method of weed control is practical and has great potential in the age-old problem of removing weeds selectively from vegetable crops.

Arthur H. Lange is Extension Weed Control Specialist, University of California, Riverside. Many vegetable crop farm advisors and vegetable crop specialists cooperated in conducting this survey.

TABLE 3. SUMMARY—OVERALL WEED PROBLEM IN CALIFORNIA VEGETABLE CROPS

Problem Weeds	No. of Times Each Apeared on List of 5 Most Important Weeds
Lambsquarter	13
Pigweed	12
Barnyardgrass	9
Mustard	5
Annualgrass	4
Malva	4
Nutsedge	3
Bermudagrass	3
Nettle	3
Purslane	3
Shepherds Purse	3
Nightshade	3
Annual Bluegrass	2
Annual Ryegrass	2
Bindweed	2
Groundsel	2
Puncture Vine	2
Chickweed	2
Johnsongrass	1
Peppergrass	1
Miner's Lettuce	1
Foxtail	1
Oxalis	1
Sandbur	1
London Rocket	1
Fiddleneck	1

TABLE 4. SUMMARY, FIVE IMPORTANT WEEDS OF EACH CROP

Crop	Five Important Weeds
Tomatoes	Pigweed, Lambsquarter, Barnyardgrass, Purslane, Bindweed
Lettuce	Pigweed, Purslane, Lambsquarter, Barnyardgrass, Mustard
Potatoes	Pigweed, Lambsquarter, Nutsedge, Barnyardgrass, Bermudagrass
Asparagus	Bermudagrass, Bindweed, Pigweed, Nutsedge, Chickweed
Melons	Lambsquarter, Pigweed, Barnyardgrass, Annual Grasses, Mustard
Celery	Nettle, Lambsquarter, Malva, London Rocket, Nightshade
Onions	Pigweed, Lambsquarter, Mustard, Annual Grasses, Shepherds Purse
Peppers	Pigweed, Lambsquarter, Barnyardgrass, Annual Grasses, Johnsongrass
Broccoli	Nettle, Shepherds Purse, Pigweed, Lambsquarter, Graundsel
Brussel Sprouts	Annual Rye Grass, Nightshade, Malva, Groundsel, Mustard
Beans	Pigweed, Lambsquarter, Barnyardgrass, Purslane, Nightshade
Sweet Corn	Pigweed, Barnyardgrass, Lambsquarter, Annual Grasses, Nutsedge
Peas	Miner's Lettuce, Annual Bluegrass, Fiddleneck, Pepper Grass, Chickweed
Sweet Potatoes	Puncture Vine, Bermudagrass, Barnyardgrass, Sandbur, Lambsquarter
Artichokes	Mustard, Oxalis, Malva, Annual Rye Grass, Nettle
Garlic	Pigweed, Lambsquarter, Malva, Foxtail, Barnyardgrass
Cantaloupe	Puncture Vine, Annual Bluegrass, Pigweed, Shepherds Purse, Lambsquarter

DDT accumulated over the past 20 years was detected in 22 of 23 pear orchard soils sampled in this Lake County survey. Two-thirds of the DDT was found in the top 6 inches of soil and 94% in the upper 12 inches of soil. Most pear roots in cultivated orchard soils are concentrated between the 1- and 4-ft depths.

DDT, . . . a

R. H. GRIPP • K. RYUGO

PEAR DECLINE has been on the increase in Lake County since 1961. Mature Bartlett pear trees, especially those grafted on oriental rootstocks which are lacking in vigor, are probably afflicted with this disease transmitted by the insect vector, pear psylla (*Psylla pyricola*, Foerester). However, with nationwide attention focused on the increased use of pesticides in agriculture, there have been questions as to whether some of these compounds exert the same devitalizing influence on pear trees as on other woody and herbaceous species. The average pear grower has applied at least two sprays of DDT annually for nearly 20 years. Figuring the recommended rate of application (which has been 2 lbs of 50% wettable powder per 100 gallons of water) and the gallonage required by different orchardists to adequately control codling moths (*Carpocapsa pomonella* Linn.), it has been estimated that between 100 and 300 lbs of actual DDT per acre have been applied since this insecticide was introduced commercially. This survey was conducted to determine the level of DDT residue in pear orchard soils in Lake County—as a part of the overall pear decline research program.

The Bartlett pear orchards picked at random for the tests had been bearing commercial crops over 20 years. Of the 23 test sites selected, 14 were located in the Big Valley basin; eight in Scotts Valley, and one near Upper Lake. The soil was sampled at a predetermined location within each orchard (within the drip line of the fourth tree in the fourth row from the northeast corner of the planting). Soil samples were collected at the following four depths: 0 to 6 inches, 6 to 12 inches, 12 to 24 inches and 24 to 36 inches. Five grams of soil from each sample were extracted with three 20 ml aliquots of n-hexane which were filtered, combined, dried, and brought to a uniform volume. The DDT concentration in the soil extract

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Soil Residues in Mature Pear Orchards

Lake County Survey

VERTICAL DISTRIBUTION OF ACCUMULATED DDT RESIDUES* IN 23 LAKE COUNTY ORCHARDS

Sites	Soil depth in inches			
	0–6	6–12	12–24	24–36
1	1.7	0.2	0.0	0.0
2	2.1	0.0	0.0	0.0
3	1.4	0.0	0.0	0.0
4	1.8	1.0	0.0	0.0
5	1.4	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0
7	0.4	0.0	0.0	. .
8	1.8	0.7	0.2	0.0
9	1.3	1.0	0.0	. .
10	1.4	1.0	1.0	0.0
11	0.4	0.0	0.0	. .
12	2.9	0.1	0.0	. .
13	1.6	0.3	0.0	. .
14	1.4	0.4	0.8	0.0
15	5.1	4.6	0.6	0.0
16	3.5	1.7	0.1	0.0
17	0.8	0.1	0.0	. .
18	1.7	0.1	0.1	0.0
19	0.5	0.0	0.0	. .
20	3.0	1.1	0.1	0.0
21	0.4	0.1	0.0	. .
22	0.6	0.2	0.0	. .
23	3.1	0.1	0.3	0.0
Total	38.3	12.7	3.2	0.0
Mean	1.67	0.55	0.14	0.0

* The figures represent averages of two analyses in parts per million (ppm) on the dry soil basis.

was then determined by gas chromatography using an electron capture detector.

DDT detected

DDT was detected in 22 of the 23 orchards sampled in this survey. The table shows the sum of two DDT isomers, ortho-para′ and para-para′, which were found at each depth. The pattern of vertical distribution of DDT varied slightly from site to site but the general trend was for the concentration to decrease as depth increased. About two-thirds of the DDT was confined to the upper 6 inches of the topsoil while 94% was found in the upper 12 inches of soil.

The eight sites which had detectable amounts of DDT at the 12 to 24 inch level had none at the 24 to 36 inch depth. Samples at 24 to 36 inches in sites 1 through 6 were also negative for DDT. It was assumed from these patterns of distribution that the remaining nine sites showing no DDT at the 12 to 24 inch depth would also show no detectable amounts at the lower soil horizon.

Residue levels

To assess the effect these residue levels may have on the trees, the adjusted mean DDT concentration in the top 24 inches of soil at a given site was plotted against the dry weight of 100 leaves collected from trees surrounding the sampling site. Leaf size is usually proportional to its dry weight and reflects the relative vigor of the trees. The scatter diagram shows no correlation between the level of DDT residue in the top 24 inches of soil and vigor of the trees. This lack of correlation is not unexpected if the distribution pattern of DDT is compared with that of the pear roots. While most of the DDT was confined to the upper 12 inches of topsoil, studies have shown that most pear roots in cultivated orchards are concentrated between the 1- and 4-foot depths.

Seedling study

As an integral part of this study, Winter Nelis seedlings were grown for 60 days in soils to which varying amounts of DDT were added. At the end of this period, it was found that the average increment of new growth made by seedlings growing in soil containing 10 ppm of DDT was slightly greater than those in the control plots. With 500 ppm of DDT added, the seedlings grew just as well as those of the control, but at 1,000 and 2,000 ppm DDT, the seedlings did not grow as well.

At all DDT levels, however, the growth increment varied among individual seedlings so that the differences between mean values among the treatments were not significant.

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Scatter diagram of mean DDT concentration versus the dry weight of 100 pear leaves collected around the same soil sampling site.