the soil), (5) sprout control agents (growth inhibitors to prevent sprouting), and (6) rodenticides (used to kill rodents). Bactericides (used to control bacterial diseases) are grouped with fungicides while multi-purpose fumigants are included in nematicides.

The term "acres treated" is used to identify acres receiving one or more applications of a specific pesticide. Treated acres are not additive because two or more different specific ingredients may have been used on the same acre.

As these acres are not mutually exclusive, summing them could result in double counting. For this reason, the sums of acres treated are not shown in Table 5 through 18.

"Acre-treatments" are the number of acres treated with a pesticide material multiplied by the number of applications made during the growing season. Acre-treatments are summed for each material at the State and regional level. Single application and annual rates are estimated for specific active ingredients. Annual rates are a weighted average of the pesticide applications made during the summer and fall seasons. The single application rate is derived by dividing the total pounds of active ingredient of a specific pesticide by the number of acre-treatments; the annual rate is derived by dividing the total pounds of active ingredient by the number of acres treated.

Acres treated and acre-treatments for Bacillus thuringiensis, a bacteria, are included in the insecticide category. The rates and quantities applied are not reported since application rates are expressed in terms of spores per gram rather than in pounds of active ingredient.

The rate per application and number of applications for specific pesticides may vary considerably from published guidelines for a number of reasons. For example, published rates are generally broadcast rates, whereas a number of the rates reported in the survey were band or in-furrow rates, which are one-fourth to one-third that of the broadcast rates. Also, young vegetable plants require considerably lower dosage rates of insecticides and fungicides than do older plants. Lower rates and fewer applications of insecticides and herbicides are generally required for vegetables grown on sandy soils than for the same vegetables grown on organic soils.

Weather plays an important role in the use of fungicides. In low moisture years, rates and numbers of applications are lower than in high moisture years.

Some varieties of vegetables have greater resistance to specific diseases and are less attractive to insects than other varieties, requiring lower rates and fewer applications. Also, resistance of pests to pesticides plays an important role in determining rates and number of applications. Rates are generally lower when two or more pesticides with the same spectrum of control are applied in tank-mix applications than when those respective pesticides are applied as single ingredients.

RESULTS

In 1979, Northwest growers planted about 322,000 acres of cabbage, carrots, green peas, lettuce, onions, snap beans, and sweet corn, of which more than 90 percent were planted for the processing market (Table 2). Green peas, snap beans, and sweet corn accounted for about 91 percent of the 322,000 acre total.

The growers used approximately 671,000 acre-treatments for the seven crops, with Oregon and Washington accounting for about 31 and 55 percent of the total, respectively (Table 3). For those pesticides applied as single ingredient applications, herbicides accounted for 45 percent of the total acre-treatments and insecticides 42 percent. Green peas, snap beans, and sweet corn comprised 87 percent of the herbicide acre-treatments; green peas and sweet corn comprised 80 percent of the insecticide acre-treatments; and onions and snap beans nearly all of the fungicide acre-treatments. Tank-mix applications applied to the seven crops accounted for about 50,000 acre-treatments, or about 7 percent of the 671,000 total acre-treatments.

The growers applied nearly 1.2 million pounds of active ingredients (a.i.) of all pesticides to the seven vegetable crops (Table 4). For those pesticides applied as single ingredient applications, herbicides accounted for 60 percent of the total and insecticides 17 percent. Green peas, onions, snap beans, and

Table 2. Vegetables: Acres planted, Idaho, Oregon, and Washington, 1979 a/

Crop and State	Acres planted for		
	Fresh market	Processing market	Total
----- 1,000 acres -----			
<u>Cabbage</u>			
Oregon	0.7	-	0.7
Washington	1.0	-	1.0
Region	1.7	-	1.7
<u>Carrots</u>			
Oregon	-	-	1.5
Washington	-	-	5.2
Region <u>b/</u>	-	-	6.7
<u>Green peas</u>			
Idaho	-	11.6	11.6
Oregon	-	42.9	42.9
Washington	-	84.9	84.9
Region <u>c/</u>	-	139.4	139.4
<u>Lettuce</u>			
Washington	1.3	-	1.3
Region	1.3	-	1.3
<u>Onions</u>			
Idaho	-	-	4.6
Oregon	-	-	9.6
Washington	-	-	4.8
Region <u>b/</u>	-	-	19.0
<u>Snap beans</u>			
Oregon	-	38.5	38.5
Washington	-	2.3	2.3
Region	-	40.8	40.8
<u>Sweet corn</u>			
Idaho	-	26.5	26.5
Oregon	1.9	39.6	41.5
Washington	2.0	42.9	44.9
Region	3.9	109.0	112.9
<u>7 Crop Total</u>			
Idaho	4.6	38.1	42.7
Oregon	13.7	121.0	134.7
Washington	14.3	130.1	144.4
Region	-	-	321.8

a/ "Vegetables, 1980 Summary," U.S. Dept. Agr., Vg 1-2(80), December 1980.

b/ Acres planted are not available for individual markets.

c/ Data for Idaho were last published in 1977 when 11,600 acres of green peas were reported planted. It was assumed that Idaho growers planted 11,600 acres annually during the period 1978-80.

Table 3. Vegetables: Acre-treatments of pesticides by crop, single ingredient and tank-mix applications, Northwest, 1979 a/

Pesticides	:Cabbage:	Carrots:	Green :peas	:Lettuce:	Onions:	Snap :beans	Sweet :corn	Total
----- <u>1,000 acre-treatments</u> -----								
BY CATEGORY:								
<u>Single applications</u>								
Herbicides <u>b/</u>	0.4	13.4	83.9	0.3	25.1	64.6	116.0	303.7
Insecticides	1.1	.9	93.9	1.8	27.7	25.7	133.3	283.5
Fungicides <u>b/</u>		.2	-	.2	16.4	10.0	-	26.8
Nematicides	-	-	-	-	1.3	-	-	.9
Rodenticides	-	.3	-	-	-	-	-	.3
Sprout control	-	-	-	-	5.8	-	-	5.8
<u>Tank-mix applications</u>	.2	.1	24.6	<u>c/</u>	15.0	2.8	5.9	49.9
Total <u>d/</u>	1.7	14.9	202.4	2.3	91.3	103.1	255.2	670.9
BY STATE:								
Idaho	-	-	19.5	-	44.9	-	29.9	94.4
Oregon	-	3.2	12.0	-	27.9	103.1	62.7	208.9
Washington	1.8	11.7	170.9	2.3	18.4	-	162.6	367.6
Total <u>d/</u>	1.8	14.9	202.4	2.3	91.2	103.1	255.2	670.9

- None reported.

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ Does not include 271 acres of carrots treated with 3,990 gallons of mineral spirits.

c/ Less than 50 acre-treatments.

d/ Totals may not agree because of rounding.

Table 4. Vegetables: Quantities of pesticides used by crop, single ingredient and tank-mix applications, Northwest, 1979 a/

Pesticides	:Cabbage:	:Carrots:	:Green:peas	:Lettuce:	:Onions:	:Snap:beans	:Sweet:corn	: Total
----- 1,000 pounds a.i. -----								
BY CATEGORY:								
<u>Single applications</u>								
Herbicides <u>b/</u>	0.4	11.6	124.4	0.3	115.6	156.5	259.6	668.4
Insecticides	.7	.4	51.8	1.1	38.5	23.4	67.8	183.7
Fungicides	<u>c/</u>	.2	-	.3	35.5	6.6	-	42.6
Nematicides	-	-	-	-	239.0	-	-	239.0
Rodenticides	-	<u>c/</u>	-	-	-	-	-	<u>c/</u>
Sprout control	-	-	-	-	16.3	-	-	16.3
<u>Tank-mix applications</u>	.3	.1	64.6	.1	43.4	11.6	26.3	146.4
Total <u>d/</u>	1.4	12.3	240.8	1.8	488.3	198.1	353.7	1,296.4
BY STATE:								
Idaho	-	-	17.3	-	100.3	-	89.6	207.2
Oregon	-	2.3	10.1	1.8	313.9	198.1	105.3	631.5
Washington	1.4	10.0	213.4	-	74.2	-	158.8	457.8
Total <u>d/</u>	1.4	12.3	240.8	1.8	488.4	198.1	353.7	1,296.5

- None reported.

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ Does not include 271 acres of carrots treated with 3,990 gallons of mineral spirits.

c/ Less than 50 pounds a.i.

d/ Totals may not agree because of rounding.

sweet corn accounted for 93 percent of the herbicide active ingredients used, and insecticides used on the same four crops accounted for nearly all of the insecticides used. Of the total quantity applied to the seven crops, two or more active ingredients applied in tank-mixes accounted for about 211,000 pounds (a.i.), or about 18 percent of the 1.2 million pounds.

PESTICIDE USE BY CROP

In the following sections, the major uses of pesticides by crop are discussed along with the primary pests controlled by these pesticides. Patterns of pesticide use discussed include acres treated, acre-treatments, times applied, rate per application, and annual rates by specific ingredient applied singly and in tank-mixes.

Cabbage

In 1979, approximately 1,700 acres of cabbage were planted for the fresh market in Washington and Oregon. Only the Washington growers were included in the 1979 Vegetable Pesticide Survey; these growers accounted for approximately 60 percent of the total acreage planted in both States. About 1,400 pounds (a.i.) of all pesticides were used by Washington cabbage growers in 1,800 acre-treatments (Table 5).

Weeds affecting cabbage in Washington are primarily annual summer grasses and broadleaf weeds such as annual bluegrass, barnyardgrass, lambsquarters, and pigweed. Trifluralin accounted for nearly 80 percent of the approximately 450 herbicide acre-treatments.

Major insect problems on cabbage in Washington include aphid, cabbage maggot, flea beetle, diamondback moth larvae, wireworm, armyworm, cutworm, imported cabbage worm, and looper. Azinphosmethyl, diazinon, endosulfan, and naled accounted for about 90 percent of the 1,100 insecticide acre-treatments applied

Table 5. Cabbage: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

	:	:	:	:Pounds of active ingredient			
				: Acres	: Acre-	: Times	: Per acre
Pesticides	:	c/	:	:	:	:	:
	:	:	:	: treated	: treatments	: applied	: Per time : Annual : : applied : average : Total
<u>Single applications</u>							
<u>Herbicides</u>							
Nitrofen	63	70	1.1	2.1	2.4	151	
Trifluralin	351	351	1.0	.5	.5	159	
Other	-	22	-	3.1	-	68	
Total	-	443	-	.9	-	378	
<u>Insecticides</u>							
Azinphosmethyl	102	154	1.5	.5	.7	71	
Diazinon	115	185	1.6	1.3	2.2	249	
Endosulfan	128	375	2.9	.4	1.2	150	
Naled	144	284	2.0	.5	.9	131	
Other	-	109	-	.6	-	64	
Total	-	1,107	-	.6	-	665	
<u>Fungicides</u>							
Chlorothalonil	36	36	1.0	.9	.9	33	
<u>Tank-mix applications</u>							
Azinphosmethyl + insecticides	90	190	2.1	1.3	2.7	240	
Methomyl + demeton	18	35	1.9	.4	.9	16	
				.5	1.0	18	
Other	-	15	-	1.4	-	22	
Total	-	240	-	1.2	-	296	
TOTAL PESTICIDES	-	1,826	-	.8	-	1,372	

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,000 acres were planted for the fresh market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

as single ingredients. Azinphosmethyl combined with other insecticides accounted for about 80 percent of the tank-mix applications.

Only minimal acreage was treated with fungicides.

Carrots

An estimated 6,700 acres of carrots were planted for fresh market and processing in 1979 in Oregon and Washington. Carrots are not grown for the commercial market in Idaho. About 48,000 pounds (a.i.) of all pesticides were used for 15,000 acre-treatments in Oregon and Washington (Tables 6 and 7).

Linuron and trifluralin were the primary herbicides used in Oregon and Washington, accounting for about 90 percent of the 2,600 herbicide acre-treatments in Oregon and nearly 100 percent of the 11,000 acre-treatments in Washington. A large number of annual weeds and grasses are a problem in carrots including lambsquarters, pigweed, shepherdspurse, barnyardgrass, and annual bluegrass.

Carrot aphids and carrot rust flies are the major insects affecting carrot production in the Northwest. The primary insecticides used for controlling these insects were carbaryl in Oregon and diazinon in Washington. Each insecticide accounted for about one-half of the States' insecticide acre-treatments.

Oregon growers reported minor acreages of carrots treated with zineb for leaf spot and leaf blight control. Approximately 200 pounds (a.i.) were used in about 170 acre-treatments at a rate of 1.2 pounds (a.i.) per application.

Strychnine was used in Oregon in about 290 acre-treatments for controlling gophers and other rodents.

Green peas

An estimated 139,400 acres of green peas were planted for the processing market in the Northwest region in 1979. Washington growers planted 84,900 acres of green peas, Oregon growers 42,900 acres, and Idaho growers 11,600 acres.

Table 6. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/

	:	:	:	:Pounds of active ingredient		
				: Acres	: Acre-	: Times
Pesticides	:	:	:	: Per time	: Annual	:
	: c/	:	:	: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Linuron	1,161	1,204	1.0	1.2	1.2	1,408
Trifluralin	1,140	1,140	1.0	.4	.4	416
Total <u>d/</u>	-	2,344	-	.8	-	1,824
<u>Insecticides</u>						
Carbaryl	151	151	1.0	.8	.8	121
Other	-	128	1.0	.3	-	32
Total	-	279	-	.5	-	153
<u>Fungicides</u>						
Zineb	173	173	1.0	1.2	1.2	211
<u>Rodenticides</u>						
Strychnine <u>e/</u>	57	287	5.0	-	-	-
<u>Tank-mix applications</u>						
Fonofos	103	103	1.0	.4	.4	42
+ trifluralin				.3	.3	26
Total	-	103	-	.7	-	68
TOTAL PESTICIDES	-	3,186	-	.7	-	2,256

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,500 acres were planted for the fresh and processing markets (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Not included are 265 acres treated with 3,702 gallons of mineral spirits.

e/ Used chiefly in poison baits for controlling gophers and other rodents. Baits usually contain 0.5 to 1.0 percent active ingredient.

Table 7. Carrots: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

Pesticides	: Acres treated : c/	: Acre-treatments :	: Times applied :	:Pounds of active ingredient			: Total
				: Per acre	: Per time	: Annual average	
<u>Single applications</u>							
<u>Herbicides</u>							
Linuron	5,623	7,494	1.3	1.0	1.4		7,758
Trifluralin	3,577	3,577	1.0	.6	.6		2,052
Total <u>d/</u>	-	11,071	-	1.1	-		9,810
<u>Insecticides</u>							
Diazinon	155	298	1.9	.5	1.0		147
Other	-	315	-	.3	-		79
Total	-	613	-	.4	-		226
TOTAL PESTICIDES	-	11,684	-	.9	-		10,036

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 5,200 acres were planted for the fresh and processing markets (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Not included are 6 acres treated with 288 gallons of mineral spirits.

About 240,000 pounds (a.i.) and 202,000 acre-treatments of all pesticides were reported for the three States, with about 85 percent of the acre-treatments in Washington (Tables 8, 9, and 10).

In Washington, dinoseb accounted for about 60 percent of the 68,000 herbicide acre-treatments and trifluralin 30 percent. In Idaho and Oregon, dinoseb and trifluralin together comprised about 60 percent and 95 percent, respectively, of the herbicide acre-treatments. The primary weeds controlled included chickweed, lambsquarters, annual bluegrass, and barnyardgrass.

Major insects affecting green peas in the three States include pea aphid, pea weevil, pea leaf weevil, looper, and celery cutworm. Washington growers used parathion or Bacillus thuringiensis for about 30 to 35 percent of the 78,000 insecticide acre-treatments applied in single ingredient applications. Parathion was also tank-mixed with methyl parathion in Washington for nearly 25,000 acre-treatments. In Idaho, methyl parathion comprised 55 percent of about 10,000 insecticide acre-treatments. Oregon growers used parathion in 45 percent of the 5,400 acre-treatments, which was followed in importance by phosmet. Phosmet was used in about 30 percent of the insecticide acre-treatments.

No use of fungicides was reported by any of the surveyed growers in the three States.

Lettuce

In 1979, about 1,300 acres of lettuce were planted in Washington. Lettuce is not grown commercially in Idaho and Oregon. Washington growers applied about 1,800 pounds (a.i.) of all pesticides in 2,300 acre-treatments (Table 11).

Growers used pronamide in about 85 percent of the nearly 300 herbicide acre-treatments. Pronamide was used to control annual bluegrass, annual ryegrass, barnyardgrass, and chickweed in lettuce.

The major insects affecting lettuce in Washington are looper, corn earworm,

Table 8. Green peas: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Idaho, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments	: Times : applied	:Pounds of active ingredient		
				: Per acre	: Annual	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Dinoseb	4,000	4,000	1.0	2.4	2.4	9,720
MCPA	3,188	3,188	1.0	.4	.4	1,224
Trifluralin	1,602	1,602	1.0	.4	.4	569
Other	-	348	1.0	.9	-	303
Total	-	9,138	-	1.3	-	11,816
<u>Insecticides</u>						
Dimethoate	2,461	2,461	1.0	.1	.1	362
Malathion	1,793	1,793	1.0	1.3	1.3	2,241
Methyl parathion	5,519	5,519	1.0	.4	.4	2,337
Other	-	539	-	1.0	-	561
Total	-	10,312	-	.5	-	5,501
TOTAL PESTICIDES	-	19,450	-	.9	-	17,317

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ Data for Idaho were last published in 1977 when 11,600 acres of green peas were reported planted. It was assumed that Idaho growers planted 11,600 acres annually during the period 1978-80.

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 9. Green peas: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments	: Times : applied	: Pounds of active ingredient		
				: Per acre	: Per time	: Annual
				: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Dinoseb	2,064	2,064	1.0	2.3	2.3	4,836
Trifluralin	4,137	4,137	1.0	.5	.5	2,004
Other	-	427	-	<u>d/</u>	-	17
Total	-	6,628	-	1.0	-	6,857
<u>Insecticides</u>						
Malathion	657	657	1.0	.3	.3	185
Parathion	2,396	2,396	1.0	.5	.5	1,155
Phosmet	1,240	1,599	1.3	.5	.6	799
Toxaphene	648	648	1.0	1.5	1.5	972
Other	-	113	-	.7	-	75
Total	-	5,413	-	.6	-	3,186
TOTAL PESTICIDES	-	12,041	-	.8	-	10,043

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 42,900 acres were planted for the processing market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Less than 0.05.

Table 10. Green peas: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

Pesticides	: Acres treated	: c/	: Acres- treatments	: Times applied	: Pounds of active ingredient		
					: Per acre	: Per time applied	: Annual average
							: Total
<u>Single applications</u>							
<u>Herbicides</u>							
Dalapon	1,074		1,074	1.0	0.9	0.9	913
Diallate	2,673		2,904	1.1	1.2	1.2	3,587
Dinoseb	29,574		40,155	1.4	2.2	2.9	86,555
Glyphosate	485		485	1.0	.9	.9	437
Trifluralin	17,640		21,791	1.2	.5	.7	11,349
Other	-		1,742	-	1.6	-	2,854
Total	-		68,151	-	1.6	-	105,695
<u>Insecticides</u>							
<u>Bacillus</u>							
<u>thuringiensis</u> d/	24,893		24,893	1.0	-	-	-
Carbaryl	9,667		9,667	1.0	.9	.9	8,783
Dimethoate	6,174		6,174	1.0	.3	.3	1,871
Methomyl	6,867		6,867	1.0	.4	.4	2,926
Parathion	12,354		28,213	2.3	1.0	2.3	28,036
Other	-		2,327	-	.7	-	1,527
Total	-		78,141	-	.6	-	43,143
<u>Tank-mix applications</u>							
Methyl parathion + parathion	11,540		24,631	2.1	.9	1.9	21,531
					1.7	3.7	43,062
Total	-		24,631	-	2.6	-	64,593
TOTAL PESTICIDES	-		170,923	-	1.2	-	213,431

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 84,900 acres were planted for the processing market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

d/ Quantity data not reported because Bacillus thuringiensis is expressed in terms of number of spores per gram rather than in pounds active ingredient.

Table 11. Lettuce: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments	: Times : applied	:Pounds of active ingredient		
				: Per acre	: Per time	: Annual
				: applied	: average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Pronamide	253	253	1.0	0.8	0.8	211
Other	-	42	-	1.6	-	67
Total	-	295	-	.9	-	278
<u>Insecticides</u>						
Demeton	106	211	2.0	.3	.6	59
Endosulfan	668	1,191	1.8	.6	1.1	737
Parathion	129	301	2.3	.7	1.7	215
Other	-	99	-	1.3	-	127
Total	-	1,802	-	.6	-	1,138
<u>Fungicides</u>						
Captan	163	173	1.1	1.8	1.9	305
<u>Tank-mix applications</u>						
Endosulfan + demeton	48	48	1.0	1.1 .3	1.1 .3	54 14
Total	-	48	-	1.4	-	68
TOTAL PESTICIDES	-	2,318	-	.8	-	1,789

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 1,300 acres were planted for the fresh market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

and wireworm. Endosulfan accounted for about 65 percent of the 1,800 insecticide acre-treatments applied as single ingredients and was tank-mixed with demeton in about 50 acre-treatments.

For disease control, surveyed lettuce growers reported about 300 pounds (a.i.) of captan was used in approximately 170 acre-treatments at an average rate of 0.8 pound per time applied.

Onions

In 1979, approximately 19,000 acres of onions were planted in the Northwest, 9,600 acres (50 percent) were located in Oregon with the remaining acreage equally divided between Idaho and Washington. Although Oregon growers planted about twice the acreage of Idaho growers, the Idaho growers applied approximately 30 percent more herbicide acre-treatments, 260 percent more insecticide acre-treatments, and 170 percent more fungicide acre-treatments. In Idaho, the greater use of irrigation and higher temperatures in certain onion growing areas contributes to a heavier use of pesticides for controlling weeds, insects, and diseases. In the three States, about 91,000 acre-treatments were made to apply 528,000 pounds (a.i.) of all pesticides (Tables 12, 13, and 14).

For weed control, onion growers used DCPA for about 45 percent of the herbicide acre-treatments in Idaho, 55 percent in Oregon, and 70 percent in Washington. In Idaho and Oregon, growers used nitrofen for most of the remaining herbicide acre-treatments, whereas in Washington, chloroxuron accounted for most of the remaining acre-treatments. The herbicides were used to control crabgrass, purslane, annual bluegrass, and other annual broadleaf weeds and grasses in onions.

Major insect problems include onion maggot, onion thrip, brown wheat mite, and pea leafminer. Parathion comprised nearly 50 percent of the acre-treatments

Table 12. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Idaho, 1979 a/ b/

Pesticides	: Acres : : treated : : c/ :	: Acre- : : treatments : : :	: Times : : applied : : :	:Pounds of active ingredient			: Total
				: Per acre : : Per time : : applied :	: Annual : : average :	:	
<u>Single applications</u>							
<u>Herbicides</u>							
DCPA	4,921	4,921	1.0	6.0	6.0		29,469
Nitrofen	4,038	5,745	1.4	1.9	2.7		10,963
Other	-	469	-	.1	-		43
Total	-	11,135	-	3.6	-		40,475
<u>Insecticides</u>							
Carbophenothion	1,129	1,129	1.0	2.8	2.8		3,142
Ethion	870	870	1.0	1.2	1.2		1,055
Malathion	872	941	1.1	1.0	1.1		928
Methyl parathion	456	1,025	2.2	.4	.8		385
Parathion	3,704	8,026	2.2	.7	1.5		5,486
Toxaphene	1,757	3,838	2.2	3.3	7.2		12,619
Other	-	389	1.0	1.1	-		438
Total	-	16,218	-	1.5	-		24,053
<u>Fungicides</u>							
Anilazine	521	521	1.0	1.2	1.2		602
Mancozeb	2,963	8,703	2.9	2.2	6.6		19,529
Zineb	376	958	2.5	1.5	3.7		1,405
Other	-	891	-	1.9	-		1,714
Total	-	11,073	-	2.1	-		23,250
<u>Sprout control</u>							
Maleic hydrazide	3,412	3,412	1.0	2.1	2.1		7,276
<u>Tank-mix applications</u>							
<u>Anilazine</u>							
+ insecticides							
+ fungicides	220	326	1.5	2.0	3.0		652
<u>Endosulfan</u>							
+ methyl parathion	611	1,795	2.9	.3	1.0		582
<u>Maleic hydrazide</u>							
+ mancozeb	105	105	1.0	3.9	3.9		413
				2.4	2.4		253
				.2	.5		291

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Table 12. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Idaho, 1979 a/ b/ -- continued

Pesticides	:	:	:	:Pounds of active ingredient			:
				: Acres	: Acre-	: Times	
	:	:	:	: Per time	: Annual	:	:
	:	:	:	: applied	: average	:	: Total

Tank-mix applications (cont'd)

Parathion							
+ fungicides							
+ insecticides	555	721	1.3	2.6	3.4		1,887
Other	-	140	-	8.1	-		1,146
Total	-	3,087	-	1.7	-		5,224
TOTAL PESTICIDES	-	44,925	-	2.2	-		100,278

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 4,600 acres were planted for the fresh and processing markets (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 13. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments	: Times : applied	: Pounds of active ingredient		
				: Per acre : Per time : applied	: Annual : average	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
DCPA	3,396	4,675	1.4	7.5	10.3	34,834
Nitrofen	1,767	2,147	1.2	2.4	2.9	5,197
Other	-	1,602	-	2.4	-	3,780
Total	-	8,424	-	5.2	-	43,811
<u>Insecticides</u>						
Carbophenothion	1,492	1,492	1.0	4.6	4.6	6,829
Fonofos	362	723	2.0	.2	.3	122
Parathion	732	1,135	1.6	1.0	1.5	1,098
Other	-	1,005	-	.9	-	936
Total	-	4,355	-	2.1	-	8,985
<u>Fungicides</u>						
Anilazine	999	999	1.0	1.0	1.0	999
Maneb	244	1,220	5.0	1.6	8.0	1,953
Mancozeb	646	1,695	2.6	3.9	10.2	6,574
Other	-	136	-	3.5	-	476
Total	-	4,050	-	2.5	-	10,002
<u>Nematicides</u>						
D-D	1,111	1,111	1.0	190.6	190.6	211,754
<u>Sprout control</u>						
Maleic hydrazide	1,347	1,347	1.0	4.4	4.4	5,873
<u>Tank-mix applications</u>						
Malathion	524	805	1.5	1.5	2.3	1,189
+ toxaphene				2.0	3.1	1,609
Parathion	687	1,962	2.9	1.0	2.9	1,962
+ toxaphene				1.0	2.9	1,962
Parathion	1,076	1,587	1.5	.8	1.1	1,209
+ toxaphene				2.4	3.5	3,815
+ mancozeb				2.1	3.1	3,294
Anilazine	411	411	1.0	1.0	1.0	411
+ maleic hydrazide				4.6	4.6	1,878

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Table 13. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/ -- continued

Pesticides	: Acres treated : c/	: Acre-treatments :	: Times applied :	:Pounds of active ingredient		
				: Per time applied :	: Annual average :	: Total :
<u>Tank-mix applications (cont'd)</u>						
Anilazine	1,003	2,888	2.9	1.0	3.0	3,001
+ parathion				1.1	3.3	3,288
+ toxaphene				2.5	7.1	7,121
Other	-	922	-	3.0	-	2,746
Total	-	8,575	-	4.4	-	33,485
TOTAL PESTICIDES	-	27,862	-	11.7	-	313,910

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 9,600 acres were planted for the fresh and processing markets (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 14. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

Pesticides	: Acres : : treated : : c/ :	: Acre- : : treatments : : :	: Times : : applied :	: Pounds of active ingredient :		
				: Per acre : : Per time : : applied :	: Annual : : average :	: Total :
<u>Single applications</u>						
<u>Herbicides</u>						
Chloroxuron	883	1,273	1.4	2.4	3.4	3,012
DCPA	3,010	3,844	1.3	7.0	9.0	27,039
Other	-	443	-	2.9	-	1,282
Total	-	5,560	-	5.6	-	31,333
<u>Insecticides</u>						
Carbophenothion	336	336	1.0	1.1	1.1	358
Diazinon	476	1,136	2.4	.9	2.0	970
Ethion	2,211	2,268	1.0	.6	.6	1,256
Methyl parathion	619	1,074	1.7	.4	.6	386
Parathion	761	761	1.0	1.0	1.0	759
Other	-	1,559	-	1.1	-	1,782
Total	-	7,134	-	.8	-	5,511
<u>Fungicides</u>						
Maneb	320	572	1.8	2.2	4.0	1,274
Mancozeb	96	578	6.0	1.6	9.6	925
Other	-	100	-	.3	-	29
Total	-	1,250	-	1.8	-	2,228
<u>Nematicides</u>						
D-D	164	164	1.0	166.4	166.4	27,283
<u>Sprout control</u>						
Maleic hydrazide	1,026	1,026	1.0	3.1	3.1	3,158
<u>Tank-mix applications</u>						
Azinphosmethyl + parathion	960	960	1.0	.7 1.0	.7 1.0	713 960
Methyl parathion + parathion	374	413	1.1	.8 .5	.9 .6	330 206

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Table 14. Onions: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/ -- continued

Pesticides	: Acres treated : c/	: Acre-treatments :	: Times applied :	:Pounds of active ingredient		
				: Per time applied	: Annual average	: Total

Tank-mix applications (cont'd)

Parathion	960	1,919	2.0	1.0	2.0	1,919
+ mevinphos				.2	.4	427
Other	-	16	-	7.1	-	113
Total	-	3,308	-	1.4	-	4,668
TOTAL PESTICIDES	-	18,442	-	4.0	-	74,181

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 4,800 acres were planted for the fresh and processing markets (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

used by Idaho growers for controlling these insects. In the three States, other important insecticides included carbophenothion, ethion, and methyl parathion.

Diseases affecting onions include downy mildew and purple blotch. Mancozeb comprised about 80 percent of the fungicide acre-treatments used in controlling these diseases. In the three State area, other important fungicides included maneb, anilazine, and zineb. D-D, a nematicide used for control of pink root and other soil-born diseases, was also applied by Oregon and Washington growers.

Growers in all three States applied maleic hydrazide during the growing season for sprout control in storage. About 5,800 single application acre-treatments were made in the three States, of which about 60 percent were applied by Idaho growers.

About 16,300 acre-treatments of tank-mixtures were made primarily for insect control.

Snap beans

Approximately 41,000 acres of snap beans for processing were planted in Oregon and Washington in 1979. Snap beans are not grown commercially in Idaho. Only the Oregon snap bean growers were surveyed in the 1979 Vegetable Pesticide Survey. The Oregon growers used about 198,000 pounds (a.i.) of all pesticides in approximately 103,000 acre-treatments (Table 15).

Dinoseb and EPTC each accounted for about 40 percent of the acre-treatments with herbicides. Problem weeds and grasses controlled included yellow nutsedge, chickweed, and barnyardgrass.

Major insects affecting Oregon snap beans include the western spotted cucumber beetle, cutworm, armyworm, and seedcorn maggot. Fonofos and carbaryl were the major insecticides used accounting for nearly 90 percent of the single application acre-treatments and 95 percent of the active ingredients applied.

Sclerotinia, gray mold and root rot are the major snap bean diseases in

Table 15. Snap beans: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/

Pesticides	: Acres treated : c/	: Acre-treatments :	: Times applied :	:Pounds of active ingredient		
				: Per acre	: Annual	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Dinoseb	25,702	25,702	1.0	2.5	2.5	64,285
EPTC	26,766	27,086	1.0	3.2	3.2	85,855
Profluralin	4,410	4,410	1.0	.5	.5	2,009
Trifluralin	7,349	7,349	1.0	.5	.5	3,644
Other	-	49	-	2.8	-	136
Total	-	64,596	-	2.4	-	156,469
<u>Insecticides</u>						
Carbaryl	6,733	6,733	1.0	.7	.7	4,873
Disulfoton	1,172	1,172	1.0	.5	.5	567
Diazinon	1,137	1,137	1.0	.4	.4	417
Fonofos	15,775	15,775	1.0	1.1	1.1	17,354
Other	-	855	-	.3	-	223
Total	-	25,672	-	.9	-	23,434
<u>Fungicides</u>						
Benomyl	5,589	6,495	1.2	.5	.6	3,308
Captan	2,284	2,284	1.0	.9	.9	2,026
Ziram	725	725	1.0	1.2	1.2	881
Other	-	500	-	.8	-	396
Total	-	10,004	-	.7	-	6,611
<u>Tank-mix applications</u>						
EPTC						
+ herbicides	985	985	1.0	3.7	3.7	3,638
Fonofos	378	378	1.0	.5	.5	189
+ EPTC				2.6	2.6	992
+ profluralin				.5	.5	189
Other	-	1,415	-	4.7	-	6,598
Total	-	2,778	-	4.2	-	11,606
TOTAL PESTICIDES	-	103,050	-	1.9	-	198,120

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 38,500 acres were planted for the processing market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Oregon. Benomyl and captan accounted for nearly 90 percent of the acre-treatments for controlling these and other diseases.

Sweet corn

An estimated 113,000 acres of sweet corn were planted in 1979 in the Northwest region for the fresh and processing markets. About 95 percent, or 109,000 acres, were planted for processing only. Washington growers planted 44,900 acres, Oregon growers 41,500 acres, and Idaho growers 26,500 acres. About 353,700 pounds (a.i.) of all pesticides were used for approximately 255,200 acre-treatments (Tables 16, 17, and 18).

Herbicides accounted for about 90 percent of all pesticide acre-treatments in Idaho, 65 percent in Oregon, and 25 percent in Washington. The primary herbicides were EPTC in Idaho, atrazine in Oregon, and alachlor in Washington. A number of other herbicides were important in the three State area including 2,4-D and vernolate. These herbicides were used by corn growers to control annual broadleaf and grass weeds including foxtail, barnyardgrass, black nightshade, and nutsedge.

The major insects affecting sweet corn in the Northwest include corn earworm, garden symphylan, western bean cutworm, and wireworm. The corn earworm is a more serious pest in Washington than in the other two States. For corn earworm control, Washington growers used methomyl for nearly all of the 116,000 insecticide acre-treatments applied as single ingredients. Carbaryl comprised 75 percent of the acre-treatments in Oregon and carbaryl was the only single ingredient insecticide reported by surveyed Idaho growers.

No fungicide use was reported by any of the surveyed growers in the three States.

Table 16. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Idaho, 1979 a/ b/

Pesticides	: Acres : : treated : : c/ :	: Acre- : : treatments : :	: Times : : applied :	:Pounds of active ingredient		
				: Per acre : : Per time : : applied :	: Annual : : average :	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Alachlor	5,317	5,999	1.1	2.5	2.8	14,730
Atrazine	5,688	5,688	1.0	2.8	2.8	16,122
EPTC	9,323	9,323	1.0	4.2	4.2	38,771
2,4-D	6,393	6,393	1.0	2.3	2.3	14,784
Other	-	58	-	.4	-	136
Total	-	27,461	-	3.1	-	84,543
<u>Insecticides</u>						
Carbaryl	1,170	1,170	1.0	1.8	1.8	2,126
<u>Tank-mix applications</u>						
Carbaryl	1,310	1,310	1.0	1.8	1.8	2,380
+ methomyl				.4	.4	590
Total	-	1,310	-	2.3	-	2,970
TOTAL PESTICIDES	-	29,941	-	3.0	-	89,639

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 26,500 acres were planted for the processing market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 17. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Oregon, 1979 a/ b/

Pesticides	: Acres : treated : c/	: Acre- : treatments	: Times : applied	:Pounds of active ingredient		
				: Per acre	: Annual	: Total
<u>Single applications</u>						
<u>Herbicides</u>						
Atrazine	18,845	18,898	1.0	1.0	1.0	18,952
Dinoseb	2,063	2,063	1.0	3.4	3.4	7,020
EPTC	795	795	1.0	1.8	1.8	1,391
Alachlor	10,332	10,332	1.0	1.6	1.6	16,462
Butylate	1,040	1,040	1.0	3.2	3.2	3,299
Vernolate	11,580	11,580	1.0	3.4	3.4	38,924
Other	-	375	-	.6	-	585
Total	-	45,083	-	1.9	-	86,633
<u>Insecticides</u>						
Fonofos	12,326	12,326	1.0	1.0	1.0	12,037
Demeton	3,143	3,143	1.0	.6	.6	1,929
Other	-	673	-	1.7	-	1,156
Total	-	16,142	-	.9	-	15,122
<u>Tank-mix applications</u>						
Atrazine + vernolate	966	966	1.0	.5	.5	483
				2.5	2.5	2,426
Other	-	490	-	1.2	-	606
Total	-	1,456	-	2.4	-	3,515
TOTAL PESTICIDES	-	62,681	-	1.7	-	105,270

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 41,500 acres were planted, of which 39,600 were for the processing market and 1,900 were for the fresh market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

Table 18. Sweet corn: Acres treated, acre-treatments, times applied, rates and quantities used, single ingredient and tank-mix applications, Washington, 1979 a/ b/

Pesticides	: Acres : : treated : : c/ :	: Acre- : : treatments : : :	: Times : : applied : : :	: Pounds of active ingredient		
				: Per acre : : Per time : : applied :	: Annual : : average :	: Total :
<u>Single applications</u>						
<u>Herbicides</u>						
Alachlor	21,084	23,519	1.1	2.2	2.5	52,524
Atrazine	4,270	4,537	1.1	2.2	2.3	10,030
EPTC	2,049	2,049	1.0	1.2	1.2	2,456
Glyphosate	1,845	1,845	1.0	1.4	1.4	2,566
Vernolate	3,633	3,633	1.0	4.7	4.7	16,897
2,4-D	7,643	7,643	1.0	.5	.5	3,513
Other	-	212	-	2.2	-	472
Total	-	43,438	-	2.0	-	88,458
<u>Insecticides</u>						
Fonofos	987	987	1.0	1.6	1.6	1,564
Methomyl	32,198	114,987	3.6	.4	1.5	48,966
Other	-	67	-	.5	-	33
Total	-	116,041	-	.4	-	50,563
<u>Tank-mix applications</u>						
Atrazine + vernolate	2,896	2,896	1.0	1.7 4.7	1.7 4.7	5,046 13,716
Atrazine + herbicides	202	202	1.0	5.2	5.2	1,047
Total	-	3,098	-	6.4	-	19,809
TOTAL PESTICIDES	-	162,577	-	1.0	-	158,830

a/ "1979 Vegetable Pesticide Survey," Natural Resource Economics Division, ESCS, USDA.

b/ In 1979, 44,900 acres were planted, of which 42,900 were for the processing market and 2,000 were for the fresh market (Table 2).

c/ Acres treated not reported in this column for "other" and "total" because two or more materials may have been used on the same acre resulting in double counting.

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