ABSTRACTS OF REPORTS FROM THE
46th ANNUAL WESTERN COOPERATIVE SPRAY PROJECT

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These abstracts of progress reports on research conducted on the principal insect and disease pests of tree fruits and nuts in the states of California, Colorado, Idaho, Montana, Oregon, Utah and Washington, and the Province of British Columbia, are not intended to be recommendations of the project. Official recommendations can only be made by public service entomologists and plant pathologists from their respective areas.

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Abstracts of Reports from the
46th Annual Western Cooperative Spray Project

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S E C T I O N I

LEPIDOPTEROUS INSECTS

CODLING MOTH -- APPLES

M. D. Proverbs:

For the third consecutive year, irradiated codling moths were released by helicopter in an 100-acre orchard. Percent codling moth injured apples was 0.007 compared with 0.02 in 1970. An additional 300 acres in 17 orchards were first sprayed with insecticides in May and June and releases of sterilized insects were made from July to late September. At harvest, 4% of the apples were injured by codling moth in one orchard, 0.2% in two orchards and less than 0.05% in 14 orchards.

H. F. Madsen and J. Vakenti:

A synthetic sex pheromone of the codling moth was very attractive to males in the field. Traps containing 0.1 mg. of pheromone were more attractive to male codling moths than female-baited traps. The pheromone remained attractive in the field for 79 days. There was no difference in male capture when B.A. Butt traps were compared with a wing-type fold down trap.

H. F. Madsen:

Encapsulated parathion (Pencap E), parathion E.C., Padan (Cartap), GS-13005, and Phosvel all failed to give adequate control of codling moth following 4 applications in a heavily infested orchard. In a large scale semi-commercial test, Zolone, Fundal S.P., and Galecron E.C., gave satisfactory control. Padan caused defoliation on the Red Delicious variety, parathion caused fruit russet on McIntosh and Spartan apples.

CODLING MOTH -- APPLES AND PEARS

B. A. Butt, H. R. Moffitt, D. O. Hathaway, and L. D. White:

In 1970, the codling moth population in the 32-square-mile Wenas Valley was reduced by an estimated 96%. This estimate was confirmed by trap data in 1971.

During the 1971 season (April 15 - September 24) 1,666,175 sterile codling moths were released in 113 releases. The noncommercial trees in the valley were treated with Imidan, one small orchard received a full spray program, another the first cover spray only, and the remaining two orchards no sprays. The overwintering population in noncommercial trees was reduced from an estimated 7,763 larvae during the 1970-71 winter to nearly none during the 1971-72 winter. The overwintering larval population in commercial orchards increased from an estimated 31 larvae during the 1970-71 winter to 205 during the 1971-72 winter.

Darrell O. Hathaway:

Cylindrical plastic pellets approximately 1.6 mm long and 1.6 mm in diameter were compared with wax paper as an oviposition substrate for codling moth, *Laspeyresia pomonella* (L.). Egg hatch was 78.2% on pellets and 74.1% on wax paper when substrates were changed daily. However, the hatch was less when moths were allowed to oviposit on the same substrate for five days. When 2,004 eggs oviposited on pellets were put on artificial diet or apples, 309 moths were produced on apples and 285 on diet. In comparison, the same number of eggs on wax paper produced 249 moths on apples and 235 moths on diet. It was 10 times faster to plant pellets upon which eggs had been deposited than to cut and plant strips of wax paper, or 20 times faster than to cut wax paper into small pieces and plant. There was no effect on the egg-to-adult stages when eggs were dipped in 0.1% solution of sodium hypochlorite, rinsed, and airdried. The average number of eggs deposited per female was 92 on wax paper and 95 on plastic pellets.

H. R. Moffitt and L. G. Schoenleber:

During the 1971 season, over 1.6 million sterile codling moths were marked and released in a sterile moth control program. The moths were marked with daylight fluorescent pigments in a vacuum duster and then released from airplane, helicopter, or ground. The fluorescent pigments had no

significant effects upon reproduction or longevity of the moths in the laboratory but a few did adversely affect flight behavior in the field. Most releases were made from the helicopter because less damage to the moths is evident than when releases are made from the airplane. Studies on reducing damage in releases from the airplane are continuing.

CODLING MOTH -- PEARS

R. S. Bethell, L. A. Falcon, W. C. Batiste, G. W. Morehead:

Five pear growers and six apple growers in El Dorado County have cooperated for three years in investigations on the use of sex lures (a) to assess codling moth density and (b) time chemical spray applications for codling moth control. There has been a general reduction in the application of chemicals for codling moth and spider mite control. Moth populations have been maintained or reduced, except in those cases where a drastic reduction in the use of chemicals has occurred.

Six pear growers in Sacramento County cooperated during the 1971 season in a program to demonstrate that pest control efforts could be based on need as determined by sex lure traps and other pest monitoring procedures. Chemical usage was reduced by over 40% and integrated control of two-spot mites was achieved in four of the six operations.

CODLING MOTH -- POME FRUITS

R. W. Zwick and G. J. Fields:

Synthetic sex pheromone traps indicated there were two major emergence peaks of the overwintering generation about one month apart. The first summer brood moths also had a bimodal curve, but separated in July by only 10 days. The second summer brood moths peaked August 10. Partial third brood worms were found in pears in late October in The Dalles area.

S. C. Jones:

Plots were set up to determine if acaricide SD 14114 could be combined with insecticides for the control of mites and codling moth. SD 14114 was combined with Gardona, Imidan and Guthion. The combinations did not effect the control of the codling moth. The population of mites was not high enough to evaluate SD 14114 for mite control.

CODLING MOTH -- WALNUTS

M. M. Barnes, C. S. Davis, and G. S. Sibbett:

Using moths from the Riverside laboratory, W. Roelofs (Cornell University) determined the structure of a synthetic attractant for codling moth males. This compound was extensively tested on the West Coast in 1971. (A trade name of the pure material is Codlemone.) Our field results show more consistent and reliable performance with the synthetic attractant than with live female moths (supplied by W. C. Batiste). Comparative results were obtained in both high and low populations. Integrated pest management in walnut orchards can be furthered if treatment for codling moth control is shifted from suppression of the first brood to suppression of the second brood. This permits excellent regulation of the walnut aphid by *Trioxys pallidus* during spring. A single treatment, accurately timed by the synthetic sex attractant against second brood, with azinphos-methyl (1½ lbs.), phosalone (2 lbs.), or chlorphenamidine (1½ lbs.) at the indicated rates per acre provided excellent control of the codling moth and adequate control of the navel orangeworm.

OMNIVOROUS LEAF ROLLER -- PEACHES

J. E. Dibble and M. H. Gerdts:

Ten different materials were tried as a summer control of this pest. Although preliminary and not run under the best of conditions - Supracide and methyl parathion (encapsulated) looked good, Imidan, Zolone, Galecron/Fundal and Gardona were fair. Guthion, Diazinon and Lannate gave poor results in regards to fruit injury ratings.

OMNIVOROUS LEAF ROLLER -- PEARS

James A. Beutel, C. S. Davis, J. E. DeTar, and W. Reil:

Moderate fruit damage caused by omnivorous leaf roller *(Platynota sultana)* occurred at harvest in Yolo County orchard under sod culture. Several materials were being evaluated for their effect on all pear pests and their control of this pest was determined by counting damage in three 200-fruit samples. Control was significantly (1% level) better with one application of Galecron at 2 lbs/A (1.0%) or Zolone at 1 gal/A (0.8%) than with Guthion at 3 lbs/A (3.4%) or 1½ lbs/A (5.5%) or Imidan at 5 lbs/A (8.3%). Unsprayed trees had 6.3% damaged fruit and an adjacent orchard which received two Guthion sprays at 1½ lbs/A and one Thiodan spray at 1 lb/A showed no pears damaged by this pest.

PEACH TWIG BORER -- PEACHES

Edward W. Anthon:

In the rearing of peach twig borer this year the addition of a raw linseed oil and ascorbic acid were added to the diet which prevented wing deformity and we were able to rear the moths into the fourth generation. Further experiments this season showed that the female twig borer produces a sex pheromone which attracts the male twig borer. A number of synthetic pheromones were tested this summer without success.

Pupa were sent to Dr. Wendell Roelofs in Geneva, New York late in the season for the purpose of developing synthetic pheromones and these pheromones will be tested on the spring brood of twig borers in the field.

The following materials gave good control of peach twig borer: Phosvel, Thiodan and Zolone.

Norman Ross and J. E. Dibble:

A very simple trial was run in June to compare Diazinon 50 W.P., at 2 lbs. and Dipel at 1 lb. per acre. There were 2/3 as many twig borer shoot strikes in the Dipel treated trees as the check. Diazinon gave acceptable control.

PEACH TWIG BORER -- ALMONDS

J. E. Dibble:

Early February applications evaluated as number of shoot strikes per tree in April - showed Diazinon, Supracide, Imidan and PP-511 to give excellent control. Dibrom and Galecron/Fundal were close behind. In further decreasing order of effectiveness was Gardona, Lannate, Zolone and Sevin. All materials were applied with oil.

R. E. Rice:

Dormant sprays of insecticides in combination with oil were applied by hand to third leaf almonds in Fresno and Kern Counties. In both trials, Diazinon, Dibrom, Dursban, Fundal/Galecron, Pirimiphos-methyl, and Supracide gave statistically superior control compared to BAY 37344, DuPont 1410-L, Gardona, Lannate, Ortho 12420, and Zolone.

FRUIT TREE LEAF ROLLER -- APPLES

H. F. Madsen:

Diazinon, Guthion and Phosvel gave excellent control of the fruit tree leaf roller when applied at the pink bud stage. A single application at the pink stage was just as effective as two sprays, one at pink and one at petal fall. GS-13005, Galecron E.C., and Galecron S.P., were less effective although they reduced the percentage infested fruit below that of the nonsprayed plot.

OTHER LEPIDOPTEROUS PESTS

ORIENTAL FRUIT MOTH -- PEACHES

D. H. Chaney, L. B. Fitch and J. E. Dibble:

Handgun applications were made in July and evaluated as average number of shoot strikes per tree. Imidan and Guthion both gave 97% control whereas B.T. at 1/2 lb/100 gave only 35% and at 1 lb/100 21% control.

S E C T I O N II

ORCHARD MITES

PHYTOPHAGOUS MITES

Edward W. Anthon:

Plictran, SD 14114, DuPont 1410, Fundal, Omite, Galecron and Stauffer R10044 gave good control of the following mites: Plum Nursery Mite: Prunes -- field.
Cherry Rust Mite: Cherries -- field.
Peach Silver Mite: Peaches -- field.

Donald W. Davis:

The 1971 control tests were conducted on red delicious apples at North Salt Lake City, Utah. The dominant spider mites were *Tetranychus urticae* with about 25% *T. mcdanieli*. Nine chemicals or formulations were used. In order of decreasing length of effectiveness were Galecron (Fundal) EC, followed by SD 14114, Plictran, Lovozal, Acarol, Omite, Carzol, Galecron (Fundal) SP, and Morestan. The longest effective control was for the entire season, the shortest was three weeks.

Field evaluation was made of the adverse effects to the predatory mite *Typhlodromus occidentalis*. Plictran, followed by SD 14114, Morestan and Omite had least adverse impact. Carzol and Lovozal were intermediate. Galecron (Fundal) and Acarol were most detrimental. The long lasting control by Plictran and SD 14114 was due, at least in part, to the preservation of predators.

Edward W. Anthon:

The following materials gave good control of the McDaniel mite on peaches and cherries in the field: Plictran, SD 14114, DuPont 1410, Fundal, Omite, Galecron and Stauffer R10044.

James A. Beutel, C. S. Davis, J. E. DeTar and W. Reil:

Heavy rust mite *Epitrimerus pyri*, populations resulted in 15-77% of Bartlett pears to be considered unacceptable for fresh shipment in one Sacramento area orchard. Two applications (May 31 and July 9) of 5 lbs/A Imidan significantly (1% level) increased rust mite damaged fruit (77%) compared to unsprayed (50%) and Guthion (47%) sprayed plots. Two applications of Galecron at 2 lbs/A or Zolone at 1 gal/A significantly reduced rust mite damaged fruit to 15% and 18% respectively.

R. E. Rice:

Acaricides were applied by handgun to third leaf peach trees for control of Pacific mite. Carzol, Fundal/Galecron, Plictran, SD 14114, and U-27415 gave good initial knockdown and control at seven days post-treatment. DPX-1410, Dow 3196, Dursban, and Pirimiphos-methyl did not perform satisfactorily. Effects of the chemicals were hard to evaluate past seven days due to large populations of the six-spotted thrips *Scolothrips sexmaculatus* in the plots. Galecron, Dow 3196, Dursban, Carzol, and DPX-1410 seemed to have the least effect on the predacious thrips.

J. E. Dibble and J. H. LaRue:

Thirteen materials were applied in the summer on Santa Rosa plums for Pacific mite control. Plictran, Morestan, Galecron, Omite, Zolone and Carzol gave excellent control through four weeks. Kelthane, Kelthane plus oil and Volck Supreme, Sun-7 E, Spraytex and PGSO-2 Superior Oils also gave very good control after one week. PP-511, Orthene and Cygon gave poor control. Lannate increased the mite population tremendously.

J. E. Dibble and J. H. LaRue:

On nectarines the peach silver mite - a questionable tree pest and beneficial mite food source - was severely held down for 14 days by PP-511, Morestan, Carzol and Volck Supreme. The lighter narrow range oils, Plictran, Lannate, Omite and Kelthane were considerably less harsh. Imidan was by far the least effective on this species. In separate tests involving Volck Supreme, PGSO-2, Spraytex NR, Sun-7 E and Sun-11 E oils - they reduced the population of silver mite from 86-95%.

PHYTOPHAGOUS MITES (Cont'd.)

J. L. Joos, W. C. Batiste, A. Berlowitz:

Inside and outside overtree sprinkler evaluation of *Tetranychus urticae* Koch (two-spotted mite) on pears. Overtree sprinkler irrigation blocks showed no visible mite damage. Significant damage did show outside of overtree sprinklers.

Edward W. Anthon:

The following materials gave good control of the two-spotted mite on bean plants in the greenhouse: BAY 89504, DuPont 3196 and Omite.

C. S. Davis and L. J. Brown:

For the third year in a row, two-spotted mite was controlled in a walnut orchard in Hanford, California, with predators. Alfalfa hay was planted in every fourth tree middle in a 10-foot strip, a total of six strips in a 25-acre orchard. Every other strip was cut at two-week intervals. The hay was infested with two-spotted mite, spotted alfalfa aphid, pea aphid, and many other arthropods. This hay acted as an insectary to raise 6-spotted thrips, minute pirate bug, ladybird beetles, and predacious mites. When the hay was cut, these predacious insects and mites were forced into the trees where they fed upon mites and aphids and reduced the populations below economic levels. The aphids were mainly controlled by a parasitic wasp, *Trioxys palladus*.

C. S. Davis, J. Joos and H. Schulbach:

Brown mites, *Bryobia rubrioculus*, were controlled in an almond orchard by injecting Trithion through an overhead sprinkler system. Two-spotted mites were not controlled. Two applications of Trithion were applied, one on May 19 and the other on July 23 at the rate of 1 qt/A. Trithion was injected into the overhead sprinkler system through a pressure sprayer in 200 gallons of water at 190 lbs. psi and into an irrigation line with a line pressure of 80 psi. One half the dosage of Trithion was applied through the sprinkler for 15 minutes, then the trees allowed to dry for one hour. The other half was then applied through the sprinkler system for 15 minutes and the trees allowed to dry for an hour. Then the irrigation system was flushed for 15 minutes.

R. S. Downing:

On apples, Plictran as a pink bud spray controlled the European red mite, gave fair control of the apple rust mite and allowed survival of predator mites. Tedion as a pink spray gave poor control of the European red mite, but Animert was effective. Neither were toxic to the apple rust mite or predator mites. As summer sprays, Plictran, Omite and SD 14114 gave excellent control of the European red mite but Animert was ineffective.

On pears, Plictran and Morestan at the white bud stage controlled the European red mite. Galecron was not effective as a pre-bloom spray, but gave good control when applied at the calyx stage. Pear rust mite was controlled by two applications of Galecron and a single white bud spray of Morestan. Plictran as a white bud application was not effective.

R. W. Zwick and G. J. Fields:

Widespread use of chlorphenamidine from petal fall through second cover resulted in excellent mite control and almost no mite problems were experienced on pears this year.

Apples: SD 14114, Plictran, Morestan gave excellent red mite control of a multi-resistant strain. Omite must be used at a minimum of 1¼# for effective red mite control. Plictran at 2.0 oz. is effective if thorough coverage is obtained.

R. W. Zwick and G. J. Fields:

A series of samplings and color pictures indicated a mid-summer red mite infestation that severely bronzed foliage and depleted chlorophyll content by 30% did not inhibit coloration of red delicious apples from late August until harvest.

PHYTOPHAGOUS MITES (Cont'd.)

R. E. Rice:

Miticides were applied by handgun to mature Santa Rosa plums for control of European red mite. Carzol, DPX-1410, Morestan, Pirimiphos-methyl, Plictran, SD 14114, and U-27415 held populations at less than 2.5 mites/leaf 21 days post-treatment. Carzol, SD 14114, and U-27415 were still giving this level of control 28 days post-treatment. Dow 3196, Dursban, and Lannate did not provide suitable control in this test.

PREDATOR MITES

Stanley C. Hoyt:

Plictran and SD 14114 gave very effective control of the McDaniel spider mite and the European red mite while allowing good survival of the predator, *Metaseiulus occidentalis*. Work over several years indicates that Plictran should be used at six ounces per 100 gallons where predators are scarce or four ounces per 100 gallons where predators are relatively numerous.

Guthion at eight ounces per 100 gallons of water caused a substantial reduction in the number of predators during the early part of the season. Recovery of *M. occidentalis* populations from early applications occurred but an application during July prevented effective integrated control in some instances.

C. V. G. Morgan:

Overtree irrigation at weekly intervals with one inch of water per acre gave a 70% reduction in European red mite numbers when compared to trees receiving undertree irrigation. The reduction occurred in May, June and July, but not in August. Overtree irrigation every two weeks with two inches of water per acre was less effective. There were fewer phytoseiids and *Zetzellia mali* on overtree sprinkled trees, but tydeid mites were not adversely affected.

R. W. Zwick and G. J. Fields:

Cherries: Omite was very effective against two-spotted and McDaniel mites on cherries post-harvest and allowed *Typhlodromous* and rust mite to survive in good numbers. Registration for Omite on cherries is needed in The Dalles, as dicofol and carbophenothion are no longer effective.

R. W. Zwick and G. J. Fields:

Orchards having good early-season predator control of McDaniel mite did not necessarily have effective mid-summer biological control due to the differential effects of the prolonged high temperatures experienced during July-August. Plictran and Omite were the two most effective acaricides which were used to establish better predator:prey ratios on cherries and apples. An exceedingly high population of *Stethorus* sp. controlled a late-season McDaniel mite infestation on young cherries after some foliage damage was evident. These trees had been sprayed with both diazinon early and DDT late in the summer.

R. E. Rice:

Preliminary data taken in September 1971 from four varieties of almonds, four of nectarines, and 12 of peaches showed positive correlations between numbers of peach silver mites and *Metaseiulus occidentalis*. The hypotehsis is that low numbers of eriophyids on almonds leads to low numbers of predacious mites, resulting in greater severity of phytophagous mites on almonds. Additional data will be collected in 1972 to support this hypothesis.

S E C T I O N III

OTHER INSECT PESTS

PEAR PSYLLA -- PEARS

R. W. Zwick and G. J. Fields:

Psylla from Hood River were found resistant to Perthane in laboratory and field tests. Half rates of Perthane plus Thiodan were needed to give effective control of overwintering adults this year. Chlorphenamidine S.P., was very effective at petal fall but ineffective as a pink spray. Morestan gave excellent psylla control as a pink and no bud damage or effects on fruit set were observed this year. Chlorphenamidine is effective for only 3-4 weeks as a cover against psylla nymphs and is poor against adults. Half rates of Morestan plus chlorphenamidine was the most effective cover against high psylla infestations. Dithane M-45 (or Manzate 200) applied three times from pink through first cover was ineffective against psylla and this block had to be sprayed numerous times during the season. No experimental compounds evaluated this year show promise for psylla control.

G. J. Fields: (Biological Control)

Attempts at increasing psylla predators on unsprayed trees by introductions were not highly rewarding as determined by late season sampling. Massive introductions of *Trechnites insidiousus* resulted in a high rate of parasitism by August-September, but 95% of the fruit was marked by psylla honeydew excretions.

Everett C. Burts:

Of several materials screened against adult pear psylla in the lab, only PP511, Padan, and C17018 were comparable to standard insecticides now recommended against this insect including Perthane, Thiodan, and Chlorophenamidine.

In dormant sprays for control of overwintered adult pear psylla Perthane and Thiodan were equally effective while chlorophenamidine was erratic, providing good control in some tests and poor in others.

In summer sprays against all stages of pear psylla Padan was the most effective compound tested.

Two juvenile hormone mimics, R-20458 and ZR-0451 were found to be low in toxicity to late instar nymphs and adults but quite toxic to eggs and young nymphs. Sub-lethal dosages caused delays in egg hatch, development changes in nymphs and deformed adults developing from treated eggs and nymphs.

SAN JOSE SCALE -- PEARS

Peter H. Westigard:

Prebloom: In field tests oil or oil-phosphate combinations provided excellent control of scale at the delayed dormant timing. Of the phosphates used alone parathion gave the best control (89%) while Ethion reduced the population by only 40%. Perimiphos Methyl gave good control in laboratory twig-dip tests but was not as effective under field conditions.

Summer: Tests were conducted on control of scale crawlers by residues of various chemicals. In test 1, Penncap E gave over 90% control after 28 days compared to 22% for parathion. Galecron gave negligable residual control of crawlers. In test 2, Imidan at 2 lbs. plus oil at 1 gal. gave the best residual control.

SAN JOSE SCALE -- PEACHES

J. E. Dibble:

Dormant applications as applied concentrate at 30 gpa with a Kinkelder sprayer showed Diazinon 50 W.P., or parathion 25 W.P., to still be a very effective control when combined with oil (PGSO-2). Trithion, Imidan and Dibrom plus oil also looked very good. Zolone, Fundal/Galecron and Diazinon plus a wetting agent (even with oil) gave poor scale control.

SAN JOSE SCALE -- PLUMS

R. E. Rice, J. E. Dibble and M. H. Gerdts:

Fundal/Galecron, Supracide and Diazinon with and without oils were applied in the fall, dormant and spring for scale control. Supracide looked better than all the others (treatments or times) in the spring spray. The dormant treatment proved generally better than the other treatment periods.

J. E. Dibble and J. H. LaRue:

Volck Supreme and the narrow range oils (PGSO-2, Spraytex NR, Sun-6 E, Sun-7 E, Sun-11 E, and Orchex 796) were applied with and without Diazinon. In each case the combination was appreciably better than the oil alone. Imidan, Sevin, Dibrom and Lannate in combination with oil looked good as spring sprays. Diazinon plus oil appeared to be better as a dormant spray than as a spring treatment. Most treatments looked good as delayed dormant sprays.

SAN JOSE SCALE -- FIELD

Edward W. Anthon:

Good control of San Jose Scale was obtained in the field with the combination of oil with Parathion, Phosvel, Dow 214, Zolone, Imidan and Atlox A411F emulsifier plus oil also gave good control.

LECANIUM SCALE -- FIELD

Edward W. Anthon:

Good control of Lecanium scale was obtained in the field with the combination of oil with Imidan, Parathion, Dow 214-M3196, Zolone, Galecron, Phosvel and the application of two gallons of Atlox oil (A1 1021) or Depester oil.

THRIPS

J. E. Dibble, J. H. LaRue and G. Obenauf:

Bloom applications (2) were made for control of thrips on nectarines. This jacket stage protection was excellent with Cygon and Lannate; very good with Orthene, Carzol, Parathion and Supracide and somewhat poorer with Ethion, Gardona, Dibrom and Zolone. General thrips control in the terminals in June showed Carzol and Orthene to be better than Cygon and Lannate. Thrips control in July again showed that Carzol and Orthene performed better than the other treatments over a two week period. Cygon and Lannate did, however, show a good initial knockdown.

R. D. McMullen:

A dimple injury to sweet and sour cherries caused by *Taeniothrips orionis* Treherne was widespread in the Okanagan Valley of B.C. in 1971. The injury is caused by oviposition into the fruitlets by thrips adults and an estimated 10% of the total crop was affected. In a few orchards, where populations were high, feeding on the fruit by first generation nymphs caused a silvery russet on the cherries. In late June, a spray of diazinon reduced numbers of first generation adults by 98-100%.

APHIDS

C. S. Davis, G. S. Sibbett and M. M. Barnes:

The Iranian biotype of *Trioxys pallidus*, introduced by R. van den Bosch, effectively suppressed walnut aphid populations in almost all walnut orchards of the Central Valley of California in 1971. Second brood treatment for codling moth with phosalone and chlorphenamidine were preferable to azinphosmethyl with respect to subsequent interference with parasite activity, in studies conducted in collaboration with van den Bosch. Uniroyal K-840 was effective against walnut aphid and offers promise of highly selective action. Effects of walnut aphid on production and quality were continued for a third year, excluding the parasite with methoxychlor, and showed a 24% reduction (P..001) in yield on trees infested with aphids during spring. Prevention of honeydew induced and direct heat damage by white-washing was studied by excluding and maintaining aphids on white-washed trees.

APHIDS (Cont'd.)

C. S. Davis, G. S. Sibbett, and M. M. Barnes:

Insecticides applied for second brood codling moth control on walnuts in an orchard in the Sacramento Valley and for first and second brood in another orchard in the San Joaquin Valley were also tested for their effect on the walnut aphid parasite, *Trioxys palladus*. Parasitism of the walnut aphid was determined by dissecting the walnut aphid and looking for parasite larvae. Ninety-seven days after second brood application in the Sacramento Valley parasitism in the following chemical treatments was as follows: Check 62%, Zolone 54%, Phosphamidon 52%, Fundal 37%, Imidan 10%, Guthion 2%. One hundred eleven days after second brood application in the San Joaquin Valley parasitism in the following chemical treatments was as follows: Check 45%, Fundal 24%, Zolone 12%, Guthion .5%. One hundred seventy-five days following first brood application in the San Joaquin Valley parasitism in the following chemical treatments was as follows: Check 45%, Fundal 56%, Guthion 52%.

S. C. Jones:

Zolone E.C., 3 lbs/1 gallon, at concentrations of 2/3 and 1 pint/100 was tested for filbert aphid control. The plots were sprayed on June 8, and check for aphid control on June 11, June 23, and July 7. The aphid population was still low on the sprayed plots on July 7, averaging less than one aphid per leaf compared with 14.1, 38.4, and 93.8 for the three check plots.

Everett C. Burts:

On apples, aerial sprays of Phosphamidon, either in eight gallons of water per acre or as the undiluted formulation applied through Beecomist ULV spinning nozzles, gave good control of apple aphid equal to ground sprays applied with handguns or airblast equipment.

PEACH TWIG BORER AND GREEN PEACH APHID -- PEACHES

R. D. McMullen:

Guthion, Thiodan, Zolone and Fundal as a single treatment at the pink bud stage or as a double treatment at pink and husk fall gave excellent control of the peach twig borer. Green peach aphid control was excellent in the blocks receiving one or two sprays of Thiodan and good in blocks receiving two treatments of Fundal. All the other plots required retreatment with Thiodan to control the green peach aphid.

CHERRY FRUIT FLY

S. C. Jones:

Imidan 50% W.P., 1 lb/100 and Guthion E.C., 1 pint/100 were tested for cherry fruit fly control. Sprays were applied on June 15, June 28, July 8, and July 19. Plots sprayed with Guthion showed two maggots in 4,941 cherries; and plots sprayed with Imidan showed one maggot in 3,979 cherries. Cherries in the unsprayed plots showed 13 maggots in 3,872 cherries. A single back yard montmorency cherry tree was sprayed on the same dates as the above plots with Zolone (3 lbs/1 gal.), 1 pint/100. The cherries on this tree were heavily infested in 1970. One maggot was found in 1,832 cherries examined.

R. W. Zwick and G. J. Fields:

Field and laboratory bioassay tests were used to determine the most effective materials. Dimethoate was the most toxic for the longest time as an adult knockdown material and gave up to 30 days protection against maggot infestation on backyard trees. Residues were well within the tolerances for pome fruits.

F. L. Banham:

At Robson, B.C., one or two applications of dimethoate five days after the first fly was trapped or at five and 16 days prevented maggot damage to sweet cherries. At Creston, B.C., plots with two applications of dimethoate had no damaged fruit, those with one application averaged 13 maggots per five lbs., and checks averaged 488.4 maggots.

CHERRY FRUIT FLY (Cont'd.)

Don R. Merkley:

For the first time in 20 years no sticky-board traps were used for cherry fruit fly survey.

Chemicals screened this year were Stauffer's Imidan 50W, R23680 E.C., and R23680 W.P.

Imidan 50W, applied June 17 and July 12 at the rate of 3/4, and 1½ lbs. actual/100 gal. of H_2O, with a pre-harvest spray of Perthane E.C. at 1 lb. actual/100 gal. of H_2O, gave excellent control of *R. indifferens*.

R23680 E.C. applied June 17, July 12, and July 30 at rates of ½ and 1 lb. actual/100 gal. gave good control, but R23680 applied same dates at ½ lb. actual/100 gal. indicated 13% infestation. Unsprayed check 16% infested.

WALNUT HUSK FLY

J. L. Joos, W. C. Batiste, C. S. Davis:

A study was made with Frick Traps (ammonium carbonate) for color preference of walnut husk fly, *Rhagoletis completa* Cresson. Individual studies from 1967 to 1971 showed higher acceptance of white over colors. Order of preference was white, silver, yellow, orange, red, green, brown and black. Population density tests were made with the Frick Trap, Jackson Trap, Tapered Milk Carton Trap and the new U. C. (DBJ) Trap. The Frick Trap gave the highest population density reading over the Jackson and the Tapered Milk Carton Traps, but preliminary late season (1971) tests show the new U. C. (DBJ) Trap may attain higher density levels than the Frick Trap.

Tests with string and wire suspension of traps showed higher acceptance with string suspension for the Frick Trap and the Tapered Milk Carton Trap, but higher trap acceptance with wire suspension for the Jackson Trap. Tests with ammonium carbonate (Frick Trap) and Staley's No. 7 Bait (Frick Trap) showed very high preference for ammonium carbonate.

CAMPYLOMMA VERBASCI -- APPLES

R. D. McMullen:

For the second successive year, *Campylomma verbasci*, a mirid bug, caused significant crop loss to Red and Golden Delicious apples. Since the eggs of this bug hatch during the bloom period, pink sprays applied for fruit tree leaf roller do not give control. Post bloom applications of diazinon, Guthion, Imidan and Zolone reduced *C. verbasci* numbers by 100, 86, 61 and 11 percent respectively.

SYNETA BEETLE

S. C. Jones:

Five acre plots of 25-year old cherry trees were sprayed with Methoxychlor 50% W.P., 16 lbs/400 of spray and Thiodan 50% W.P., 8 lbs/400 of spray, at the pre-blossom stage of fruit development for Syneta beetle control. Syneta beetle injury to the fruit in these plots were 7.6% and 7.4% respectively. The fruit in the unsprayed plot showed 17.2% injury.

STINK BUGS -- NEW CHERRY DISORDER (FIELD)

Edward W. Anthon:

Investigations into the cause of field pitting of cherries was instigated this year in the Yakima Valley. Preliminary tests have shown the green soldier bug will cause this identical disorder in cherries. This may not be the sole cause of cherry pitting, but seems to fit into the picture as one of the main causes of pitting in the field.

CUTWORMS -- GREENHOUSE AND FIELD

Edward W. Anthon:

The following materials gave the best control of cutworms in the greenhouse trials were: Thiodan, Parathion, Dursban, Azodrin, Toxaphene, Orthene, DuPont 1410, Dylox spray and bait, Dieldrin and Dieldrin + Parathion + oil. The materials which gave the best control in the field were: Dylox bait, Imidan and DuPont 1410.

INSIDE AND OUTSIDE OF OVERTREE SPRINKLER MITE AND INSECT LEAF COUNTS -- APPLES

J. L. Joos, C. S. Davis, W. C. Batiste:

One orchard at Boonville, California was under observation for population dynamics of mite and insect species inside and outside of overtree sprinklers. Apple rust mite showed a high population with either undertree or overtree sprinklers with spray controls of Ethion and oil (3/16/70), Diazinon (5/15/70) and Guthion (6/21/70). Other insects and mites remained at low population density levels. However, European red mite and two-spotted mite remained higher with undertree sprinklers. Thrips species, leafroller eggs, lacewing eggs, leafhopper species and predacious mites showed no significant difference in population.

INSECT AND MITE POPULATION DYNAMICS -- PEARS

J. L. Joos, C. S. Davis, W. C. Batiste:

Five pear orchards in the north coast counties of California were under observation for pear leaf blister mite, two-spotted mite, European red mite, thrips species, six-spotted thrip, predatory mites, and pear psylla. The reduction of blister mite and pear psylla shows important controls under overtree sprinklers. European red mite under overtree sprinklers indicates a more favorable condition provided for this species; however, a reduction was shown on two-spotted mite and beneficial predacious mites.

S E C T I O N IV

SPRAY RESIDUES, COMPATIBILITY, PHYTOTOXICITY, BEE POISONING AND POLLINATION, CONCENTRATE SPRAYING AND OCCUPATIONAL EXPOSURE

J. E. Dibble and J. H. LaRue:

Oils sprayed alone at 5 gpa on plums for Pacific mite control were applied at 30, 50, 100 and 400 gpa. Applications made with a Span-Spray, Kinkelder (Royal), Windmill and Bean 200 showed very good coverage and control. Very little differences in degree of control was seen between gallons per acre, sprayer type and oil used (Volck Supreme, PGSO-2, Sun-7 E, Sun-11 E, or Spraytex NR).

J. E. Dibble and J. H. LaRue:

Relatively no difference in San Jose Scale control was observed on plums between 15, 30, 60, 90 and 310 gpa. February Diazinon and oil sprays if anything gave a slight edge to the 30 gpa rate. All treatments were applied with a Kinkelder Royal Sprayer.

J. H. LaRue and G. S. Sibbett:

The most oil sensitive variety of plums is considered to be Queen Anns. Dormant oil emulsion and Volck Supreme plus parathion 25 W.P., were applied in December, January, February and March. Only the D.O.E. plus parathion applied in late January showed any injury and this was in the form of a five day bloom delay and somewhat disturbed flower petals. There was no twig injury or crop loss in either the plum or prune tests.

Everett C. Burts:

SP formulations of chlorophenamidine did not lose their toxicity to pear psylla when diluted with water containing 20 grains per gallon Na_2CO_3. In lab tests the alkaline mixture gave quicker kill of adult psylla than chlorophenamidine in distilled water, even after spray mixtures had aged for 24 hours. No differences were found when these sprays were applied to psylla on orchard trees.

Everett C. Burts:

Plictran injured fruit and foliage when applied in dilute sprays to D'Anjou pears in combination with, 14 days after or 21 days before, sprays containing superior type oils.

J. L. Joos, J. E. Dibble, W. C. Batiste:

The objective of this study (overtree sprinkler dye application coverage tests) was to establish coverage patterns, time lapse intervals and time rates for future pesticide applications with overtree sprinklers on pears.

J. L. Joos, L. J. Booher, C. S. Davis:

Dye application coverage patterns and time lapse studies of injected material were made with overtree sprinklers. The objective of the study was to establish coverage and time lapse intervals in the sprinkler system for future streptomycin applications on fireblight of pears.

R. W. Zwick and G. J. Fields:

Volck oil at 2.0 gal/100 in a full dilute delayed dormant on Bartlett and Anjou pears 12 hours preceding a morning low temperature of 21°F. produced no noticeable bud damage or injury to bloom or fruit set. Chlorphenamidine S.P., plus dodine after petal fall seriously marked Anjou and Bartlett fruit.

A. D. McMechan and C. V. G. Morgan:

Replicated plots were treated with Guthion and divided into undertree irrigated and overtree irrigated plots. A 0.73 inch rainfall which occurred within a few hours of the first application removed 40-50% of the initial spray deposit. Throughout the season, spray deposits on apple leaves were degraded slightly faster with overtree irrigated plots than with undertree. This was reflected at harvest where overtree irrigated plots had slightly higher codling moth damage than undertree.

A. D. McMechan and C. V. G. Morgan:

The tower sprayer for tree-wall plantings on apples differs from conventional sprayers in that the spray laden airstream is directed laterally through the trees. Very little spray material is lost to the atmosphere above the trees. The sprayer was used for codling moth control in replicated plots with Guthion at three rates. Spray deposits were quite uniform but tended to be slightly higher at the seven foot level than at four or 11 feet. Codling moth control was as follows: 20 or 15 oz. per acre - 5% damaged fruit, 10 oz. per acre - 7.7%, and nonsprayed - 43%.

J. L. Joos, C. S. Davis, L. J. Booher:

Dye application coverage patterns and time lapse studies of injected material were made on an experimental orchard with overtree sprinklers. The objective of the study was to establish patterns and time lapse intervals in the system for future pesticide applications on almonds with overtree sprinklers.

S E C T I O N V

DISEASES OF STONE FRUITS

N. S. Luepschen and H. Harder:

Using mature Elberta peach trees and one year old shoots from young trees, various chemicals were applied as a topical brush-on application to intact bark of cankered areas. Artificial infections with *Cytospora leucostoma* were made on scaffold limbs five weeks prior to treatment in the orchard and three weeks before treatment with the detached woody shoots in the lab. Measurements were made in the field five weeks later, obtaining total lesion length in cm. In experiment (B), downward extension of the canker from the inoculation point was measured ten days after chemical treatment. Control data were calculated from the untreated check lesions. Six replications were used for each treatment in each experiment.

On older bark, Mertect F at 50% dilution in water showed some promise in controlling Cytospora, while in young, thinner bark material the Merck 77 formulation also performed well. DMSO appears to have some additive effect in control, while dichloromethane apparently did not aid penetration. DMSO and Benlate powder produced a noxious vapor.

Material	Dilution	% Control	Phytotoxicity
A. Orchard Experiment			
Mertect Flowable 42.7%	full strength	18	------
" " "	50% H_2O	34	------
" " "	25% H_2O, 25% DMSO	22	------
Merck 77 Seed Treater	full strength	0	mod.
" " " "	25% H_2O	0	severe
D M S O check	50% H_2O	29	------
B. Lab Experiment			
Mertect Flowable	50% H_2O	32	slight
" "	50% DMSO	44	mod.
" "	50% Dichloromethane	17	mod.
Merck 77	25% H_2O	37	mod.
" "	50% DMSO	35	slight
" "	50% Dichloromethane	31	severe
Benlate 50 WP	1 oz/2 oz H_2O	21	------
" " "	1 oz/4 oz H_2O	13	------
" " "	1 oz/4 oz DMSO	11	------

Iain C. MacSwan:

Sprays were applied by handgun to two-row plots of ten year old Black Republican trees on November 17, 1970 and January 29, 1971. Each plot contained eighteen trees. Assessment of disease was made on seven trees, selected by random in each plot on April 21, 1971, by rating 100 buds produced in 1970 as diseased or healthy.

Bordeaux and Kocide provided adequate control of dead bud.

Treatment and rate per 100 gallons	Percent buds with dead bud
Bordeaux 12-12-100	7.0
Kocide 6 lb. + 1 pint superior oil	7.1
Citcop 6 quarts	20.0
Check	26.4

Iain C. MacSwan:

Sprays were applied by handgun to single tree plots, replicated four times, of eight year old Improved Elberta trees, at popcorn (April 2) full bloom (April 12) and petal fall (April 20). One hundred blossoms per tree were rated as diseased or healthy on May 6, 1971.

Best control was obtained from Benlate at 2 oz. plus 1 gal. of superior oil and Topsin M at 12 oz. per 100 gals., followed by Benlate at 4 and 8 oz. plus 1 gal. superior oil, Bravo at 1 1/2 lbs. and Mertect Flowable 5 oz. (42% active ingredient) per 100 gallons. No phytotoxicity occurred in any plot.

Treatment and rate per 100 gallons	Percent brown rot blossom blight
Benlate 50 wp 2 oz. + 1 gal. superior oil	1.5
Topsin M 70 wp 12 oz. + 2 oz. Biofilm	1.7
Benlate 50 wp 4 oz. + 1 gal. superior oil	3.5
Bravo 75 wp 1 1/2 lb. + 2 oz. Biofilm	4.2
Benlate 50 wp 8 oz. + 1 gal. superior oil	5.7
Mertect Flowable 5 oz. (42% active ingredient)	7.0
Mertect 60 wp 8 oz.	9.5
AC 84467 50 wp 2 lb. + 2 oz. Biofilm	10.1
AC 60362 50 wp 1 lb. + 2 oz. Biofilm	12.7
AC 60362 50 wp 1/2 lb. + 2 oz. Biofilm	13.0
AC 84467 50 wp 1 lb. + 2 oz. Biofilm	16.7
Cyprex 65 w 1/2 lb. + 2 oz. Biofilm	17.2
Check	22.5

Iain C. MacSwan:

Sprays were applied by air blast sprayer at the rate of 325 gallons per acre to two blocks of eighteen year old Improved Elberta trees on November 2, 1970. One block contained forty-five trees, the other forty-one trees and five trees were unsprayed. One hundred fruits per tree on each of four trees in each block were rated as diseased or healthy on June 10, 1971. Three bloom sprays (popcorn, full bloom, petal fall) of Orthocide 50 w at rate of 2 lbs. plus 2 oz. Biofilm were applied in the spring of 1971 for control of brown rot blossom blight.

In this trial which omitted the regular shuck fall spray for control of coryneum fruit blight, the Difolatan Flowable spray provided excellent control.

Treatment and rate per 100 gallons	Percent fruit with blight
Difolatan Flowable 3 qts	10.2
Bordeaux 8-8-100	75.0
Check	92.7

Iain C. MacSwan:

Sprays were applied to two-row plots each containing twenty-two Improved Elberta trees by handgun on January 26-28, 1971. Three trees in the Cyprex 2 lb. plus 4 oz. Biofilm block were sprayed with Du-Ter 20 wp plus 2 oz. Biofilm soon after budburst (April 1). One hundred leaves on each of seven trees randomized in each block were rated as diseased or healthy on June 7, 1971. One hundred leaves were rated on each of the three trees sprayed with Du-Ter 20 wp.

None of the treatments provided adequate control. Results support the recommendation of two sprays (December and January) for control of leaf curl in the Willamette Valley. Increase in disease control by increasing the surfactant (Biofilm) used with Cyprex 65 w from 4 oz. to 12 oz. per 100 gallons was significant. Testing of surfactants and their influence on disease control under orchard conditions has been neglected. A surprising reduction in leaf curl was obtained from the late spray (April 1 - after budburst) of Du-Ter 20 wp.

Treatment and rate per 100 gallons	Percent leaf curl
Cyprex 65 w 2 lbs. + 12 oz. Biofilm	15.0
Cyprex 65 w 2 lbs. + 4 oz. Biofilm, followed by 1 spray of Du-Ter 20 wp 1 lb. + 2 oz. Biofilm soon after budburst (April 1)	18.0
Cyprex 65 w 2 lb. + 4 oz. Biofilm	26.8
Bordeaux 8-8-100	31.2
Microcop 2 lb. + 12 oz. Biofilm	47.4
Microcop 2 lb. + 4 oz. Biofilm	49.5

S E C T I O N VI

DISEASES OF POME FRUITS

James A. Beutel, W. Reil and W. J. Moller:

Applications every five days from first bloom until mid-May (12 applications) gave acceptable fireblight control on pears when 2.4, 4.8, 9.6 and 19.2 ounces/A of 17% streptomycin were used. This replicated blight test was run at Yuba City under moderately severe blight conditions in an orchard nearly lost to blight the previous year.

Control expressed as blight strikes per 100 trees was best with 19.2 oz. of Strep/A in 50 gals water (7 strikes/100 trees), excellent with 9.6 oz. in 100 gal/A (16 strikes/100 trees), excellent with 9.6 oz. in 200 gal/A (28 strikes/100 trees), good with 9.6 oz. in 50 gal/A (40 strikes/100 trees), fair with 4.8 oz. in 50 gal/A (78 strikes/100 trees) and fair with only 2.4 oz. in 50 gal/A (99 strikes/100 trees). Unsprayed trees had 692 strikes/100 trees. Night versus day, concentrate versus dilute, or oil additives did not significantly affect control when 9.6 oz/A was used.

Copper (1/2 lb actual/A) gave excellent control as Kocide (13 strikes/100 trees) and fair control as COCS (96 strikes/100 trees). Fruit russet was significantly higher with copper than with streptomycin sprays.

James A. Beutel, W. Reil, W. E. Moller and M. N. Schroth:

A highly virulent streptomycin-resistant strain of fireblight bacteria was isolated from several Sacramento Valley pear orchards in 1971. It was resistant in culture to 300 ppm streptomycin. Applications of 12 oz. 17% streptomycin/A every two days failed to control it in one orchard.

A survey of 77 samples showed 47 (61%) were resistant in culture to 300 ppm streptomycin. Orchard history of streptomycin usage had little effect on occurrence of the resistant strain.

Virulence of the "strep resistant" strain was greater than normal fireblight. Field innoculation showed the resistant strain gave three times more infections which "ran" four times farther than "normal" fireblight.

J. L. Joos and R. D. Raabe: (Hawthorn - Juniper Rust -- Hawthorn (Pear Significance)*

Extensive applications of fungicides were applied to Hawthorn trees to control the aeciospores stage of this disease. The best control was obtained with Plantvax (75 WP) and Plantvax + Fermate. This information will be used for future control studies on Pear-Juniper Rust* and the telial spore stages of both diseases.

J. L. Joos, B. E. Beardon and C. Hemstreet:

Inside and outside overtree sprinkler evaluation of *Erwinia amylovora* (fireblight). Fireblight strike counts were made on five pear orchards in the north coast counties of California. No significant difference was found in the incidence of fireblight with applications of water for irrigation and frost protection with overtree sprinklers.

J. L. Joos, L. V. Lider and L. J. Booher:

Fireblight *(Erwinia amylovora)* was controlled to economic levels on pears with applications of Streptomycin through overtree sprinklers. Checks included non-functional sprinklers, no treatment areas and conventional rig application comparisons.

Harvest time fruit analysis for Streptomycin showed ppm far below residue tolerance requirements.

Leighton E. Lopatecki:

In the Okanagan area of B. C. cottony mold (Alternaria) frequently develops on the surface of apples and bins under conditions of high humidity in C.A. storage. Most mycelium is removed during the brushing process, but sufficient can remain in the stem and calyx-end to downgrade the fruit. In culture, the fungus grows exceptionally on pine wood, suggesting that in C.A. storage fungus development starts on wooden bins and later spreads over the fruit.

Leighton E. Lopatecki (Cottony Mold of Apples in C.A. Storage Cont'd.).

Fungicides were screened for ability to inhibit hyphal growth of cottony mold on agar plates. Only one material was outstanding, Geigy 20072, and this completely inhibited growth at 12 ppm. The next most active material, sodium orthophenylphenate, required 80 ppm. While post harvest treatment of fruit with SOPP usually requires rinsing and therefore leaves a total residue of around 5 ppm, sufficient may remain in the fungus environment for effective control.

Leighton E. Lopatecki:

Field infected Newtown apples were treated with ascorbic acid after harvest in an attempt to prolong natural resistance to bull's eye rot by suppressing oxidation of polyphenols in the apple skin. Results were extremely variable, poor with high concentrations and good with low. These results tie in with data indicating that polyphenols in a partially oxidized state have maximum toxicity to the bull's eye rot fungus.

Duane L. Coyier and Scott B. Kelly:

Apple seedlings were treated with dilute fungicide sprays and evaluated for control of powdery mildew *(Podosphaera leucotricha)*. Four sprays were applied at weekly intervals beginning May 4, 1971. The plants were grown in one gallon cans and removed from the growing area during the spray operation to eliminate cross contamination of fungicides due to spray drift. The treatments were applied with a handgun sprayer operated at 250 psi and the plants were sprayed to the "drip" stage. The position of each of 10 single tree replicates per treatment was re-randomized following each treatment to reduce position effect. Heavily mildewed apple seedlings were placed adjacent to each treatment and the conidia were discharged daily with a compressed air jet nozzle. The plants were grown under heavy shade to increase the incidence of powdery mildew. We rated powdery mildew 0-50 according to severity and converted the rating to percent disease control. The disease rating was made on June 2, 1971.

EL-273 (triarimol) provided outstanding disease control and did not cause any phytotoxic effects. BAS 2203F (Calixin) was the only compound tested which caused serious injury to the host. Plants treated with Calixin developed necrotic spots on the leaves and extensive leaf distortion. Although it provided 93 percent disease control it could not be considered for use on apples as it is presently formulated. Many of the other compounds provided good control of powdery mildew. A rating of 85-100 percent disease control is considered satisfactory performance of a fungicide in this test.

Treatment and rate per 100 gallons	Phytotoxicity	% Disease Control
EL-273 (triarimol), 25% W, 8 oz	None	100
EL-273 (triarimol), 25% W, 4 oz	None	95
Karathane 25% W, 8 oz	None	94
BAS 2203F (Calixin), 75% EC	Extreme	93
TD-1771 (Topsin M), 70% W, 12 oz	None	93
R-23233, 50% W, 4 lb	Slight	90
Dikar, 80% W, 2 lb	Slight	90
Benlate (benomyl), 50% W, 16 oz	None	89
Karathane 37% EC, 4 oz	None	87
Benlate (benomyl), 50% W, 8 oz	None	86
Mertect 1183 (TBZ), 60% W, 8 oz	Slight	86
Mertect 1183 (TBZ), 60% W, 16 oz	Slight	78
Merck 75 (TBZ), 50% W, 8 oz	None	71
Merck 75 (TBZ), 50% W, 9.6 oz	None	70
Mertect Flowable (TBZ), 42.7%, 10 oz	None	68
Mertect Flowable (TBZ), 42.7%, 5 oz	None	64
Check (Water sprayed)	None	8
Check (Unsprayed)	None	0
LSD .05		15

Coyier and Kelly -- Cont'd.

In another test we evaluated three fungicides at four dosage levels for control of powdery mildew on apple seedlings. Four spray applications were made at weekly intervals (6/24, 7/1, 7/8 and 7/15/71) and the plants were rated for incidence of powdery mildew on 7/23/71. The rating and evaluation system was as described in the previous test.

EL-273 (triarimol) provided 100 percent disease control (PDC) at all rates tested (2, 4, 6 and 8 oz/100 gal). Karathane sprayed plants developed significantly more mildew than the other treatments when the dosage was reduced (2 and 4 oz/100 gal) but was not significantly different than the other treatments at the higher dosage levels (6 and 8 oz/100 gal). No phytotoxicity was observed on any of the plants in this test.

Fungicide and formulation	Dosage (oz of form./100 gal)	% Disease Control
EL-273 (triarimol), 25% W	2	100
EL-273 (triarimol), 25% W	4	100
EL-273 (triarimol), 25% W	6	100
EL-273 (triarimol), 25% W	8	100
Benlate (benomyl), 50% W	6	100
Karathane, 25% W	8	100
Karathane, 25% W	6	98
Benlate (benomyl), 50% W	4	98
Benlate (benomyl), 50% W	8	97
Benlate (benomyl), 50% W	2	93
Karathane, 25% W	4	85
Karathane, 25% W	2	83
Check (Water sprayed)	-	31
Check (Unsprayed)	-	0
L.S.D. (.05)		3.2

N. S. Leupschen and L. E. Dickens:

Six year old Barkley Red Rome apple trees were used to evaluate four mildew materials. Single-tree plots were replicated six times at random, with two buffer rows between the treatment rows. Materials were applied April 14, 28, May 19, June 9, corresponding to delayed dormant (with oil), petal fall, first and second cover (Diazinon) sprays.

Mildew incidence evaluations were made on June 23, examining 10 terminals per tree and rating each terminal as to severity: 0 - none, 1 - light infection, 2 - moderate, 3 - severe. The average per tree was used to determine treatment averages, which were converted to percent mildew control based on the check.

Mertect 1183 (TBZ) gave poor control of mildew. Karathane and Benlate, while giving better control, did not give practical field control. At the rates tested, probably more applications in May and June were needed. The BAS 3201-F was statistically less effective than Karathane.

Treatment and rates per 100 gallons	% Mildew Control
Benlate 50% WP, ½ lb.	42
Karathane 25% WP, ½ lb.	31
BAS 3201-F 50% WP, ½ lb.	24
Mertect 1183 60% WP, ½ lb.	10

M. J. Sanders, J. M. Yorston and H. J. O'Reilly:

The test trees located in a high density planting at Creston, B. C. were six year old McIntosh on M IX rootstocks at a spacing of 8' x 15'. Five treatments were used: a) Check; b) Cyprex - 3 lbs/acre (.24 oz/2 gal water); c) Benlate 0.5 bls/100 gal (.16 oz/2 gal water); d) Eli Lily 273 - 40 ppm; e) Eli Lily 273 - 80 ppm. Each treatment consisted of three trees replicated five times.

Timing of the sprays was determined by the use of a DeWit leaf wetness recorder. When an infection period occurred as indicated on the recorder a spray was applied within 60 hours of the beginning of the wet period as recommended in the B. C. Tree Fruit Production Guide.

The amount of chemical per plot was the same throughout the treatments but the water volume was increased as the amount of foliage increased. Five sprays were applied during the season: 1) Just before tight cluster - April 29*; 2) Early pink stage - May 6*; 3) May 18**; 4) Calyx to first cover stage - May 31**; 5) June 16**.

One hundred fruits were picked at random from each replicate and examined for scab. Likewise one hundred leaves were examined (ten leaves from each of ten limbs) from each replicate.

AVERAGE NUMBER OF FRUIT SCAB LESIONS	
Cyprex --	0
Benlate --	0
Eli Lily 273-40 ppm --	0
Eli Lily 273-80 ppm --	0
Check average	14.2

AVERAGE NUMBER OF LEAF SCAB LESIONS	
Cyprex --	1.4
Benlate --	1.0
Eli Lily 273-40 --	0.4
Eli Lily 273-80 --	0.0
Check --	37.2
LSD .05 --	6.29
LSD .01	9.24

CONCLUSION

Because no scab lesions were found on the fruit of any of the treatments it was not necessary to run a statistical analysis of the results. All of the chemical treatments gave a significant control of the disease on the fruit.

All of the treatments gave significant control of leaf infection at the one percent level. There was no significant difference between the different chemical treatments.

There was no evidence of phytoxicity on either the fruit or the foliage.

* Applied by "Solo" power operated knapsack sprayer
** Applied by blower type sprayer

Iain C. MacSwan:

Sprays were applied by handgun to single tree plots, replicated four times, of mature Jonathan trees at early pink (April 21), late pink (April 29), late calyx (May 11), first cover (June 8) and second cover (July 15). Readings of terminals (100 per tree) were made October 20, 1971, and of fruit russet (300 apples per tree) at harvest (October 27).

Karathane 25 WD, Topsin M and ACX 77 provided best control of powdery mildew and least fruit russet.

Treatment and rate per 100 gallons	Percent mildew	Percent fruit russet
Karathane 25 WD .75 lb. + 2 oz. Biofilm.	12.2	7.8
Topsin M 70 wp .75 lb. + 2 oz. Biofilm	14.2	15.2
ACX 77 50 wp .5 lb. + 2 oz. Biofilm.	18.2	18.6
AC 84467 50 wp 2 lbs. + 2 oz. Biofilm.	28.2	23.2
Mertect Flowable (42% active) 5 oz..	28.5	24.6
Check.	49.3	38.1

Iain C. MacSwan:

The test was designed to compare Thynon, Cyprex and Polyram when applied as a single application treatment (SAT) and these treatments with regular spray programs of Cyprex and Polyram. Sprays were applied by handgun to single tree plots, replicated four times, of Red Delicious. The SAT were applied at green tip (March 31). The Cyprex and Polyram regular program sprays were applied at prepink (April 29), late calyx (May 11), first cover (June 8) and second cover (July 14). Approximately 100 leaves per tree were rated as diseased or healthy on October 21, 1971. Fruit scab and russet readings were taken on 375 to 500 apples per tree at time of harvest (November 3).

Four seasons' testing (1967-70) of several fungicides indicates that SAT does not provide consistent adequate control of scab under Willamette Valley conditions. An additional spray(s) will be required.

Treatment and rate per 100 gals.	% Fruit scab	% Leaf scab	% Fruit russet
Cyprex 65 w 0.75 lb. + 2 oz. Biofilm (regular schedule).	16.2	11.7	2.6
Polyram 80 wp 1.5 lb. + 2 oz. Biofilm (regular schedule).	28.7	14.2	4.6
Thynon 75 wp 3 lb. + 2.5 gal. superior-type oil	32.6	30.5	5.3
Cyprex 65 w 3 lb. + 2.5 gal. superior-type oil	88.0	44.0	5.0
Polyram 80 wp 3 lb. + 2.5 gal. superior-type oil	99.4	45.0	3.0
Check	98.6	42.0	3.3

Iain C. MacSwan:

Sprays were applied by handgun to single tree plots, replicated four times, of eight year old dwarf Rome trees at full bloom (May 7), late calyx (May 18), first cover (June 11) and second cover (July 21). The R23233 plots received only two sprays (full bloom and late calyx). Dates of disease readings: Leaf scab (100 leaves/tree) and powdery mildew (100 terminals/tree) - November 5; fruit scab and russet - November 9.

Inclement weather prevented the application of crucial early sprays. Scab control was inadequate in all plots. Dikar provided best control of powdery mildew.

Treatment and rate per 100 gallons	% Fruit scab	% Leaf cab	% Powdery mildew	% Fruit russet
ACX 77 50 wp .75 lb. + 2 oz. Biofilm	22.7	10.5	4.7	12.0
Dikar 80 wp 2 lb. + 1 pint WEX (two trees only)	33.8	12.0	2.5	14.6
Mertect 60 wp .5 lb. + 2 oz. Biofilm	34.9	17.0	11.0	28.6
ACX 77 50 wp .5 lb. + 2 oz. Biofilm.	37.6	16.0	7.7	10.7
R 23233 50 w 2 lbs. (two sprays only)	51.0	15.7	7.2	8.7
Mertect Flowable (42% active) 5 fl. oz.	61.4	18.7	9.5	28.6
ACX 75 25 wp 1 lb. + 2 oz. Biofilm	93.4	11.7	9.5	28.0
ACX 76 25 wp 1 lb. + 2 oz. Biofilm	96.9	12.7	8.0	9.1
Check.	98.6	9.1	7.5	25.4

Iain C. MacSwan:

Sprays were applied by handgun to single tree plots, replicated four times, of mature Rome trees at full bloom (May 7), late calyx (May 18), first cover (June 14) and second cover (July 22). Dates of disease readings: Powdery mildew (100 terminals/tree) October 21; leaf scab - November 5; fruit scab and russet November 15, 1971 (harvest).

Benlate 4 oz. plus 1 gal. superior-type oil provided best control of scab and mildew, but increased fruit russet and in addition produced a white scurf on the skin. Cyprex plus Karathane and Topsin M provided acceptable disease control and low fruit russet. A white scurf was present on the skin of the apples sprayed with Benlate 2 oz. plus 1/2 gal. superior-type oil, but much less evident than that on the fruit of the Benlate 4 oz. + 1 gal. superior-type oil sprayed trees.

Treatment and rate per 100 gallons	% Fruit scab	% Leaf scab	% Powdery mildew	% Fruit russet
Benlate 50 wp 4 oz. + 1 gal. superior-type oil	8.7	6.7	6.5	11.5
Cyprex 65 w .75 lb. + Karathane 25 WD .75 lb. + 2 oz. Biofilm	16.3	11.2	7.5	3.2
Topsin M 70 wp .75 lb. + 2 oz. Biofilm	21.3	20.7	9.2	4.1
Benlate 50 wp 2 oz. + .5 gal. superior-type oil	34.5	20.2	9.0	3.8
ACX 77 50 wp .5 lb. + 2 oz. Biofilm	45.6	26.0	12.7	3.3
Cela W524 20% EC 250 ppm active ingredient	48.3	24.0	8.5	4.0
Mertect 60 wp .5 lb. + 2 oz. Biofilm	55.0	36.2	21.0	2.7
Cela W524 20% EC 200 ppm active ingredient	57.9	20.2	5.7	3.4
AC 84467 50 wp 1 lb. + 2 oz. Biofilm	89.7	32.2	17.7	1.7
ACX 75 25 wp 1 lb. + 2 oz. Biofilm	91.7	32.2	14.0	0.8
ACX 76 25 wp 1 lb. + 2 oz. Biofilm	92.4	32.0	11.7	3.2
Check.	99.9	33.2	36.7	(unable to assess because of scab)

Iain C. MacSwan:

Sprays were applied by handgun to single tree plots, replicated four times, of mature Bartletts, at prepink (April 12) calyx (April 26) and 1st cover (May 24). Pear scab did not appear in any of the plots. Russet readings were taken on 150-200 pears per tree at time of harvest August 28, 1971. All treatments except Cyprex improved fruit finish by reducing russet.

Treatment and rate per 100 gallons	% Scab	Percent Pears with russet
ACX 77 50 wp .5 lb. + 2 oz. Biofilm (applied Calyx and 1st cover only)	Nil	22.4
Polyram 80 wp 1.5 lbs. + 2 oz. Biofilm	Nil	27.0
Mertect 60 wp .5 lb. + 2 oz. Biofilm	Nil	33.0
Thynon 75 wp 1 lb. + 2 oz. Biofilm	Nil	33.2
AC 84467 50 wp .5 lb. + 2 oz. Biofilm (applied Calyx and 1st cover only)	Nil	33.5
Cyprex 65 wp .75 lb. + 2 oz. Biofilm	Nil	50.1
Check		51.7

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