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# PESTICIDE USE ON VEGETABLE CROPS USED FOR PROCESSING IN OHIO - 1979

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OHIO COOPERATIVE EXTENSION SERVICE
THE OHIO STATE UNIVERSITY
AND
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

# PESTICIDE USE ON PROCESSING VEGETABLE CROPS IN OHIO - 1979

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## INTRODUCTION

Vegetable production in Ohio constitutes a minor percentage of the total crop acreage but adds a significant contribution to the crop income. In 1979 the 22,110 acres of harvested fresh vegetables, the 27,170 acres of processed vegetables and the 11,400 acres of harvested potatoes accounted for only approximately 0.55 percent of the total Ohio crop production acreage.[1/] However, cash receipts for all vegetables in 1979 amounted to $95,530,000[2/] which constituted approximately 4.9 percent of the crop production income and 2.8 percent of the total agricultural production income of Ohio.

Ohio ranks 13th in the nation in the acreage of fresh market vegetables planted and harvested, 15th in the quantity of production, and 12th in the income from production. Likewise, for processing vegetables Ohio ranks 13th in acreage planted and harvested, but 5th in the quantity of production and 6th in the crop value.[3/] These figures do not include potatoes, which for Ohio on a national production basis would be relatively insignificant.

Satisfactory pest control is critical for vegetable production in Ohio. Currently, the producers have several chemical pesticides registered and recommended for use against pests on vegetables, thus providing alternatives if one pesticide has a less satisfactory performance record or is not readily available. In some cases, however, the number of registered pesticides is limited, emphasizing the need to protect the registration of those pesticides currently in use and to promote the development of new pest control agents. Pesticide use data is essential in helping to substantiate the need for such materials in agricultural production.

## PROCEDURES

In 1978 a survey was conducted for the 1977 pesticide use on fresh market vegetables. The results of the survey were published in OCES Bulletin 648.[4/] The survey sample size was sufficient to also collect data on sweet corn and

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[1] Ohio Agricultural Statistics 1979. May 1980. Ohio Crop Reporting Service.

[2] 1979 Ohio Farm Income. October 1980. Department Series ESO 757. Ohio Agricultural Research and Development Center.

[3] Vegetables: Estimates by Seasonal Groups and States 1974-78 Acreage, Yield, Production Value. May 1981. USDA-ESS Crop Reporting Board, Statistical Bulletin No. 665.

[4] Pesticide Use on Field Grown Fresh Market Vegetable Crops in Ohio-1977. Ohio Pesticide Impact Assessment Program-Acie C. Waldron, William D. Rogers, and Robert L. Curtner. OCES Bulletin 648, May 1979.

potatoes. In response to the requests for national and regional pesticide use data, the Natural Resource Economics Division of USDA-ESS-SEA (now ERS-S&E) collected data via personal contact from a stratified random sampling design of growers during late November and early December in selected states for the 1979 processing vegetable crops. Ohio was included with the selected states. Although the survey data for all regions has not yet been published, a summary of Ohio data for cabbage, celery, cucumbers, onions, sweet corn, and tomatoes was provided for the State Pesticide Impact Assessment Program office. ERS expanded the data for individual farms in the survey to reflect all farms by mutliplying the sample data by the inverse of the sample ratio for the sample stratum. The pesticide use data for each crop were then adjusted by the ratio of the number of acres grown in the State to the number of expanded sample acres for each crop grown.

## INTERPRETING THE DATA

The term, "acres treated", is used to identify acres receiving one or more applications of a specific pesticide. Acres treated are not additive because two or more different specific ingredients may have been used on the same acre. Therefore, summing them could result in double counting. For this reason the sums of acres treated are not shown in Tables 7 through 12.

"Acre-treatments" is the term used to represent the total accumulated acreage of pesticide application whether it be multiple application of one or several pesticides on the same acreage or only one treatment during the season. The interpretation of survey data did not provide for determining the pesticide application history for the season for each specific field or fields in a farm operation. Consequently, the "acre-treatments" can exceed the "acres treated" and the acres planted. The number of applications per season was derived by dividing the acre-treatments by the acres treated for each specific pesticide material.

Single application and annual rates were estimated for specific active ingredients. The annual rates include the average rate for the season and were derived by dividing the total active ingredients of the specific pesticide applied by the acres treated. The single application rate was derived by dividing the total active ingredients of the specific pesticide applied by the number of acre-treatments. The rate of application and the number of application 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 rates reported in the survey were band or in-furrow which are one-fourth to one-third that of the broadcast rate. Other factors that can influence the rate of application are the age of the plant, the type of soil, the weather conditions, the resistance of vegetables to specific pests, the resistance of pests to specific pesticides, and the differences in concentrations in tank mixes of two or more pesticides versus the same when applied as single ingredients.

All references to the quantity of pesticides in this publication, unless indicated otherwise, are related to pounds of active ingredient (a.i.).

RESULTS:

A. General

A summary of the planted and harvested acreage of the six vegetable crops for both the fresh and the processing market in Ohio for 1977 through 1981 is recorded in Table 1. Of major note is the significant decline in processing tomato acreage during the period.

The acreage of selected vegetable crops treated with pesticides in 1979 is recorded in Table 2. Data was not provided for the number of individual acres treated one or more times with one or more pesticides. Consequently, the percentage of the acreage of each crop that was treated for weed control, insect control, disease control, or other purposes could not be definitely determined. However, comparison between the data for acres planted (Table 1) and individual pesticide use (Tables 7-12) indicates that: probably most of the celery, cucumber, onion and tomato acreages were treated for weed, insect and disease control; most of the cabbage acreage was treated for weed and insect control with much less acreage requiring disease control; a large percentage of the sweet corn was treated for insect control but much less for weed control and almost none for disease control. It can be determined that approximately 68 percent of the onion acreage was treated with maleic hydrazide to control sprouting and 60 percent of the tomato acreage was treated with ethephon to regulate ripening. The data in Table 2 reports the pesticide class use on an acre-treatment basis for the six vegetable crops for both single ingredient and for tank-mix application. It is noted that although there were 47,150 acres total of the six vegetables planted there were 474,091 acre-treatments. Approximately 64 percent of that was associated with tomato production.

Table 3 indicates that 739,460 pounds of pesticides were used on the six vegetable crops in Ohio in 1979. Tomato production accounted for approximately 65.3 percent of the total pesticide quantity used, sweet corn - 10.5 percent, onion - 10.3 percent, cucumbers - 6.9 percent, cabbage - 4.8 percent, and celery - 2.2 percent. Fungicides were the materials used in the greatest overall quantity; particularly on tomatoes, onions and celery. Survey results indicated that 71.4 percent of the pesticide active ingredients were applied as single ingredients and the remaining 28.6 percent as tank mixes containing combinations of two or more herbicides, insecticides and fungicides. By contrast, 83.4 percent of the acre-treatments received single ingredient applications and only 16.6 percent were treated with tank mixes.

As indicated previously because of the several factors involved, rates of pesticide application derived from survey data calculations do not always agree with label recommendations. A review of the data reported herein verifies that situation in some cases, but also indicates that most of the pesticide use on vegetable crops in Ohio approximated the ranges of application rates recommended. The misuse of pesticides related to crops for which registration was valid appeared to be minimal. Some question is raised concerning reports of ethephon on cabbage, permethrin on celery (unless a Sec. 18 use), acephate on cucumbers, aldicarb on cucumbers and tomatoes, methamidophos on onions, and BHC on sweet corn.

B. Pesticide Use on Cabbage

A total of 35,229 pounds of pesticides was applied to cabbage in Ohio during 1979 (Table 7). Of that amount, 57.2 percent were insecticides, 31.4 percent fungicides, 10.6 percent herbicides, and 0.8 percent other chemicals. Approximately 26.2 percent of all pesticides was applied in tank mixes.

Approximately 3,749 pounds of herbicides were applied to 3,262 acre-treatments of cabbage (Tables 4 and 7). Of this, 3,746 pounds and 3,232 acre-treatments were by single ingredient applications and 3 pounds of trifluralin and 30 acre-treatments were from a tank mix application. Trifluralin was the most extensively used herbicide with 71.9 percent of the acreage (2,345 acre-treatments) receiving application. Nitrofen, applied to 476 acre-treatments, constituted 14.5 percent of the acreage treated. Metribuzin and pebulate accounted for 5.8 percent each of the total acreage treated. Herbicides were generally applied only once during the year. Of the total quantity of herbicides applied, trifluralin with 1,350 pounds and nitrofen with 1,334 pounds accounted for 36.0 and 35.6 percent, respectively. Pebulate accounted for 20.4 percent and metribuzin for 5.0 percent (Table 4).

Bacillus thuringiensis (B.T.) was used on more cabbage acreage than any other insecticide. Single ingredient applications were made on 11,090 acre-treatments which constituted 37.4 percent of that total acreage. As an ingredient in a tank mix, B.T. was applied on 3,109 acre treatments which was 63.0 percent of that total (Table 7). However, because of the low application rate only 341 pounds (Table 5) or 1.7 percent of total insecticides applied was attributed to B.T. Methomyl was the insecticide used in the greatest quantity with 1,470 pounds used in single ingredient applications and 4,028 pounds applied in tank mixes (Table 5). Single ingredient applications of methomyl were made to 814 acres at an average of 3.6 applications during the season for 2,899 acre-treatments. Methomyl tank mix applications were made on 1,182 acres at from 1 to 7.9 average applications per season for a total of 3,355 acre-treatments. Azinphosmethyl was applied only as a single ingredient. It was used an average of 4.3 times during the season for a total of 5,145 pounds on 1,213 acres and 5,203 acre-treatments. Carbaryl was applied to 794 acres and 1,620 acre-treatments as a single ingredient and to 529 acres and 1,736 acre-treatments in a tank mix for a total of 2,851 pounds (Tables 5 and 7). Applications of parathion and methamidophos were by single ingredient only and accounted for 1,815 and 1,920 pounds, 1,361 and 814 acres treated, and 4,559 and 1,519 acre-treatments, respectively. Nine hundred and sixty-nine pounds of endosulfan were used, two-thirds of it as a single ingredient and the remainder in tank mixes, on 764 acres and 1,533 acre-treatments. In relation to the total quantity of insecticides used on cabbage, methomyl accounted for 27.3 percent, azinphosmethyl - 25.5, carbaryl - 14.1, methamidophos - 9.5, parathion - 9.0, and endosulfan - 4.8 percent. All other insecticides accounted for the remaining 9.8 percent. Approximately 70.1 percent of the quantity of insecticide and 85.7 percent of the acre-treatments were applied as single ingredients.

Sulfur was the fungicide used in the greatest quantity accounting for 47.6 percent of the total poundage. Sulfur was applied only as a single ingredient (Table 6) and was used an average of 5 times during the season (Table 7). Zineb use amounted to 12.5 percent of the total active ingredient poundage;

also as single ingredient application (Table 6). Maneb accounted for 12.4 percent of the total but 88 percent was applied in tank mixes (Tables 6 and 7). Zineb was applied to 578 acres an average of 8 times during the season (Table 7) for a total of 4,624 acre-treatments. Sulfur was applied to 405 acres with 5 applications per season for a total of 2,023 acre-treatments. Maneb was applied to only 214 total acres but the 4 applications per season and the application rate of 1.6 pounds per acre accounted for the quantity used for 857 acre-treatments. Chlorothalonil, which accounted for 5.5 percent of the fungicides used, was applied only as a single ingredient to 231 acres on an average of 3.5 times for 818 acre-treatments. Captafol, copper ammonia complex and copper sulfate were applied only in tank mixes and accounted for 6.0, 6.7 and 5.3 percent, respectively, of the total fungicide applied. Seventy-one percent of the fungicides applied and 64.2 percent of the acres treated were by single ingredient application.

C. Pesticide Use on Celery

Evaluation of the data in Table 8 in comparison with the acres for celery production in Ohio for 1979 could lead to the assumption that 100 percent of the acreage was treated for insect, weed and disease control. A total of 16,458 pounds of pesticide active ingredient was applied to the celery crop in 1979. Fungicides accounted for 70.8 percent of the total, insecticides - 17.2 percent, and herbicides - 12 percent. Ninety-nine percent of the pesticides was applied as single ingredients. The 1.0 percent applied as a tank mix involved combinations of 97 pounds of B.T. with 65 pounds of ethylan which was applied to 80 acres over an average of 6 times during the season (Tables 5 and 8).

Only two herbicides were reported as being used for weed control in celery in Ohio during 1979. The data in Table 8 indicates that most of the acres were treated with both CDEC and nitrofen and that some acres were treated more than once. Celery producers used 1,385 pounds of CDEC (69.9 percent of the total) and 595 pounds of nitrofen.

Nine insecticides were reported as being used on celery. Of the total of 2,828 pounds active ingredient reported (Table 5), malathion accounted for 56.6 percent and acephate for 18.7 percent. B.T. was applied to such treated acreage on an average of 8 times during the year as a single ingredient and 6 times in a tank mix. The low rate of application resulted in a reported use of only 107 pounds of B.T. Ninety-one percent of the B.T. was used in tank mixes applied to 480 acre-treatments. The remaining 9 percent of the B.T. (or 10 pounds a.i.) was applied as a single ingredient to an accumulated total of 640 acre-treatments. Malathion was used on more acres than any other insecticide, being applied one or more times to 393 acres for a total of 1,435 acre treatments. Acephate was applied one or more times to 290 acres for an accumulation of 705 acre-treatments (Table 8).

Five fungicides were reported used for disease control in celery. Copper hydroxide and anilazine were used on approximately the same amount of acreage at the same number of applications per year (360 acres and 7.7 to 7.9 times per year - Table 8). Because copper hydroxide was applied at a high rate it

accounted for 44.5 percent of the total fungicide used whereas anilazine accounted for 28.8 percent. Mancozeb was applied to 205 acres an average of 2.4 times for a total of 1,175 acre treatments and 24.2 percent of the quantity of fungicide used.

D. Pesticide Use on Cucumbers

Vegetable producers used 50,911 pounds of pesticide active ingredient on cucumbers in Ohio during 1979. Fungicides accounted for 45.7 percent of the total or 23,275 pounds of which 79.5 percent was applied as single ingredients and 20.5 percent in tank mixes.

Growers reported the use of eight different fungicide chemicals (Table 6). Fixed copper, sometimes called copper sulfate, was the fungicide used most extensively amounting to 38.2 percent of the total poundage with 83.6 percent of the quantity applied as a single ingredient on a total of 5,780 acre-treatments. Tank mix combinations of fixed copper were applied to 1,898 acre-treatments (Table 9). In descending order, mancozeb accounted for 20 percent of the total pounds used, chlorothalonil - 15.2, copper ammonia complex - 11.3, maneb - 7.5, copper hydroxide - 5.8, sulfur - 1.4 and nabam - 0.6 percent. Chlorothalonil was applied to 2,207 acre-treatments as a single ingredient and 513 acre-treatments in tank mixes. Mancozeb was applied to 1,780 acre-treatments as a single ingredient and 343 in tank mixes. Data recorded in Table 9 indicates that fungicides were applied to the cucumber acreage generally more than one time during the growing season with a range of 1 to 5 times per acre treated.

Five herbicides were reported used for control of weeds in cucumbers (Tables 4 and 9). Two chemicals, naptalam and bensulide, accounted for 84.3 percent of the total herbicide active ingredient used with 42.2 and 42.1 percent, respectively. Approximately 19.5 percent of the naptalam and 23 percent of the bensulide were combined in a tank mix and applied one time to 619 acres of cucumbers. Chloramben, pebulate and trifluralin applied as single ingredients accounted for 14.7, 0.2 and 0.8 percent of the quantity of herbicides, respectively. Each herbicide, as a single ingredient or as a component of the tank mix, was applied only once to the acreage treated (Table 9).

Cucumber producers used seven different pesticides for insect control. Of the 15,979 pounds applied, 82.8 percent was used as single ingredients (Table 5). Carbaryl accounted for 72 percent of the total insecticides used with 89.3 percent of it applied as a single ingredient on 6,037 acres and 10,759 acre-treatments, 0.9 percent on 107 acres or 177 acre-treatments for unidentified reasons other than insect control, and the remaining 9.8 percent as a component in tank mixes applied to 683 acres and 1,308 acre-treatments (Tables 5 and 9). Two other insecticides, malathion and endosulfan, accounted for 15.3 and 11.9 percent of the total quantity applied during the year. The other insecticides reported constituted less than 1.0 percent of the total used. Fifty-four and one-half percent of the malathion and 83.7 percent of the endosulfan were applied as single ingredients to 729 and 2,317 acre-treatments, respectively.

E. Pesticide Use on Onions

With the exception of 771 pounds each of CDAA and chlorpropham applied as a tank mix,all pesticide chemicals used for onion production occurred as single ingredient applications. A total of 76,199 pounds of pesticides were used on onion crops in 1979. Fungicides accounted for 85.5 percent of that total, but were applied to only 28.8 percent of the acre-treatments. Approximately 95.2 percent of all fungicide use was attributed to thiram which was applied to 408 acres on an average of 4 applications for the season at the rate of 38 pounds per acre per application (Table 10). Mancozeb accounted for 2.1 percent of the fungicide quantity applied and copper hydroxide, chlorothalonil, and maneb contributed 1.2, 1.2 and 0.3 percent, respectively (Table 6). In relation to the percentage of acre-treatments, thiram accounted for 48.2 percent, mancozeb - 16.8, copper hydroxide - 16.3, chlorothalonil - 15.5, and maneb - 3.2 percent (Table 10).

Six herbicides were reported as being used for onions but DCPA and propachlor use was insignificant (Table 4). Of the four with significant use chlorpropham accounted for 40.1 percent of the 4,879 pounds of total herbicide, CDAA and nitrofen for 28.9 percent each, and CDEC for 2.0 percent. As indicated earlier only CDAA and chlorpropham were applied as a tank mix and accounted for 31.6 percent of the total herbicide application. Nitrofen was applied to 1,225 acre-treatments or 44.9 percent of the total, CDAA to 741 acres or 27.1 percent and chlorpropham to 737 acres or 27.0 percent. Acre-treatments for other herbicides amounted to only 1.0 percent.

Parathion was the most commonly used insecticide on the onion crop in Ohio. At an average of 6 applications during the season 2,825 pounds were used on 540 acres for 3,214 acre-treatments. This accounted for 58.6 percent of the insecticide applied and 58.5 percent of the acre-treatments. In descending order those insecticides that contributed more than 2.0 percent of the total poundage were malathion - 14.0 percent on 10.7 percent of the acreage, fonofos - 11.8 percent on 10.4 percent, and diazinon - 11.7 percent on 14.5 percent of the acreage (Tables 5 and 10).

Maleic hydrazide was applied one time at a rate of 3.4 pounds per acre on 408 acres for a total use of 1,377 pounds. This use was to control sprouting in the subsequently harvested crop.

F. Pesticide Use on Sweet Corn

The most prevalent use of pesticides in sweet corn was for insect control accounting for 50,688 pounds or 65.4 percent of the total. Herbicides at 26,908 pounds accounted for approximately 34.6 percent. The 31 pounds of fungicides (chlorothalonil applied 6.8 times to 10 acres at 0.5 pounds per application) was insignificant.

Approximately 60.3 percent of the poundage of insecticide was applied as single ingredients on 79.1 percent of the acre-treatments (Tables 5 and 11). Carbaryl was the insecticide used in the greatest quantity with 17,069 pounds used in single ingredient applications on 14,213 acre-treatments and 9,975 pounds

in tank mixes on 10,911 acre-treatments. This constituted 30.7 percent of all pesticides used in tank mixes and a corresponding 72.8 percent of the acre-treatments. A total of 26,706 pounds of carbaryl (52.7 percent of the total insecticide poundage) was applied to 20,886 acre-treatments (40 percent of total acreage). Sweet corn growers applied 11,571 pounds of methomyl on 14,315 acre-treatments with 58.3 percent of the amount and 23.3 percent of the acre-treatments applied in tank mixes. Parathion was applied to 10,145 acre-treatments with 52.1 percent of the quantity applied as a single ingredient to 43.7 percent of the acre-treatments (Tables 5 and 11). Approximately 79.2 percent of the malathion use reported was applied in tank mixes to 78.1 percent of the associated acre-treatments. All other insecticides reported were applied as single ingredients.

Following carbaryl in order of percent quantity used were methomyl - 22.8, BHC - 7.0, parathion - 6.6, malathion - 4.5, and methyl parathion - 2.0 percent (Table 5). The other seven insecticides listed accounted for from 1.1 to 0.02 percent of the total.

Four herbicides accounted for 96 percent of such chemicals applied to 90.3 percent of the total acre-treatments. Alachlor was used in greatest quantity with 10,816 pounds (40.3 percent of the total herbicides) used on 6,076 acre-treatments. (Tables 4 and 11). Approximately 50.9 percent of that quantity was used in tank mixes in combination with atrazine. Atrazine accounted for 17.1 percent of the herbicide poundage applied, cyanazine - 30.8 and butylate - 7.8. Cyanazine was applied to 5,445 acre-treatments with 78.9 percent of those acres being treated with the herbicide as a single ingredient. Approximately 67.2 percent of the atrazine was applied as a tank mix.

## G. Pesticide Use on Tomatoes

Approximately 438,135 pounds of pesticides were applied on 303,599 acre-treatments of processing tomatoes in Ohio in 1979 (Table 12). Of the quantity used, 67.2 percent was applied as single ingredients and the remaining 32.8 percent in 76 different tank mix formulations. However, tank mix formulations were applied on only 17.9 percent of the acre-treatments. Approximately 71.9 percent of the acreage being treated with tank mix formulations received one or more insecticides in the mix and 95.8 percent received one or more fungicides. Fungicides were included in 72 of the tank mix formulations listed and insecticides in 57 mixes. Maneb accounted for approximately 18.5 percent of the ingredients in tank mixes followed by carbaryl with 16.6 percent, mancozeb 13.1, captafol - 13.0, copper ammonia complexes - 9.2, chlorothalonil - 7.8, copper hydroxide - 5.2, copper sulfate - 4.6, endosulfan - 4.2, sulfur - 2.7, and methomyl - 1.0 percent.

Eight herbicides were reported as used by Ohio tomato growers for weed control. Growers applied 88.9 percent of the total herbicide poundage as single ingredients on 93.7 percent of the acre-treatments (Tables 4 and 12). Only metribuzin, pebulate and trifluralin were used in tank mixes on 1,855 acre-treatments (Table 12). Metribuzin was used on the largest acreage where 5,107 pounds were applied as the single ingredient to 12,200 acre-treatments and 789 pounds were applied in tank mixes to 1,845 acre-treatments. This

accounted for 24.6 percent of the amount of herbicides applied and 46.8 percent of the acreage. Trifluralin, however, was used in the greatest quantity where 8,667 pounds or 35.3 percent of the total herbicides, were used on 11,934 acre-treatments or 39.8 percent of the treated acreage. Approximately 90.8 percent of that quantity was applied to 88.1 percent of the acre-treatments as a single ingredient. Other herbicides used were diphenamid - 16 percent of the total poundage on 5.2 percent of the acre-treatments, pebulate - 14.1 on 10.5, chloramben - 7.1 on 2.8, naptalam - 0.8 on 0.6, napropamide - 0.8 on 0.3, and DCPA 0.5 on 0.1. Approximately 32.3 percent of the pebulate was applied in tank mixes with metribuzin and captafol on 29.7 percent of the pebulate treated acreage.

Carbaryl accounted for 74.6 percent of the insecticides applied by tomato growers. Approximately 64.9 percent of the total carbaryl poundage was applied as a single ingredient to 49,627 acre-treatments and the balance was applied in 26 different formulations of tank mixes to 24,056 acre-treatments. Carbaryl was applied to 64.4 percent of the accumulative tomato acreage treated with insecticides (Tables 5 and 12). Endosulfan was the second most used insecticide constituting 17.3 percent of the total, with 10,757 pounds (61.8 percent of the quantity) applied as the single ingredient to 16,141 acre-treatments (64.4 percent of the acreage) and 6,662 pounds applied to 8,913 acre-treatments in 14 different tank mix formulations. Other significant insecticide use reported indicated that diazinon contributed 2.5 percent of the total poundage applied to 3.2 percent of the accumulated acre-treatments with 88.3 percent of that quantity applied to 85.8 percent of that acreage as single ingredient application; methomyl - 2.3 percent, applied to 3.2 percent of the acre-treatments and 68.7 percent of that quantity applied to 68.2 percent of the acreage in 6 different tank mix formulations; azinphosmethyl - 2.0 percent, applied to 5.1 percent of the acre-treatments of which 70.8 percent of that quantity was applied to 69.4 percent of that acreage as single ingredient application; and malathion - 0.7 percent, applied to 0.5 percent of the accumulative acreage with 63.0 percent of that quantity applied to 54.1 percent of that acreage in a tank mix.

Approximately 75.3 percent of the quantity of fungicides reported used by vegetable growers on the six crops was used for tomatoes (Table 6). Thirteen different fungicide chemicals were used. Eight of the chemicals accounted for 99.2 percent of the total quantity of fungicides used and 95.3 percent of the total acre-treatments. Seventy-two different tank mix formulations were used on 52,120 accumulative acres of tomatoes (Table 12). Approximately 133,307 acre-treatments or 71.9 percent of the total acreage received single ingredient application of fungicides.

Mancozeb and chlorothalonil were the two fungicides used in the greatest quantities accounting for approximately 21.5 and 21.4 percent of the total, respectively (Table 6). Chlorothalonil was applied to more acreage than any other fungicide with application to 48,394 acre-treatments of which 76 percent of the acreage and 82.7 percent of the poundage was by single ingredient application (Table 12). Captafol, which was the third in order for the most used fungicides with 17.2 percent of the total poundage, was second in the acreage coverage. Approximately 37,466 accumulative acres were treated with captafol where 67.4 percent of the acreage received 64.8 percent of the poundage by single ingredient application. Sixty-nine and one-half percent of the 34,770 accumulative acres treated with mancozeb and 71.6 percent of the poundage was by single ingredient application.

In descending order following Captafol relative to the quantity of fungicide active ingredient applied, maneb accounted for 16.5 percent of the total, copper hydroxide - 8.2, copper sulfate - 7.5, copper ammonia complex - 5.5, sulfur - 1.3, nabam - 0.5, and metallic copper - 0.3 percent (Table 6). The other three fungicides listed contributed less than 0.1 percent to the total used. Maneb was applied to 29,792 acre-treatments with 52.4 percent of the quantity applied to 51 percent of the acreage in tank mixes. Copper sulfate was applied to 23,255 acre-treatments of which 60 percent of the acreage received 71.5 percent of the total poundage in single ingredient application. Approximately 63.7 percent of the 20,085 accumulative acreage treated with copper hydroxide received single ingredient application. This constituted 70.3 percent of the total poundage used. Copper ammonia complex was applied to 2,124 acre-treatments as a single ingredient and 7,953 acre-treatments in tank mixes. Approximately 83.1 percent of the acreage treated with nabam and 90.6 percent of the quantity used were by single ingredient application. Sulfur and metallic copper were applied only in tank mixes to 9,591 and 4,378 acre-treatments respectively.

Ethephon was applied to 13,329 acre-treatments of tomatoes to promote uniform ripening. Ninety-four percent of the quantity was applied to 96.2 percent of the acreage as a single ingredient (Tables 6 ans 12).

Table 1. Acreage of Selected[a/] Commercial Vegetable Production in Ohio 1977-81. [b/]

| CROP | FRESH MARKET | | | | | PROCESSING MARKET | | | | | FRESH AND PROCESSING MARKET | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1977[c/] | 1978 | 1979 | 1980 | 1981 | 1977 | 1978 | 1979 | 1980 | 1981 | 1977 | 1978 | 1979 | 1980 | 1981 |
| | 1000 Acres Planted | | | | | | | | | | | | | | |
| Cabbage | 2.6 | 2.7 | 2.5 | 2.5 | 2.3 | 1.2 | 1.5 | 1.4 | 1.2 | 1.5 | 3.8 | 4.2 | 3.9 | 3.7 | 3.8 |
| Celery | 0.29 | 0.34 | 0.35 | 0.43 | 0.47 | --- | --- | --- | --- | --- | 0.29 | 0.34 | 0.35 | 0.43 | 0.47 |
| Cucumbers | --- | --- | --- | --- | --- | 6.5 | 6.5 | 6.6 | 6.3 | 5.3 | 6.5 | 6.5 | 6.6 | 6.3 | 5.3 |
| Onions | 0.6 | 0.6 | 0.6 | 0.55 | 0.56 | --- | --- | --- | --- | --- | 0.6 | 0.6 | 0.6 | 0.55 | 0.56 |
| Sweet Corn | 15.0 | 15.3 | 15.4 | 16.0 | 16.5 | --- | --- | --- | --- | --- | 15.0 | 15.3 | 15.4 | 16.0 | 16.5 |
| Tomatoes | 1.3 | 1.1 | 0.9 | 0.7 | 1.0 | 21.4 | 20.0 | 19.4 | 17.0 | 15.1 | 22.7 | 21.1 | 20.3 | 17.7 | 16.1 |
| Totals | 19.79 | 20.04 | 19.75 | 19.98 | 20.83 | 29.1 | 28.0 | 27.4 | 24.5 | 21.9 | 48.89 | 48.04 | 47.15 | 44.68 | 42.73 |
| | 1000 Acres Harvested | | | | | | | | | | | | | | |
| Cabbage | 2.15 | 2.3 | 2.1 | 2.1 | 1.9 | 1.1 | 1.3 | 1.2 | 1.1 | 1.4 | 3.25 | 3.6 | 3.3 | 3.2 | 3.3 |
| Celery | 0.23 | 0.33 | 0.32 | 0.39 | 0.44 | --- | --- | --- | --- | --- | 0.23 | 0.33 | 0.32 | 0.39 | 0.44 |
| Cucumbers | --- | --- | --- | --- | --- | 6.4 | 6.4 | 6.4 | 6.1 | 5.2 | 6.4 | 6.4 | 6.4 | 6.1 | 5.2 |
| Onions | 0.56 | 0.55 | 0.59 | 0.54 | 0.53 | --- | --- | --- | --- | --- | 0.56 | 0.55 | 0.59 | 0.54 | 0.53 |
| Sweet Corn | 14.5 | 14.8 | 15.0 | 15.5 | 15.0 | --- | --- | --- | --- | --- | 14.5 | 14.8 | 15.0 | 15.5 | 15.0 |
| Tomatoes | 0.9 | 0.8 | 0.7 | 0.65 | 0.9 | 21.2 | 19.7 | 18.7 | 16.8 | 14.1 | 22.1 | 20.5 | 19.4 | 17.45 | 15.0 |
| Totals | 18.34 | 18.78 | 18.71 | 19.18 | 18.77 | 28.7 | 27.4 | 26.3 | 24.0 | 20.7 | 47.04 | 46.18 | 45.01 | 43.18 | 39.47 |

[a/] Vegetables included in the 1979 ERS Survey of Pesticide Use in Commercial Production

[b/] Data from Ohio Agricultural Statistics - Ohio Crop Reporting Service

[c/] Data from OCES Bulletin 648 "Pesticide Use on Field Grown Fresh Market Vegetable Crops in Ohio 1977" report acreage as: Cabbage-2200, Celery-230, Cucumbers-7000, Onions-800, Sweet Corn-14500 and Tomatoes-900.

Table 2. Acre-treatments with pesticides on selected commercial vegetables in Ohio - 1979[a/]

| Crop | Single Ingredient Applications | | | | Tank-Mix Applications | Total |
|---|---|---|---|---|---|---|
| | Herbicides | Insecticides | Fungicides | Other | | |
| | (Acre-Treatments[b/]) | | | | | |
| Cabbage | 3232 | 29634 | 7891 | 188 | 4935 | 45879 |
| Celery | 945 | 3935 | 7110 | --- | 480 | 12470 |
| Cucumbers | 4812 | 13843 | 12013 | 177 | 3978 | 34823 |
| Onions | 2217 | 5492 | 3384 | 408 | 257 | 11758 |
| Sweet Corn | 9668 | 41314 | 68 | 325 | 14587 | 65962 |
| Tomatoes | 27639 | 75329 | 133307 | 12504 | 54420 | 303199 |
| Total | 48513 | 169547 | 163773 | 13602 | 78656 | 474091 |

[a/] Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

[b/] Acre-treatments is equivalent to the summation of all acres treated recorded each time a pesticide is applied. Data were not provided to show how many individual acres were treated one or more times during the year

Table 3. Quantities of pesticides used on selected commercial vegetables in Ohio - 1979[a/]

| Crop | Single Ingredient Applications | | | | Tank-Mix Applications | Total |
|---|---|---|---|---|---|---|
| | Herbicides | Insecticides | Fungicides | Other | | |
| | (pounds active ingredient) | | | | | |
| Cabbage | 3746 | 14136 | 7851 | 271 | 9225 | 35229 |
| Celery | 1980 | 2666 | 11650 | --- | 162 | 16458 |
| Cucumbers | 9571 | 13053 | 18497 | 184 | 9606 | 50911 |
| Onions | 3337 | 4822 | 65121 | 1377 | 1542 | 76199 |
| Sweet Corn | 14447 | 30226 | 31 | 338 | 32486 | 77528 |
| Tomatoes | 21303 | 64336 | 220396 | 18783 | 158317 | 483135 |
| Total | 54834 | 129239 | 323546 | 20953 | 211338 | 739460 |

[a/] Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

Table 4. Herbicide Use on Selected Commercial Vegetables in Ohio - 1979[a/]

| Herbicide (Common Name)[b/] | VEGETABLE CROP | | | | | | | | | | | | | | | | | | Total All Crops |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cabbage | | | Celery | | | Cucumbers | | | Onions | | | Sweet Corn | | | Tomatoes | | | |
| | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | |
| | (Pounds Active Ingredient) | | | | | | | | | | | | | | | | | | |
| Alachlor | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5310 | 5506 | 10816 | -- | -- | -- | 10816 |
| Atrazine | 19 | -- | 19 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1504 | 3076 | 4580 | -- | -- | -- | 4599 |
| Bensulide | -- | -- | -- | -- | -- | -- | 3777 | 1126 | 4903 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4903 |
| Butylate | -- | -- | -- | -- | -- | -- | -- | -- | -- | 641 | -- | -- | 192 | 1874 | 2086 | -- | -- | -- | 2086 |
| CDAA | -- | -- | -- | -- | -- | -- | -- | -- | -- | 100 | 771 | 1412 | -- | -- | -- | -- | -- | -- | 1412 |
| CDEC | -- | -- | -- | 1385 | -- | 1385 | -- | -- | -- | -- | -- | 100 | -- | 25 | -- | -- | -- | -- | 1485 |
| Chloramben | 4 | -- | 4 | -- | -- | -- | 1711 | -- | 1711 | 1185 | -- | -- | -- | -- | 25 | 1698 | -- | 1698 | 3438 |
| Chlorpropham | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 771 | 1956 | -- | 1861 | -- | -- | -- | -- | 1956 |
| Cyanazine | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6388 | -- | 8249 | -- | -- | -- | 8249 |
| 2,4-D | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 | -- | -- | 181 | -- | 181 | -- | -- | -- | 181 |
| DCPA | 76 | -- | 76 | -- | -- | -- | -- | -- | -- | -- | -- | 2 | -- | -- | -- | 127 | -- | 127 | 205 |
| Diphenamid | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3839 | -- | 3839 | 3839 |
| Eptam | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 189 | -- | 189 | -- | -- | -- | 189 |
| Glyphosate | 14 | -- | 14 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14 |
| Linuron | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 29 | -- | 29 | -- | -- | -- | 29 |
| Metribuzin | 189 | -- | 189 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 5107 | 789 | 5896 | 6085 |
| Napropamide | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 182 | -- | 182 | 182 |
| Naptalam | -- | -- | -- | -- | -- | -- | 3965 | 959 | 4924 | -- | -- | -- | -- | -- | -- | 185 | -- | 185 | 5109 |
| Nitrofen | 1334 | -- | 1334 | 595 | -- | 595 | -- | -- | -- | 1408 | -- | 1408 | -- | -- | -- | -- | -- | -- | 3337 |
| Pebulate | 763 | -- | 763 | -- | -- | -- | 24 | -- | 24 | -- | -- | -- | -- | -- | -- | 2289 | 1091 | 3380 | 4167 |
| Propachlor | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | -- | 1 | 390 | -- | 390 | -- | -- | -- | 391 |
| Trifluralin | 1347 | 3 | 1350 | -- | -- | -- | 94 | -- | 94 | -- | -- | -- | 264 | -- | 264 | 7876 | 791 | 8667 | 10375 |
| Totals | 3746 | 3 | 3749 | 1980 | -- | 1980 | 9571 | 2085 | 11656 | 3337 | 1542 | 4879 | 14447 | 12362 | 26809 | 21303 | 2671 | 23974 | 73047 |

[a/] Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey.

[b/] See Appendix I for a listing of familiar trade names.

Table 5. Insecticide Use on Selected Commercial Vegetables in Ohio - 1979[a/]

| Insecticide (Common Name)[b/] | VEGETABLE CROP | | | | | | | | | | | | | | | | | | Total All Crops |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cabbage | | | Celery | | | Cucumbers | | | Onions | | | Sweet Corn | | | Tomatoes | | | |
| | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | |
| | (Pounds Active Ingredient) | | | | | | | | | | | | | | | | | | |
| Acephate | -- | -- | -- | 529 | -- | 529 | 42 | -- | 42 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 571 |
| Aldicarb | -- | -- | -- | -- | -- | -- | -- | 9 | 9 | -- | -- | -- | -- | -- | -- | -- | 68 | 68 | 77 |
| Azinphosmethyl | 5145 | -- | 5145 | -- | -- | -- | -- | 19 | 19 | 66 | -- | 66 | -- | -- | -- | 1624 | 670 | 2294 | 7524 |
| Bacillus thuringiensis | 266 | 75 | 341 | 10 | 97 | 107 | -- | -- | -- | -- | -- | -- | 10 | -- | 10 | 5 | 12 | 17 | 475 |
| BHC | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3527 | -- | 3527 | -- | -- | -- | 3527 |
| Carbaryl | 1580 | 1271 | 2851 | -- | -- | -- | 10279 | 1271 | 11510 | 3 | -- | 3 | 17069 | 9975 | 26706 | 48689 | 26287 | 74983 | 116424 |
| Diazinon | 124 | 323 | 447 | 165 | -- | 165 | -- | -- | -- | 564 | -- | 564 | 118 | -- | 118 | 2197 | 292 | 2489 | 3783 |
| Dimethoate | 19 | -- | 19 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 19 |
| Disulfoton | 423 | -- | 423 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 520 | -- | 520 | -- | -- | -- | 943 |
| Endosulfan | 647 | 322 | 969 | 62 | -- | 62 | 1587 | 308 | 1895 | -- | -- | -- | 193 | -- | 193 | 10757 | 6662 | 17419 | 20538 |
| Ethion | -- | -- | -- | -- | -- | -- | -- | -- | -- | 76 | -- | 76 | -- | -- | -- | -- | -- | -- | 76 |
| Ethylan | -- | -- | -- | -- | 65 | 65 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 65 |
| Fonofos | -- | -- | -- | -- | -- | -- | -- | -- | -- | 569 | -- | 569 | 39 | -- | 39 | -- | -- | -- | 608 |
| Malathion | 543 | -- | 543 | 1602 | -- | 1602 | 1329 | 1110 | 2439 | 673 | -- | 673 | 473 | 1801 | 2274 | 250 | 425 | 675 | 8206 |
| Methamidophos | 1920 | -- | 1920 | -- | -- | -- | -- | -- | -- | 46 | -- | 46 | -- | -- | -- | -- | -- | -- | 1966 |
| Methomyl | 1470 | -- | 5498 | -- | -- | -- | -- | 25 | 25 | -- | -- | -- | 4829 | 6742 | 11571 | 723 | 1588 | 2311 | 19405 |
| Methyl Parathion | -- | 4028 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1036 | -- | 1036 | -- | -- | -- | 1036 |
| Oxydemetonmethyl | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 546 | -- | 645 | -- | -- | -- | 546 |
| Parathion | 1815 | -- | 1815 | 94 | -- | 94 | -- | -- | -- | 2825 | -- | 2825 | 1748 | 1606 | 3354 | 74 | -- | 74 | 8162 |
| Permethrin | -- | -- | -- | 16 | -- | 16 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 16 |
| Phosdrin | 184 | -- | 184 | 188 | -- | 188 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 95 | 50 | 145 | 517 |
| Rotenone | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4 | -- | 4 | 4 |
| Terbufos | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 456 | -- | 456 | -- | -- | -- | 456 |
| Totals | 14136 | 6019 | 20155 | 2666 | 162 | 2828 | 13237 | 2742 | 15979 | 4822 | -- | 4822 | 30564 | 20124 | 50688 | 64418 | 36054 | 100472 | 194944 |

[a/] Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

[b/] See Appendix I for the listing of familiar trade names.

Table 6. Fungicide and Other Chemical Use on Selected Commercial Vegetables in Ohio - 1979[a/]

| FUNGICIDE (Common Name)[b/] | VEGETABLE CROPS | | | | | | | | | | | | | | | | | | Total All Crops |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cabbage | | | Celery | | | Cucumbers | | | Onions | | | Sweet Corn | | | Tomatoes | | | |
| | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | Single Application | Tank Mix | Total | |
| | (Pounds Active Ingredient) | | | | | | | | | | | | | | | | | | |
| Anilazine | -- | -- | -- | 3360 | -- | 3360 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3360 |
| Benomyl | 1 | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 103 | 29 | 132 | 133 |
| Captafol | -- | 662 | 662 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 37866 | 20559 | 58425 | 59087 |
| Captan | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7 | -- | 7 | 7 |
| Chlorothalonil | 609 | -- | 609 | 136 | -- | 136 | 2901 | 648 | 3549 | 769 | -- | 769 | 31 | -- | 31 | 60125 | 12567 | 72692 | 77786 |
| Copper Ammonia Complex | -- | 740 | 740 | -- | -- | -- | 1683 | 951 | 2634 | -- | -- | -- | -- | -- | -- | 4002 | 14638 | 18640 | 22014 |
| Copper Hydroxide | 283 | -- | 283 | 5188 | -- | 5188 | 1108[c/] | 250[c/] | 1358[c/] | 800 | -- | 800 | -- | -- | -- | 19518 | 8230 | 27748 | 35377 |
| Copper Sulfate | -- | 586 | 586 | -- | -- | -- | 7427[c/] | 1457[c/] | 8884[c/] | -- | -- | -- | -- | -- | -- | 18308 | 7283 | 25591 | 35061 |
| Mancozeb | 134 | 10 | 144 | 2820 | -- | 2820 | 4075 | 578 | 4653 | 1363 | -- | 1363 | -- | -- | -- | 52186 | 20673 | 72859 | 81839 |
| Maneb | 165 | 1206 | 1371 | -- | -- | -- | 1303 | 440 | 1743 | 173 | -- | 173 | -- | -- | -- | 26657 | 29292 | 55949 | 59736 |
| Metallic Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 908 | 908 | 908 |
| Metiram | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 167 | -- | 167 | 167 |
| Nabam | -- | -- | -- | -- | -- | -- | -- | 131 | 131 | -- | -- | -- | -- | -- | -- | 1457 | 152 | 1609 | 1740 |
| PCNB | 12 | -- | 12 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 12 |
| Sulfur | 5260 | -- | 5260 | -- | -- | -- | -- | 324 | 324 | -- | -- | -- | -- | -- | -- | -- | 4338 | 4338 | 9922 |
| Thiram | -- | -- | -- | -- | -- | -- | -- | -- | -- | 62016 | -- | 62016 | -- | -- | -- | -- | -- | -- | 62016 |
| Zineb | 1387 | -- | 1387 | 146 | -- | 146 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1533 |
| Total | 7851 | 3204 | 11055 | 11650 | -- | 11650 | 18497 | 4779 | 23276 | 65121 | -- | 65121 | 31 | -- | 31 | 220396 | 118669 | 339065 | 450198 |
| Other Chemicals | | | | | | | | | | | | | | | | | | | |
| Ethephon | 271 | -- | 271 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 18701 | 923 | 19624 | 19895 |
| Maleic Hydrazide | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1377 | -- | 1377 | -- | -- | -- | -- | -- | -- | 1377 |
| Total | 271 | -- | 271 | -- | -- | -- | -- | -- | -- | 1377 | -- | 1377 | -- | -- | -- | 18701 | 923 | 19624 | 21272 |

[a/] Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey.

[b/] See Appendix I for a listing of familiar trade names.

[c/] Fixed copper.

Table 7. Pesticide on Cabbage in Ohio - 1979[a/]



| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREAT-MENTS | NO. OF APPLICA-TIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) | | |
|---|---|---|---|---|---|---|
| | | | | PER APPLICA-TION | ANNUAL AVERAGE | TOTAL |
| A. HERBICIDES: | | | | | | |
| Atrazine | 12 | 12 | 1.0 | 1.6 | 1.6 | 19 |
| Chloramben | 4 | 4 | 1.0 | 0.9 | 0.9 | 4 |
| DCPA | 38 | 38 | 1.0 | 2.0 | 2.0 | 76 |
| Glyphosate | 15 | 15 | 1.0 | 0.9 | 0.9 | 14 |
| Metribuzin | 188 | 188 | 1.0 | 1.0 | 1.0 | 189 |
| Nitrofen | 453 | 472 | 1.0 | 2.8 | 2.9 | 1334 |
| Pebulate | 188 | 188 | 1.0 | 4.1 | 4.1 | 763 |
| Trifluralin | 2315 | 2315 | 1.0 | 0.6 | 0.6 | 1347 |
| Single Application | --- | 3232 | --- | 1.2 | --- | 3746 |
| B. INSECTICIDES: | | | | | | |
| Azinphosmethyl | 1213 | 5203 | 4.3 | 1.0 | 4.2 | 5145 |
| Bacillus thuringiensis | 2211 | 11090 | 5.0 | 0.0 | 0.1 | 266 |
| Carbaryl | 794 | 1620 | 2.0 | 1.0 | 2.0 | 1580 |
| Diazinon | 135 | 161 | 1.2 | 0.8 | 0.9 | 124 |
| Dimethoate | 16 | 16 | 1.0 | 1.1 | 1.1 | 19 |
| Disulfoton | 578 | 578 | 1.0 | 0.7 | 0.7 | 423 |
| Endosulfan | 478 | 1055 | 2.2 | 0.6 | 1.4 | 647 |
| Malathion | 171 | 566 | 3.3 | 1.0 | 3.2 | 543 |
| Methamidophos | 521 | 1519 | 2.9 | 1.3 | 3.7 | 1920 |
| Methomyl | 814 | 2899 | 3.6 | 0.5 | 1.8 | 1470 |
| Parathion | 1361 | 4559 | 3.3 | 0.4 | 1.3 | 1815 |
| Phosdrin | 179 | 368 | 2.1 | 0.5 | 1.0 | 184 |
| Single Application | --- | 29634 | --- | 0.5 | --- | 14136 |
| C. FUNGICIDES: | | | | | | |
| Benomyl | 2 | 3 | 1.5 | 0.3 | 0.5 | 1 |
| Chlorothanlonil | 231 | 818 | 3.5 | 0.7 | 2.6 | 609 |
| Copper Hydroxide | 46 | 228 | 5.0 | 1.2 | 6.2 | 283 |
| Mancozeb | 76 | 76 | 1.0 | 1.8 | 1.8 | 134 |
| Maneb | 26 | 103 | 4.0 | 1.6 | 6.4 | 165 |
| PCNB | 16 | 16 | 1.0 | 0.8 | 0.8 | 12 |
| Sulfur | 405 | 2023 | 5.0 | 2.6 | 13.0 | 5260 |
| Zineb | 578 | 4624 | 8.0 | 0.3 | 2.4 | 1387 |
| Single Application | --- | 7891 | --- | 1.0 | --- | 7851 |
| D. OTHER REASONS: | | | | | | |
| Ethephon | 188 | 188 | 1.0 | 1.4 | 1.4 | 271 |
| Single Application | --- | 188 | --- | 1.4 | --- | 271 |

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES: | | | | | | |
| Bacillus thuringiensis | 58 | 461 | 7.9 | 0.0 | 0.1 | 7 |
| + Carbaryl | | | | 0.8 | 6.0 | 346 |
| + Methomyl | | | | 0.7 | 5.8 | 332 |
| Bacillus thuringiensis | 199 | 254 | 1.3 | 0.0 | 0.0 | 2 |
| + Copper Ammonia Complexes | | | | 1.8 | 2.3 | 453 |
| + Methomyl | | | | 0.3 | 0.4 | 71 |
| Bacillus thuringiensis | 3 | 6 | 2.0 | 0.0 | 0.0 | 0 |
| + Copper Sulfate | | | | 0.4 | 0.7 | 2 |
| + Endosulfan | | | | 0.5 | 1.0 | 3 |
| Bacillus thuringiensis | 46 | 46 | 1.0 | 0.0 | 0.0 | 0 |
| + Copper Sulfate | | | | 3.8 | 3.8 | 175 |
| + Methomyl | | | | 0.3 | 0.3 | 13 |
| Bacillus thuringiensis | 3 | 3 | 1.0 | 0.0 | 0.0 | 0 |
| + Endosulfan | | | | 0.5 | 0.5 | 2 |
| Bacillus thuringiensis | 46 | 46 | 1.0 | 0.0 | 0.0 | 0 |
| + Endosulfan | | | | 0.4 | 0.4 | 17 |
| + Methomyl | | | | 0.2 | 0.2 | 10 |
| Bacillus thuringiensis | 644 | 2293 | 3.6 | 0.0 | 0.1 | 65 |
| + Methomyl | | | | 1.5 | 5.5 | 3548 |
| Carbaryl | 188 | 754 | 4.0 | 0.8 | 3.0 | 565 |
| + Copper Sulfate | | | | 0.4 | 1.4 | 271 |
| + Maneb | | | | 1.6 | 6.4 | 1206 |
| Carbaryl | 3 | 6 | 2.0 | 1.0 | 2.1 | 7 |
| + Copper Sulfate | | | | 0.4 | 0.7 | 2 |
| + Mancozeb | | | | 1.6 | 3.2 | 10 |
| Carbaryl | 188 | 377 | 2.0 | 0.8 | 1.5 | 283 |
| + Diazinon | | | | 0.8 | 1.5 | 283 |
| Carbaryl | 46 | 46 | 1.0 | 0.5 | 0.5 | 24 |
| + Endosulfan | | | | 0.4 | 0.4 | 17 |
| Carbaryl | 46 | 92 | 2.0 | 0.5 | 1.0 | 46 |
| + Methomyl | | | | 0.2 | 0.4 | 21 |
| Diazinon | 30 | 30 | 1.0 | 1.3 | 1.3 | 40 |
| + Trifluralin | | | | 0.1 | 0.1 | 3 |
| Copper Ammonia Complexes | 143 | 143 | 1.0 | 2.0 | 2.0 | 287 |
| + Methomyl | | | | 0.2 | 0.2 | 33 |
| Copper Sulfate | 188 | 377 | 2.0 | 0.4 | 0.7 | 136 |
| + Captafol | | | | 1.8 | 3.5 | 662 |
| + Endosulfan | | | | 0.8 | 1.5 | 283 |
| Tank Mix Applications | --- | 4934 | --- | 1.9 | --- | 9225 |
| TOTAL ALL APPLICATIONS | --- | 45879 | --- | 0.8 | --- | 35229 |

a. Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey.

Table 8. Pesticide Use on Celery in Ohio - 1979[a/]

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| A. HERBICIDES: | | | | | | |
| CDEC | 365 | 490 | 1.3 | 2.8 | 3.8 | 1385 |
| Nitrofen | 290 | 455 | 1.6 | 1.3 | 2.1 | 595 |
| Single Application | --- | 945 | --- | 2.1 | --- | 1980 |
| B. INSECTICIDES: | | | | | | |
| Acephate | 290 | 705 | 2.4 | 0.8 | 1.8 | 529 |
| Bacillus thuringiensis | 80 | 640 | 8.0 | 0.0 | 0.1 | 10 |
| Diazinon | 165 | 330 | 2.0 | 0.5 | 1.0 | 165 |
| Endosulfan | 165 | 165 | 1.0 | 0.4 | 0.4 | 62 |
| Malathion | 395 | 1435 | 3.6 | 1.1 | 4.1 | 1602 |
| Parathion | 190 | 215 | 1.1 | 0.4 | 0.5 | 94 |
| Permethrin | 70 | 70 | 1.0 | 0.2 | 0.2 | 16 |
| Phosdrin | 125 | 375 | 3.0 | 0.5 | 1.5 | 188 |
| Single Application | --- | 3935 | --- | 0.7 | --- | 2666 |
| C. FUNGICIDES: | | | | | | |
| Anilazine | 360 | 2860 | 7.9 | 1.2 | 0.3 | 3360 |
| Chlorothalonil | 25 | 150 | 6.0 | 0.9 | 5.5 | 136 |
| Copper Hydroxide | 360 | 2775 | 7.7 | 1.9 | 14.4 | 5188 |
| Mancozeb | 205 | 1175 | 5.7 | 2.4 | 13.8 | 2820 |
| Zineb | 25 | 150 | 6.0 | 1.0 | 5.9 | 146 |
| Single Application | --- | 7110 | --- | 1.6 | --- | 11650 |
| D. TANK MIXTURES: | | | | | | |
| Bacillus thuringiensis | 80 | 480 | 6.0 | 0.2 | 1.2 | 97 |
| + Ethylan | | | | 0.1 | 0.8 | 65 |
| Tank Mix Applications | --- | 480 | --- | 0.3 | --- | 162 |
| TOTAL ALL APPLICATIONS | --- | 12470 | --- | 1.3 | --- | 16458 |

a. Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey.

Table 9. Pesticide Use on Cucumbers in Ohio - 1979[a/]



| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| A. HERBICIDES: | | | | | | |
| Bensulide | 1371 | 1387 | 1.0 | 2.7 | 2.8 | 3777 |
| Chloramben | 1038 | 1086 | 1.0 | 1.6 | 1.6 | 1711 |
| Naptalam | 2056 | 2056 | 1.0 | 1.9 | 1.9 | 3965 |
| Pebulate | 157 | 157 | 1.0 | 0.1 | 0.1 | 24 |
| Trifluralin | 126 | 126 | 1.0 | 0.8 | 0.8 | 94 |
| Single Application | --- | 4812 | --- | 2.0 | --- | 9571 |
| B. INSECTICIDES: | | | | | | |
| Acephate | 38 | 38 | 1.0 | 1.1 | 1.1 | 42 |
| Carbaryl | 6037 | 10759 | 1.8 | 0.9 | 1.7 | 10095 |
| Endosulfan | 1235 | 2317 | 1.9 | 0.7 | 1.3 | 1587 |
| Malathion | 691 | 729 | 1.1 | 1.8 | 1.9 | 1329 |
| Single Application | --- | 13843 | --- | 0.9 | --- | 13053 |
| C. FUNGICIDES: | | | | | | |
| Chlorothalonil | 1281 | 2207 | 1.7 | 1.3 | 2.3 | 2901 |
| Copper Ammonia Complexes | 443 | 622 | 1.4 | 2.7 | 3.8 | 1683 |
| Copper Hydroxide | 300 | 869 | 2.9 | 1.3 | 3.7 | 1108 |
| Copper Sulfate [b/] | 2790 | 5780 | 2.1 | 1.3 | 2.7 | 7427 |
| Mancozeb | 416 | 1780 | 4.3 | 2.3 | 9.8 | 4075 |
| Maneb | 369 | 755 | 2.0 | 1.7 | 3.5 | 1303 |
| Single Application | --- | 12013 | --- | 1.5 | --- | 18497 |
| D. OTHER REASONS: | | | | | | |
| Carbaryl | 107 | 177 | 1.7 | 1.0 | 1.7 | 184 |
| Single Application | --- | 177 | --- | 1.0 | --- | 184 |
| E. TANK MIXTURES: | | | | | | |
| Naptalam | 619 | 619 | 1.0 | 1.5 | 1.5 | 959 |
| + Bensulide | | | | 1.8 | 1.8 | 1126 |
| Azinphosmethyl | 38 | 38 | 1.0 | 0.5 | 0.5 | 19 |
| + Chlorothalonil | | | | 0.6 | 0.6 | 23 |
| + Copper Ammonia Complexes | | | | 2.0 | 2.0 | 75 |
| Carbaryl | 53 | 69 | 1.3 | 1.2 | 1.5 | 82 |
| + Chlorothalonil | | | | 2.6 | 3.4 | 180 |
| Carbaryl | 51 | 102 | 2.0 | 0.8 | 1.6 | 81 |
| + Copper Ammonia Complexes | | | | 1.0 | 2.0 | 102 |
| Carbaryl | 38 | 38 | 1.0 | 1.0 | 1.0 | 38 |
| + Copper Ammonia Complexes | | | | 2.0 | 2.0 | 75 |
| + Mancozeb | | | | 1.6 | 1.6 | 60 |

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| Carbaryl | 446 | 738 | 1.7 | 1.1 | 1.8 | 787 |
| + Copper Sulfate[b/] | | | | 1.4 | 2.3 | 1042 |
| Carbaryl | 63 | 314 | 5.0 | 0.8 | 3.8 | 236 |
| + Copper Sulfate[b/] | | | | 0.2 | 0.8 | 50 |
| + Malathion | | | | 1.8 | 9.6 | 604 |
| Carbaryl | 16 | 31 | 1.9 | 1.0 | 2.0 | 31 |
| + Mancozeb | | | | 1.6 | 3.2 | 50 |
| Methomyl | 19 | 57 | 3.0 | 0.4 | 1.4 | 25 |
| + Maneb | | | | 1.2 | 3.6 | 68 |
| Chlorothalonil | 142 | 186 | 1.3 | 0.9 | 1.1 | 163 |
| + Copper Ammonia Complexes | | | | 3.4 | 4.4 | 624 |
| Chlorothalonil | 54 | 54 | 1.0 | 1.0 | 1.0 | 56 |
| + Copper Sulfate[b/] | | | | 0.4 | 0.4 | 19 |
| Chlorothalonil | 91 | 166 | 1.8 | 1.4 | 2.5 | 226 |
| + Endosulfan | | | | 0.7 | 1.3 | 121 |
| Copper Ammonia Complexes | 38 | 38 | 1.0 | 2.0 | 2.0 | 75 |
| + Endosulfan | | | | 0.8 | 0.8 | 28 |
| + Mancozeb | | | | 2.4 | 2.4 | 91 |
| Copper Hydroxide | 94 | 283 | 3.0 | 0.4 | 1.1 | 107 |
| + Nabam | | | | 0.5 | 1.4 | 131 |
| Copper Hydroxide | 72 | 143 | 2.0 | 1.0 | 2.0 | 143 |
| + Sulfur | | | | 0.6 | 1.1 | 82 |
| Copper Sulfate[b/] | 194 | 232 | 1.2 | 0.6 | 0.7 | 144 |
| + Endosulfan | | | | 0.7 | 0.8 | 159 |
| Copper Sulfate[b/] | 270 | 270 | 1.0 | 0.4 | 0.4 | 97 |
| + Malathion | | | | 1.0 | 1.0 | 270 |
| Copper Sulfate[b/] | 236 | 236 | 1.0 | 0.4 | 0.4 | 85 |
| + Malathion | | | | 1.0 | 1.0 | 236 |
| + Mancozeb | | | | 1.6 | 1.6 | 377 |
| Copper Sulfate[b/] | 38 | 38 | 1.0 | 0.4 | 0.4 | 14 |
| + Aldicarb | | | | 0.2 | 0.2 | 9 |
| Maneb | 310 | 310 | 1.0 | 1.2 | 1.2 | 372 |
| + Sulfur | | | | 0.8 | 0.8 | 242 |
| Carbaryl | 16 | 16 | 1.0 | 1.0 | 1.0 | 16 |
| + Copper Sulfate[b/] | | | | 0.4 | 0.4 | 6 |
| Tank Mix Applications | --- | 3978 | --- | 2.4 | --- | 9606 |
| TOTAL ALL APPLICATIONS | --- | 34823 | --- | 1.5 | --- | 50911 |

a/ Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

b/ Fixed Copper.

Table 10. Pesticide Use on Onions in Ohio - 1979[a/]

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| A. HERBICIDES: | | | | | | |
| CDAA | 484 | 484 | 1.0 | 1.3 | 1.3 | 641 |
| CDEC | 25 | 25 | 1.0 | 4.0 | 4.0 | 100 |
| Chlorpropham | 444 | 480 | 1.1 | 2.5 | 2.7 | 1185 |
| DCPA | 2 | 2 | 1.0 | 1.5 | 1.5 | 2 |
| Nitrofen | 630 | 1225 | 1.9 | 1.1 | 2.2 | 1408 |
| Propachlor | 1 | 1 | 1.0 | 1.3 | 1.3 | 1 |
| Single Application | --- | 2217 | --- | 1.5 | --- | 3337 |
| B. INSECTICIDES: | | | | | | |
| Azinphosmethyl | 66 | 131 | 2.0 | 0.5 | 1.0 | 66 |
| Carbaryl | 2 | 6 | 3.0 | 0.5 | 2.0 | 3 |
| Diazinon | 206 | 799 | 3.9 | 0.7 | 2.7 | 564 |
| Ethion | 76 | 76 | 1.0 | 1.0 | 1.0 | 76 |
| Fonofos | 569 | 569 | 1.0 | 1.0 | 1.0 | 569 |
| Malathion | 173 | 589 | 3.4 | 1.1 | 3.9 | 673 |
| Methamidophos | 36 | 108 | 3.0 | 0.4 | 1.3 | 46 |
| Parathion | 540 | 3214 | 6.0 | 0.9 | 5.2 | 2825 |
| Single Application | --- | 5492 | --- | 0.9 | --- | 4822 |
| C. FUNGICIDES: | | | | | | |
| Chlorothalonil | 466 | 523 | 1.1 | 1.5 | 1.7 | 769 |
| Copper Hydroxide | 173 | 553 | 3.2 | 1.4 | 4.6 | 800 |
| Mancozeb | 71 | 568 | 8.0 | 2.4 | 19.2 | 1363 |
| Maneb | 36 | 108 | 3.0 | 1.6 | 4.8 | 173 |
| Thiram | 408 | 1632 | 4.0 | 38.0 | 152.0 | 62016 |
| Single Application | --- | 3384 | --- | 19.2 | --- | 65121 |
| D. OTHER REASONS: | | | | | | |
| Maleic Hydrazide | 408 | 408 | 1.0 | 3.4 | 3.4 | 1377 |
| Single Application | --- | 408 | --- | 3.4 | --- | 1377 |
| E. TANK MIXTURES: | | | | | | |
| CDAA | 186 | 257 | 1.4 | 3.0 | 4.1 | 771 |
| + Chlorpropham | | | | 3.0 | 4.1 | 771 |
| Tank Mix Applications | --- | 257 | --- | 6.0 | --- | 1542 |
| TOTAL ALL APPLICATIONS | --- | 11758 | --- | 6.5 | --- | 76199 |

a. Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

Table 11. Pesticide Use on Sweet Corn in Ohio - 1979[a/]

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| A. HERBICIDES: | | | | | | |
| Alachlor | 2724 | 2724 | 1.0 | 1.9 | 1.9 | 5310 |
| Atrazine | 989 | 1281 | 1.3 | 1.2 | 1.5 | 1504 |
| Butylate | 38 | 38 | 1.0 | 5.1 | 5.1 | 192 |
| Cyanazine | 3332 | 4296 | 1.3 | 1.5 | 1.9 | 6388 |
| 2,4-D Low Volatile Esters | 253 | 253 | 1.0 | 0.7 | 0.7 | 181 |
| Eptam | 32 | 32 | 1.0 | 5.9 | 5.9 | 189 |
| Linuron | 77 | 77 | 1.0 | 0.4 | 0.4 | 29 |
| Propachlor | 325 | 325 | 1.0 | 1.2 | 1.2 | 390 |
| Trifluralin | 642 | 642 | 1.0 | 0.4 | 0.4 | 264 |
| Single Application | --- | 9668 | --- | 1.5 | --- | 14447 |
| B. INSECTICIDES: | | | | | | |
| Bacillus thuringiensis | 150 | 601 | 4.0 | 0.0 | 0.1 | 10 |
| BHC | 2090 | 6270 | 3.0 | 0.6 | 1.7 | 3527 |
| Carbaryl | 5644 | 14213 | 2.5 | 1.2 | 3.0 | 16731 |
| Diazinon | 119 | 276 | 2.3 | 0.4 | 1.0 | 118 |
| Disulfoton | 433 | 433 | 1.0 | 1.2 | 1.2 | 520 |
| Endosulfan | 96 | 193 | 2.0 | 1.0 | 2.0 | 193 |
| Fonofos | 39 | 39 | 1.0 | 1.0 | 1.0 | 39 |
| Malathion | 221 | 526 | 2.4 | 0.9 | 2.1 | 473 |
| Methomyl | 2107 | 10986 | 5.2 | 0.4 | 2.3 | 4829 |
| Methyl Parathion | 1342 | 1814 | 1.4 | 0.6 | 0.8 | 1036 |
| Oxydemetonmethyl | 913 | 1093 | 1.2 | 0.5 | 0.6 | 546 |
| Parathion | 1435 | 4436 | 3.1 | 0.4 | 1.2 | 1748 |
| Terbufos | 434 | 434 | 1.0 | 1.1 | 1.1 | 456 |
| Single Application | --- | 41314 | --- | 0.7 | --- | 30226 |
| C. FUNGICIDES: | | | | | | |
| Chlorothalonil | 10 | 68 | 6.8 | 0.5 | 3.2 | 31 |
| Single Application | -- | 68 | --- | 0.5 | --- | 31 |
| D. OTHER REASONS: | | | | | | |
| Carbaryl | 162 | 325 | 2.0 | 1.0 | 2.1 | 338 |
| Single Application | --- | 325 | --- | 1.0 | --- | 338 |
| E. TANK MIXTURES: | | | | | | |
| Atrazine | 2449 | 2449 | 1.0 | 1.1 | 1.1 | 2700 |
| + Alachlor | | | | 1.7 | 1.7 | 4100 |
| Atrazine | 451 | 451 | 1.0 | 0.8 | 0.8 | 376 |
| + Butylate | | | | 2.7 | 2.7 | 1232 |
| Chloramben | 27 | 27 | 1.0 | 0.9 | 0.9 | 25 |
| + Alachlor | | | | 0.4 | 0.4 | 11 |
| Cyanazine | 876 | 876 | 1.0 | 1.7 | 1.7 | 1494 |
| + Alachlor | | | | 1.6 | 1.6 | 1395 |

Table 11. Page 2

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| Cyanazine | 273 | 273 | 1.0 | 1.3 | 1.3 | 367 |
| + Butylate | | | | 2.4 | 2.4 | 662 |
| Carbaryl | 1110 | 3329 | 3.0 | 1.2 | 3.6 | 3995 |
| + Methomyl | | | | 2.0 | 6.1 | 6742 |
| Carbaryl | 208 | 1873 | 9.0 | 1.0 | 9.4 | 1948 |
| + Malathion | | | | 1.0 | 8.7 | 1801 |
| Carbaryl | 1691 | 5709 | 3.4 | 0.7 | 2.4 | 4032 |
| + Parathion | | | | 0.3 | 0.9 | 1606 |
| Tank Mix Applications | --- | 14987 | --- | 2.2 | --- | 32486 |
| TOTAL ALL APPLICATIONS | --- | 66362 | --- | 1.2 | --- | 77528 |

a. Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

Table 12. Pesticide Use on Tomatoes in Ohio - 1979[a/]

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| A. HERBICIDES: | | | | | | |
| Chloramben | 593 | 845 | 1.4 | 2.0 | 2.9 | 1698 |
| DCPA | 36 | 36 | 1.0 | 3.5 | 3.5 | 127 |
| Diphenamid | 1563 | 1563 | 1.0 | 2.5 | 2.5 | 3839 |
| Metribuzin | 9548 | 12200 | 1.3 | 0.4 | 0.5 | 5107 |
| Napropamide | 91 | 91 | 1.0 | 2.0 | 2.0 | 182 |
| Naptalam | 173 | 173 | 1.0 | 1.1 | 1.0 | 185 |
| Pebulate | 2212 | 2212 | 1.0 | 1.0 | 1.0 | 2289 |
| Trifluralin | 10383 | 10519 | 1.0 | 0.7 | 0.8 | 7876 |
| Single Application | --- | 27639 | --- | 0.8 | --- | 21303 |
| B. INSECTICIDES: | | | | | | |
| Azinphosmethyl | 1531 | 4054 | 2.6 | 0.4 | 1.1 | 1624 |
| Bacillus thuringiensis | 276 | 414 | 1.5 | 0.0 | 0.0 | 5 |
| Carbaryl | 11218 | 49627 | 4.4 | 1.0 | 4.3 | 48608 |
| Diazinon | 2334 | 3151 | 1.4 | 0.7 | 0.9 | 2197 |
| Endosulfan | 7323 | 16141 | 2.2 | 0.7 | 1.5 | 10757 |
| Malathion | 131 | 286 | 2.2 | 0.9 | 1.9 | 250 |
| Methomyl | 840 | 1164 | 1.4 | 0.6 | 0.9 | 723 |
| Parathion | 287 | 292 | 1.0 | 0.3 | 0.3 | 74 |
| Phosdrin | 95 | 190 | 2.0 | 0.5 | 1.0 | 95 |
| Rotenone | 3 | 10 | 3.3 | 0.4 | 1.2 | 4 |
| Single Application | --- | 75329 | - - | 0.9 | --- | 64436 |
| C. FUNGICIDES: | | | | | | |
| Benomyl | 371 | 451 | 1.2 | 0.2 | 0.3 | 103 |
| Captan | 1 | 4 | 4.0 | 1.8 | 7.2 | 7 |
| Chlorothalonil | 10808 | 36769 | 3.4 | 1.6 | 5.6 | 60125 |
| Copper Ammonia Complexes | 627 | 2124 | 3.4 | 1.9 | 6.4 | 4002 |
| Copper Hydroxide | 3627 | 12793 | 3.5 | 1.5 | 5.4 | 19518 |
| Copper Sulfate | 6411 | 13837 | 2.2 | 1.3 | 2.9 | 18308 |
| Captafol | 8162 | 25265 | 3.1 | 1.5 | 4.6 | 37866 |
| Mancozeb | 6409 | 24179 | 3.8 | 2.2 | 8.1 | 51286 |
| Maneb | 3701 | 14719 | 4.0 | 1.8 | 7.2 | 26657 |
| Metiram | 35 | 69 | 2.0 | 2.4 | 4.8 | 167 |
| Nabam | 734 | 3097 | 4.2 | 0.5 | 2.0 | 1457 |
| Single Application | --- | 133307 | --- | 1.7 | --- | 220396 |
| D. OTHER REASONS: | | | | | | |
| Carbaryl | 79 | 79 | 1.0 | 1.0 | 1.0 | 82 |
| Ethephon | 11528 | 12825 | 1.1 | 1.5 | 1.6 | 18701 |
| Single Application | --- | 12904 | --- | 1.5 | --- | 18783 |

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES: | | | | | | |
| Metribuzin + Pebulate | 440 | 440 | 1.0 | 0.7 | 0.7 | 293 |
| | | | | 0.4 | 0.4 | 198 |
| Metribuzin + Trifluralin | 1327 | 1415 | 1.1 | 0.4 | 0.4 | 496 |
| | | | | 0.6 | 0.6 | 791 |
| Azinphosmethyl + Chlorothalonil | 446 | 1785 | 4.0 | 0.4 | 1.5 | 670 |
| | | | | 1.1 | 4.5 | 2029 |
| Bacillus thuringiensis + Chlorothalonil | 404 | 445 | 1.1 | 0.0 | 0.0 | 7 |
| | | | | 1.4 | 1.5 | 606 |
| Bacillus thuringiensis + Captafol | 226 | 432 | 1.9 | 0.0 | 0.0 | 4 |
| | | | | 1.8 | 3.4 | 758 |
| Bacillus thuringiensis + Mancozeb | 46 | 46 | 1.0 | 0.0 | 0.0 | 1 |
| | | | | 0.4 | 0.4 | 19 |
| Carbaryl + Chlorothalonil | 671 | 1462 | 2.2 | 1.7 | 3.6 | 2439 |
| | | | | 1.2 | 2.7 | 1794 |
| Carbaryl + Chlorothalonil + Copper Hydroxide | 546 | 942 | 1.7 | 1.0 | 1.8 | 980 |
| | | | | 1.3 | 2.2 | 1225 |
| | | | | 1.6 | 2.8 | 1509 |
| Carbaryl + Chlorothalonil + Endosulfan | 3 | 13 | 4.3 | 0.5 | 2.0 | 7 |
| | | | | 1.2 | 4.8 | 16 |
| | | | | 0.3 | 1.0 | 3 |
| Carbaryl + Chlorothalonil + Ethephon | 413 | 413 | 1.0 | 2.0 | 2.0 | 827 |
| | | | | 1.4 | 1.4 | 564 |
| | | | | 1.9 | 1.9 | 792 |
| Carbaryl + Copper Ammonia Complexes | 76 | 228 | 3.0 | 1.0 | 3.1 | 237 |
| | | | | 2.0 | 6.0 | 455 |
| Carbaryl + Copper Ammonia Complexes + Maneb | 291 | 449 | 1.5 | 0.8 | 1.3 | 365 |
| | | | | 1.5 | 2.3 | 680 |
| | | | | 1.4 | 2.1 | 610 |
| Carbaryl + Copper Ammonia Complexes + Mancozeb | 811 | 855 | 1.1 | 1.0 | 1.1 | 877 |
| | | | | 2.0 | 2.1 | 1729 |
| | | | | 1.7 | 1.8 | 1425 |
| Carbaryl + Copper Hydroxide | 672 | 717 | 1.1 | 1.3 | 1.3 | 899 |
| | | | | 1.0 | 1.1 | 738 |
| Carbaryl + Copper Hydroxide + Maneb | 274 | 526 | 1.9 | 1.4 | 2.8 | 758 |
| | | | | 1.2 | 2.4 | 654 |
| | | | | 1.6 | 3.1 | 841 |
| Carbaryl + Copper Hydroxide + Maneb + Sulfur | 178 | 355 | 2.0 | 1.2 | 2.4 | 427 |
| | | | | 1.0 | 2.0 | 355 |
| | | | | 2.4 | 4.8 | 853 |
| | | | | 0.6 | 1.1 | 203 |

Table 12. Page 3

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES (continued) | | | | | | |
| Carbaryl | 89 | 266 | 3.0 | 1.2 | 3.7 | 326 |
| + Copper Hydroxide | | | | 1.3 | 3.8 | 340 |
| + Sulfur | | | | 0.7 | 2.2 | 194 |
| Carbaryl | 31 | 63 | 2.0 | 1.0 | 2.0 | 63 |
| + Copper Hydroxide | | | | 0.9 | 1.7 | 54 |
| + Mancozeb | | | | 1.6 | 3.2 | 101 |
| Carbaryl | 530 | 889 | 1.7 | 1.1 | 1.8 | 964 |
| + Copper Sulfate | | | | 0.7 | 1.1 | 588 |
| Carbaryl | 1972 | 5143 | 2.6 | 1.0 | 2.7 | 5349 |
| + Copper Sulfate | | | | 0.6 | 1.5 | 3014 |
| + Maneb | | | | 2.2 | 5.6 | 11069 |
| Carbaryl | 273 | 273 | 1.0 | 1.0 | 1.0 | 273 |
| + Copper Sulfate | | | | 0.4 | 0.4 | 97 |
| + Mancozeb | | | | 2.2 | 2.2 | 612 |
| Carbaryl | 1382 | 3347 | 2.4 | 1.0 | 2.5 | 3481 |
| + Captafol | | | | 1.3 | 3.1 | 4317 |
| Carbaryl | 413 | 413 | 1.0 | 0.1 | 0.1 | 50 |
| + Captafol | | | | 3.5 | 3.5 | 1451 |
| + Maneb | | | | 2.4 | 2.4 | 992 |
| Carbaryl | 1308 | 3262 | 2.5 | 1.1 | 2.7 | 3503 |
| + Maneb | | | | 2.3 | 5.8 | 7593 |
| Carbaryl | 620 | 620 | 1.0 | 0.8 | 0.8 | 496 |
| + Maneb | | | | 1.6 | 1.6 | 992 |
| + Metallic Copper | | | | 0.2 | 0.2 | 99 |
| + Sulfur | | | | 0.2 | 0.2 | 99 |
| Carbaryl | 1 | 1 | 1.0 | 0.3 | 0.3 | 0 |
| + Metallic Copper | | | | 0.5 | 0.5 | 1 |
| + Sulfur | | | | 3.7 | 3.7 | 4 |
| + Zinc Sulfate, Zinc | | | | 0.3 | 0.3 | 0 |
| Carbaryl | 607 | 2606 | 4.3 | 1.0 | 4.4 | 2673 |
| + Mancozeb | | | | 2.1 | 9.1 | 5506 |
| Diazinon | 91 | 91 | 1.0 | 0.5 | 0.5 | 46 |
| + Captafol | | | | 1.8 | 1.8 | 160 |
| Diazinon | 1 | 5 | 5.0 | 0.4 | 1.9 | 2 |
| + Methomyl | | | | 0.2 | 1.1 | 1 |
| Endosulfan | 149 | 149 | 1.0 | 1.0 | 1.0 | 149 |
| + Maneb | | | | 2.4 | 2.4 | 357 |
| Endosulfan | 374 | 406 | 1.1 | 0.6 | 0.7 | 253 |
| + Mancozeb | | | | 1.9 | 2.0 | 758 |
| Methomyl | 75 | 226 | 3.0 | 0.4 | 1.4 | 102 |
| + Maneb | | | | 0.4 | 1.2 | 91 |

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES (continued) | | | | | | |
| Methomyl | 440 | 440 | 1.0 | 0.4 | 0.4 | 198 |
| + Phosdrin | | | | 0.1 | 0.1 | 50 |
| Benomyl | 115 | 115 | 1.0 | 0.3 | 0.3 | 29 |
| + Chlorothalonil | | | | 1.4 | 1.4 | 156 |
| Chlorothalonil | 207 | 207 | 1.0 | 1.6 | 1.6 | 329 |
| + Copper Ammonia Complexes | | | | 2.0 | 2.0 | 413 |
| Chlorothalonil | 772 | 1150 | 1.5 | 0.7 | 1.1 | 822 |
| + Copper Ammonia Complexes | | | | 1.3 | 2.0 | 1548 |
| + Endosulfan | | | | 0.7 | 1.1 | 857 |
| Chlorothalonil | 113 | 113 | 1.0 | 0.7 | 0.7 | 77 |
| + Copper Ammonia Compleces | | | | 2.0 | 2.0 | 226 |
| + Aldicarb | | | | 0.2 | 0.2 | 25 |
| Chlorothalonil | 75 | 75 | 1.0 | 1.4 | 1.4 | 103 |
| + Copper Ammonia Complexes | | | | 2.0 | 2.0 | 151 |
| + Mancozeb | | | | 2.4 | 2.4 | 181 |
| Chlorothalonil | 31 | 63 | 2.0 | 1.4 | 2.7 | 86 |
| + Copper Hydroxide | | | | 0.9 | 1.7 | 54 |
| + Methomyl | | | | 0.4 | 0.9 | 28 |
| Chlorothalonil | 178 | 178 | 1.0 | 3.0 | 3.0 | 533 |
| + Diazinon | | | | 0.8 | 0.8 | 133 |
| Chlorothalonil | 73 | 73 | 1.0 | 1.4 | 1.4 | 100 |
| + Diazinon | | | | 0.8 | 0.8 | 55 |
| + Captafol | | | | 1.8 | 1.8 | 129 |
| Chlorothalonil | 87 | 174 | 2.0 | 1.3 | 2.6 | 221 |
| + Diazinon | | | | 0.3 | 0.6 | 56 |
| + Endosulfan | | | | 0.4 | 0.8 | 65 |
| Chlorothalonil | 220 | 2199 | 10.0 | 0.7 | 6.8 | 1499 |
| + Captafol | | | | 1.8 | 17.6 | 3859 |
| + Endosulfan | | | | 0.8 | 7.5 | 1649 |
| + Mancozeb | | | | 2.4 | 24.0 | 5277 |
| Chlorothalonil | 40 | 43 | 1.1 | 0.7 | 0.8 | 30 |
| + Endosulfan | | | | 0.7 | 0.7 | 28 |
| Chlorothalonil | 711 | 1398 | 2.0 | 0.9 | 1.8 | 1262 |
| + Methomyl | | | | 0.7 | 1.5 | 1045 |
| Chlorothalonil | 239 | 337 | 1.4 | 1.6 | 2.2 | 524 |
| + Malathion | | | | 1.3 | 1.8 | 425 |
| Chlorothalonil | 46 | 46 | 1.0 | 0.6 | 0.6 | 26 |
| + Maneb | | | | 1.2 | 1.2 | 56 |
| Chlorothalonil | 32 | 195 | 6.1 | 1.5 | 9.0 | 293 |
| + Mancozeb | | | | 1.2 | 7.2 | 234 |

Table 12. Page 5

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES (continued) | | | | | | |
| Copper Ammonia Complexes | 214 | 363 | 1.7 | 2.0 | 3.4 | 720 |
| + Captafol | | | | 1.8 | 3.0 | 648 |
| Copper Ammonia Complexes | 1575 | 3160 | 2.0 | 1.8 | 3.7 | 5837 |
| + Captafol | | | | 1.6 | 3.3 | 5138 |
| + Endosulfan | | | | 0.7 | 1.5 | 2317 |
| Copper Ammonia Complexes | 72 | 144 | 2.0 | 2.0 | 4.0 | 289 |
| + Captafol | | | | 1.8 | 3.5 | 254 |
| + Aldicarb | | | | 0.2 | 0.4 | 33 |
| Copper Ammonia Complexes | 276 | 474 | 1.7 | 2.2 | 3.7 | 1024 |
| + Endosulfan | | | | 0.6 | 1.0 | 286 |
| + Mancozeb | | | | 2.0 | 3.4 | 943 |
| Copper Ammonia Complexes | 500 | 500 | 1.0 | 2.0 | 2.0 | 1000 |
| + Maneb | | | | 1.6 | 1.6 | 800 |
| Copper Ammonia Complexes | 41 | 41 | 1.0 | 2.5 | 2.5 | 101 |
| + Aldicarb | | | | 0.3 | 0.3 | 10 |
| + Mancozeb | | | | 1.8 | 1.8 | 75 |
| Copper Ammonia Complexes | 119 | 119 | 1.0 | 2.6 | 2.6 | 314 |
| + Mancozeb | | | | 1.6 | 1.6 | 191 |
| Copper Hydroxide | 79 | 628 | 7.9 | 0.4 | 3.4 | 267 |
| + Nabam | | | | 0.2 | 1.9 | 152 |
| Copper Hydroxide | 1306 | 3319 | 2.5 | 1.1 | 2.7 | 3573 |
| + Sulfur | | | | 0.6 | 1.6 | 2037 |
| Copper Sulfate | 113 | 113 | 1.0 | 1.1 | 1.1 | 120 |
| + Captafol | | | | 1.8 | 1.8 | 199 |
| Copper Sulfate | 113 | 113 | 1.0 | 1.1 | 1.1 | 120 |
| + Captafol | | | | 1.8 | 1.8 | 199 |
| + Endosulfan | | | | 1.0 | 1.0 | 113 |
| Copper Sulfate | 136 | 136 | 1.0 | 0.4 | 0.4 | 49 |
| + Endosulfan | | | | 0.8 | 0.8 | 102 |
| + Maneb | | | | 1.2 | 1.2 | 170 |
| Copper Sulfate | 91 | 91 | 1.0 | 0.4 | 0.4 | 33 |
| + Endosulfan | | | | 1.1 | 1.1 | 102 |
| + Mancozeb | | | | 1.6 | 1.6 | 146 |
| Copper Sulfate | 113 | 113 | 1.0 | 1.1 | 1.1 | 120 |
| + Methomyl | | | | 0.9 | 0.9 | 102 |
| + Mancozeb | | | | 1.6 | 1.6 | 181 |
| Copper Sulfate | 1134 | 2134 | 1.9 | 1.4 | 2.7 | 3012 |
| + Mancozeb | | | | 1.6 | 3.0 | 3415 |
| Captafol | 740 | 740 | 1.0 | 1.7 | 1.7 | 1233 |
| + Endosulfan | | | | 0.9 | 1.9 | 687 |

| ACTIVE INGREDIENTS | ACRES TREATED | ACRE TREATMENTS | NO. OF APPLICATIONS | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) PER APPLICATION | POUNDS ACTIVE INGREDIENT APPLIED (PER ACRE) ANNUAL AVERAGE | POUNDS ACTIVE INGREDIENT APPLIED TOTAL |
|---|---|---|---|---|---|---|
| E. TANK MIXTURES (continued) | | | | | | |
| Captafol | 35 | 65 | 1.9 | 1.9 | 3.5 | 122 |
| + Endosulfan | | | | 0.8 | 1.5 | 51 |
| + Maneb | | | | 1.8 | 3.3 | 116 |
| Captafol | 91 | 91 | 1.0 | 2.6 | 2.6 | 239 |
| + Ethephon | | | | 1.4 | 1.4 | 131 |
| Captafol | 248 | 248 | 1.0 | 2.6 | 2.6 | 653 |
| + Methomyl | | | | 0.4 | 0.4 | 112 |
| Captafol | 496 | 496 | 1.0 | 2.0 | 2.0 | 1001 |
| + Pebulate | | | | 1.8 | 1.8 | 893 |
| Maneb | 620 | 1860 | 3.0 | 1.7 | 5.2 | 3224 |
| + Metallic Copper | | | | 0.1 | 0.4 | 248 |
| + Sulfur | | | | 0.1 | 0.4 | 248 |
| Maneb | 318 | 1273 | 4.0 | 1.2 | 4.8 | 1528 |
| + Sulfur | | | | 0.8 | 3.1 | 993 |
| Metallic Copper | 1024 | 1897 | 1.9 | 0.3 | 0.5 | 560 |
| + Sulfur | | | | 0.3 | 0.5 | 560 |
| Carbaryl | 199 | 199 | 1.0 | 1.4 | 1.4 | 277 |
| + Chlorothalonil | | | | 1.4 | 1.4 | 272 |
| Carbaryl | 75 | 75 | 1.0 | 0.3 | 0.3 | 20 |
| + Copper Ammonia Complexes | | | | 2.0 | 2.0 | 151 |
| + Mancozeb | | | | 1.6 | 1.6 | 121 |
| Carbaryl | 207 | 413 | 2.0 | 1.0 | 2.1 | 430 |
| + Copper Hydroxide | | | | 1.7 | 3.3 | 686 |
| + Mancozeb | | | | 1.6 | 3.2 | 661 |
| Carbaryl | 207 | 413 | 2.0 | 1.0 | 2.1 | 430 |
| + Copper Sulfate | | | | 0.3 | 0.6 | 130 |
| + Mancozeb | | | | 2.0 | 4.0 | 827 |
| Carbaryl | 113 | 113 | 1.0 | 1.2 | 1.2 | 136 |
| + Captafol | | | | 1.8 | 1.8 | 199 |
| Tank Mix Applications | --- | 54420 | --- | 2.9 | --- | 158317 |
| TOTAL ALL APPLICATIONS | --- | 303599 | --- | 1.6 | --- | 483135 |

a. Data from USDA-ERS 1979 Vegetable Pesticide Usage Survey

# APPENDIX 1: Glossary of Pesticides by Common and Some Trade Names

| Common Name | Trade Name[1/] |
|---|---|
| **A. Herbicides:** | |
| Alachlor | Lasso |
| Atrazine | AAtrex, Atrazine |
| Bensulfide | Betasan |
| Butylate | Sutan + |
| CDAA | Randox |
| CDEC | Vegedex |
| Chloramben | Amiben |
| Chlorpropham | Chloro-IPC |
| Cyanazine | Bladex |
| 2,4-D | Many names |
| DCPA | Dacthal |
| Diphenamid | Dymid, Enide |
| Eptam | EPTC |
| Glyphosate | Roundup |
| Linuron | Lorox |
| Metribuzin | Sencor, Lexone |
| Napropramide | Devrinol |
| Naptalam | Alanap |
| Nitrofen | TOK |
| Pebulate | Tillam |
| Propachlor | Bexton, Ramrod |
| Trifluralin | Treflan |
| **B. Insecticides:** | |
| Acephate | Orthene |
| Aldicarb | Temik |
| Azinphosmethyl | Guthion |
| *Bacillus thuringiensis* | Dipel, Thuricide, B. T. |
| BHC | Several |
| Carbaryl | Sevin |
| Diazinon | Diazinon |
| Dimethoate | Cygon, Defend |
| Disulfoton | Di-Syston |
| Endosulfan | Thiodan, others |
| Ethion | Ethion, NIA 1240, others |
| Ethylan | Perthane |
| Fonofos | Dyfonate |
| Malathion | Cythion, Malathion, several others |
| Methamidophos | Monitor |
| Methomyl | Lannate, Nudrin |
| Methyl Parathion | Penncap-M, Methyl Parathion, several others |
| Oxydemetonmethyl | Metasystox-R |
| Parathion | Niran, Thiophos, Phoskil, Parathion, several others |

Appendix 1 (continued)

| Common Name | Trade Name[1/] |
|---|---|
| **B. Insecticides (continued):** | |
| Permethrin | Ambush, Pounce |
| Phosdrin | Mevinphos |
| Rotenone | Rotenone |
| Terbufos | Counter |
| **C. Fungicides:** | |
| Anilazine | Dyrene |
| Benomyl | Benlate |
| Captafol | Difolatan |
| Captan | Captan, Orthocide, Merpan |
| Chlorothalonil | Bravo |
| Copper Ammonia Complexes | COPPER-COUNT-N |
| Copper Hydroxide | Kocide, Comac |
| Copper Sulfate & Fixed Copper | Several |
| Mancozeb | Dithane M-45, Manzate-200 |
| Maneb | Dithane M-22, Manzate, Maneb, several others |
| Metallic Copper | --- |
| Metiram | Polyram |
| Nabam | Dithane D-14, Parzate, others |
| PCNB | PCNB, Terraclor |
| Sulfur | Several related to formulations |
| Thiram | Thiram, AAtack, Arasen, Tersan, several others |
| Zineb | Zineb, Dithane Z-78, others |
| Zinc Sulfate | BSZ |
| **D. Other Chemicals** | |
| Ethephon | Ethrel |
| Maleic hydrazide | MH-30 |

1/ The listing of Trade names is incomplete and includes those products most commonly distributed in Ohio. The listing of a Trade name does not constitute any endorsement of the product nor does the omission of other trade names constitute any discrimination against those products.