Ron Parker

ABSTRACTS OF REPORTS FROM THE

50th WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

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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
50th Annual Western Orchard Pest and Disease Management Conference

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S E C T I O N I

LEPIDOPTEROUS INSECTS

CODLING MOTH -- APPLES

W. B. Hudson, D. E. Johnson, M. Van Horn:

Three trials were established to determine if codling moth can be controlled by trapping male moths with open and covered Pherocon I CP traps. Three traps per tree in two locations adjacent to commercial orchards failed to prevent severe infestations. Traps operated within as well as outside of trees in an urban location failed to prevent injury.

Results of 1974 and 1975 trials have conclusively demonstrated this non-chemical technique for controlling codling moth is ineffective.

R. W. Zwick:

In a semi-abandoned orchard 3 covers on a 28-day schedule were rated from best to poorest as: azinphosmethyl 1/2#, Pencap M 1 qt, chlordimeform 1/2#, chlorpyrifos 1# = U-36,059 1 qt. The control was only 32% injured, only half of the usual damage observed in this orchard. Damage to Red and Golden Delicious cultivars was equal in another once-sprayed orchard.

Stan Hoyt:

Two plots were established for evaluation of codling moth control. In these plots Penncap M, Dimilin, Phosvel, PP557, FMC 33297, and Guthion (1 oz. actual) gave very good control. Programs of PP557 and FMC 33297 were highly toxic to predacious mites, resulting in a buildup of tetranychid mites. Phosvel was less toxic to predators, but also resulted in a buildup of Tetranychus mcdanieli. Early applications of Dimilin showed toxicity to predacious mites, but later applications appeared less detrimental.

H. F. Madsen:

Codling moth control by male removal has prevented damage in an isolated orchard for the third consecutive year. Synthetic pyrethroids FMC-33297 and NRDC-143, Ofunack, PH 60-40, Ciba-Geigy 18809, and Phosvel all gave satisfactory control of codling moth, but some had undesirable side effects. European red mite increased to damaging numbers on trees sprayed with the synthetic pyrethroids and PH 60-40. Ofunack caused leaf damage and severe russet on McIntosh, Red delicious, and Golden Delicious apples.

CODLING MOTH -- APPLES AND PEARS

W. B. Hudson, D. E. Johnson, and M. Van Horn:

Intensive monitoring of apple and pear orchards in the lower and upper Yakima Valley demonstrated the utility of Pherocon 1 CP traps for timing of and need for sprays and the variability of those needs from orchard to orchard. Five traps per orchard were operated in 10 orchard or blocks ranging from 10 to 40 acres for 22 weeks starting May 5 and ending September 29. Trapping revealed only two distinct broods of codling moth in 1975. First brood sprays were needed in all of the orchards monitored. In one orchard, only a single first brood spray was applied; in 5 orchards, two first brood sprays were applied, and in 4 orchards, three cover sprays were applied. Excellent control of codling moth was obtained in all of the orchards intensively monitored.

CODLING MOTH -- PEARS

W. W. Barnett, D. Machlitt, W. Riel, and C. S. Davis:

Guthion at 1/4 and 1/2 lbs/100 and Guthion 1/4 lb and 1/2 lbs/100 plus Volck oil were applied by handgun to 15 year old pear trees. Fruits were examined twice weekly for new codling moth entries. Guthion at 1/4 lbs/100 + oil lasted 15 days, Guthion 1/4 lb and Guthion 1/2 lbs/100 lasted 21 days. Guthion at 1/2 lb per 100 lasted 31 days.

Everett Burts:

Dimilin applied as petal fall spray or as 2 covers against first brood gave good control of codling moth on d'Anjou pear. A single second brood spray was not effective in preventing worm entries in fruit.

P. H. Westigard:

Several experimental pesticides were evaluated for control of the codling moth and for their effects on non-target species. The synthetic pyrethroids FMC 33297, 25% wp, and ICI PP557 (2 lbs/gal e.c.) gave acceptable control of the codling moth at rates as low as .025 lb a.i./100. Some side effects of these compounds noted when compared to untreated checks were increases in two-spotted spider mite and decreases in population levels of predators including green lacewing and Deraeocoris brevis.

CODLING MOTH -- WALNUTS

Dennis J. Culver:

In 1974 and 1975, codling moth sprays were applied in walnut orchards in Tulare and Kings Counties as needed based on pheromone trap catch data. An application for first brood codling moth control was considered necessary if the cumulative

trap catch reached 50 on or before the peak of adult emergence of the overwintering brood; the peak of emergence occurred when day-degree accumulations (using o F) reached approximately 225 after the start of the adult emergence. This peak of emergence normally occurred 19 to 24 days after the start of emergence. The application was timed at the peak of emergence. An application for second brood codling moth control was considered necessary if the maximum trap catch/night of first brood adults exceeded 5 moths/trap/night. Optimal timing of the spray was 1-2 days after the peak of emergence; the peak of emergence similarly occurred when day-degree accumulations reached approximately 225 after the start of emergence. This optimal spray timing normally corresponded to 9-12 days after the start of emergence.

There were noticeable differences in the response of other pest populations to the different chemical materials used for codling moth control. Guthion 50 WP at 1.5 lbs ai/A applied for first brood control generally was followed by a walnut aphid problem; the same material at 0.75 lbs to 1.5 ai/A for second brood control consistently was followed by a two-spotted spider mite problem. Galecron 95% SP at 1.4 lbs ai/A and Zolone 25% WP applied for second brood control generally effectively suppressed two-spotted spider mites also if thorough coverage was obtained (250-350 gallons/A).

PEACH TWIG BORER -- ALMONDS

R. E. Rice, and R. A. Jones:

Best reduction of peach twig borer strikes with a May 20 spray on almonds was achieved with Supracide, Mobil M-9027, Guthion, and Lorsban; somewhat less but still satisfactory control was attained by Cela-Merck S-2957 and Imidan. Sandoz S-197 did not provide satisfactory control of twig borer in this trial.

PEACH TWIG BORER -- PEACHES

Edward W. Anthon:

Peach twig borer spray trials showed good control of this insect using Dimilin TH-6040, FMC 33297, Furadan, Galecron, Lorsban, Mobil 9087, Stauffer N-2596, and Thiodan.

PEACH TREE BORER -- PEACHES

Edward W. Anthon:

Peach tree borer control experiments showed good control of this insect with the following materials: FMC 33297, Furadan, Lorsban, Shell SD-43775, Stauffer N-2596 and Thiodan.

ORIENTAL FRUIT MOTH -- PEACHES

W. B. Hudson, D. E. Johnson, and M. Van Horn:

Intensive monitoring of an 11-acre peach orchard (Hardy Giant Elberta and J. H. Hale) demonstrated the utility of Pheroconn 1 CP OFM pheromone traps in making post management decisions. Five traps were monitored for 22 weeks starting April 21 and ending September 22. A total of only 26 male OFM were trapped during the entire season even though the orchard was in close proximity to peach orchards with high OFM populations. Guthion W-50 at the rate of 1 1/4 lbs. per acre was applied in a single application August 11. Excellent control of OFM was obtained. No other summer pest control measures were applied.

Donald Davis:

Annually, since the discovery of the Oriental fruit moth during 1969 in northern Utah, traps have been placed in peach orchards in the fruit growing areas. This northern infestation has not spread outside of the Pleasant Grove area (near Provo, Utah), but populations continue to remain high in an area about 2 X 5 miles in size.

A problem has been suspected in extreme southwestern Utah for a number of years. Pheromone traps were placed in four Washington County peach orchards during 1975. Positive catches were obtained in three of the orchards.

NAVEL ORANGEWORM -- ALMONDS

R. E. Rice, and L. L. Sadler:

Acceptable control of navel orangeworm in almonds was achieved by either cultural or chemical methods in 1975. Removal of 99% of the mummy nuts in trees followed by complete destruction of mummies on the ground prior to moth emergence in April resulted in ca. 75% reduction of nut damage at harvest. Single sprays of Guthion at 2.0 lbs. A.I./acre in 100 gpa (concentrate) applied in early May or early June gave ca. 72-74% control, while a double application gave ca. 75% control. The Guthion sprays also produced partial control of peach twig borer; this benefit was absent in the cultural plots.

M. M. Barnes:

Comparisons as larvicides were made among 14 materials with 10 replications in applications at 30% hull-crack and 14 days later. SD-43775, Sevin (WP), PP557, FMC 33297, Orthene, and Imidan WP ranged from 58% to 44% control in a light infestation (10%). 40-acre-block treatment with a single application of carbaryl (WP) at hull-crack gave 52% reduction in a heavy infestation (29%). Early season suppression of first brood larval development with Guthion WP in 40-acre blocks gave 58% reduction with 2 treatments and 46% reduction with 1 treatment in a moderate infestation (22%).

Movement of females may be traced by incorporating dyes in rearing medium to produce colored eggs deposited on egg traps (Keith Andrews).

FRUITTREE LEAFROLLER -- APPLES

Stan Hoyt: Pandemis Pyrusana (? = limitata) - apple

This tortricid has become a pest in a few apple orchards. Preliminary evaluation suggests that codling moth cover programs control the pest where Guthion is used, but where Zolone is used the population may build up. Pheromone traps for P. limitata were obtained from W. Roelofs and proved quite effective at trapping the Washington species.

H. F. Madsen:

Guthion, diazinon, and Dylox all gave good control of fruittree leafroller and European leafroller on apples at either the pink or petal fall stage. Dipel (Bacillus thuringiensis) was ineffective.

Traps containing the sex pheromones of the two species showed promise as monitoring devices, but were not effective as a control measure by male removal.

OBLIQUE-BANDED LEAFROLLER -- PEARS

R. W. Zwick:

An unsprayed infestation which did considerable foliage feeding preferred Bartlett over Anjou. Damage at harvest was 1.7% and 0.6%, respectively.

PEST MANAGEMENT -- APPLES

H. F. Madsen:

Two apple orchards were managed in 1975, and the number of sprays necessary for pest control was reduced by 50% in one orchard, and by 25% in the other. In orchard 1, sampling indicated the need for a leafroller spray on 1/2 of the orchard, and 3 codling moth sprays. Orchard 2 required the following spray: 1/2 of the orchard for European red mite eggs, 1/4 of the orchard for leafroller, 1/4 of the orchard for apple rust mite, and 1 complete codling moth spray.

S E C T I O N II

ORCHARD MITES

EUROPEAN RED MITE -- APPLES

R. W. Zwick:

ZR-856 as a pink was as effective as 2.0 gal oil delayed dormant. R-28627, GCP-5126, Vendex, DS-28271 were all effective against ERM as cover sprays. M09087 and AC-85,258 were ineffective.

Jack D. Eves:

ZR-856 applied as a pink spray on a 1/2 acre plot for European red mite control reduced summer populations of both European red mite and McDaniel mite over the unsprayed check plot. ZR-856 did not appear to effect apple rust mite populations.

Stan Hoyt:

Summer sprays of UBI-R677, ZR 856, Vendex and R 28627 were partially effective in control although the reduction in numbers with all materials was slow. AC 85258 was ineffective. AC 85258 and UBI-R677 appear quite toxic to predacious mites. Acidification of sprays with Sorba Spray ZKP did not reduce the buildup of European red mite on apples as had been reported in Virginia. The acidified treatments had higher mite populations than alkaline treatments but the difference in means was not significant at the 5% level.

The rate of development of European red mite was studied in constant temperature cabinets over a range of temperatures from 13° - 32°C. Similar studies on fecundity were conducted, but the number of eggs deposited per female was extremely low, and the results do not appear to represent a valid estimate. The problem appears to be in the technique as strains from other areas also showed low fecundity.

PEAR RUST MITE

R. W. Zwick:

Post harvest and dormant applications of Na polysulfide + oil reduced fruit infestation from 90+% to under 10%. Morestan in the pink and Plictran, carbaryl, and dicofol in the foliage season were effective in controlling mites on leaves.

PACIFIC MITE -- ALMONDS

Keith Andrews:

First year's results of an experiment to measure effects of mite infestation will be reported.

TWO-SPOTTED MITE -- PEACHES

R. E. Rice, R. A. Jones, and M. L. Hoffman:

Plictran, Stauffer R-28627, and Gulf GCP-5126 gave relatively quick and long lasting reduction of T. urticae on peaches, while Zoecon ZR-856 gave somewhat slower knockdown, but still satisfactory control. ZR-856 and GCP-5126 were easiest on predaceous phytoseiids and thrips, followed by R-28627 and Plictran.

TWO-SPOTTED MITE -- PEARS

P. H. Westigard:

Application of American Cyanimid's 85258 at 1.0 or .5 lb a.i./100 gave excellent control of the two-spotted mite but was phytotoxic to both fruit and foliage of the Bartlett variety. ZR856 at 0.1% a.i. also gave good control but lower rates were not as active. Vendex 4 WDS used at .25 lb and .125 a.i./100 provided better control of the two-spotted mite than the 50% WP formulation used at comparable rates. The control with Plictran during the current year was much poorer than that reported 4 years ago.

MCDANIEL MITE -- APPLES

Donald Davis:

Spider mite populations were very low on apple trees in Utah during 1975. The following materials gave nearly complete control for a 3-week interval. Rates are AI per 100 gallons of mix. Vendex 6 oz, Plictran 6 oz, Carzol 8 oz, Bay Bue 1452 6 oz, Maloneb (Gulf product) 3 and 4 oz. There were slightly more Typhlodromus occidentalis remaining in the Maloneb treatments than in the other plots.

Stan Hoyt:

Good control of this species was provided by ZR 856, R 28627, AC 85258, Plictran and Vendex. A partial knockdown of populations was evident where PP 557 and FMC 33297 were used, but these treatments were toxic to predators and T. mcdanieli numbers were increasing at the termination of the test. Several other treatments appeared toxic to Metaseiulus occidentalis but this may have been partly due to starvation of predators.

MCDANIEL MITE -- SOUR CHERRIES

Donald Davis:

Omite at 6 oz AI per 100 gal and Plictran at both 3 oz and 6 oz AI per 100 gal were applied as preharvest treatments. All three were highly effective in McDaniel mite control with no consistent differences between treatments.

Typhlodromus occidentalis were less numerous on cherry leaves than normally encountered on apples with comparable spider mite populations.

METASEIULUS OCCIDENTALIS -- APPLES

Stan Hoyt:

Single applications of ZR 856, Bay Meb 6447, Afugan, Sandoz 197 I and Dursban showed low toxicity to this predacious mite, while UBI-R 677, PP 557, FMC 33297, SD 43775, Phosvel, AC 85258 and R 28627 appear to be highly toxic. Dimilin was intermediate in toxicity.

In summarizing all tests where effects on M. occidentalis were evaluated, the synthetic pyrethroids (PP 557, FMC 33297 and SD 43775), Phosvel and AC 85258 do not seem suited for use in integrated programs, while ZR 856, Sandoz 197 I, Dursban and the fungicides Bay Meb 6447 and Afugan appear promising. Further studies with Dimilin, R 28627 and UBI-R677 may be warranted to determine less toxic dosages.

PREDATORY MITES -- APPLES

R. W. Zwick:

Phosalon and Imidan used as cover sprays produced minimal toxicity to typhlodromid predators in commercial orchards. Successful biological control of McDaniel and twospotted mites by Metaseiulus sp. was observed in 4 orchards where these materials were used and no acaricide applied.

LABORATORY EXPERIMENTS -- APPLES

R. S. Downing:

Citrazon and Plictran were low in toxicity to the predators Typhlodromus occidentalis and T. columbiensis. Plictran was toxic to Zetzellia mali, but Citrazon was not. ZR856 controlled eggs and active forms of European red mite and McDaniel mite and was low in toxicity to predator mites. PP199 was equally effective against phytophagous mites but toxic to predator mites.

FIELD EXPERIMENTS -- APPLES

R. S. Downing:

Pink bud sprays of Plictran, Citrazon, PP199, R28627, and ZR856 all controlled European red mite. PP199 was toxic to T. occidentalis, and only Citrazon was nontoxic to apple rust mite. As summer sprays, the above materials gave effective control with the exception of R28627. PP199 was the only acaricide highly toxic to T. occidentalis, and Citrazon was the only acaricide nontoxic to Zetzellia mali.

S E C T I O N III

OTHER INSECT PESTS

BOX-ELDER BUG -- PEARS

Johannes L. Joos, B. E. Bearden, C. S. Davis, and A. Berlowitz:

Sleeve tests in 1975 season showed positive damage to pears by the Western Box Elder Bug (Leptocoris rubrolineatus (Say).

The consperse stink bug, Euschistus conspersus Uhler, was first recognized as a problem on pears in 1950. Researchers have recognized for years the potential of several Hemiptera, especially in the families Pentatomidae (stink bugs), Coreidae (squash bugs), Corizidae (Corizid bugs), Lygaeidae (chinch bugs, plant bugs) and Miridae (leaf bugs) for feeding and damaging pear fruit. Lygus pratenis (Linn.) is also a known leafbug, causing injury to pears.

The Western Box-Elder bug, Leptocoris rubrolineatus (Say), in this discussion was recognized by the late E. O. Essig to feed on developing fruit of apples, cherries, grapes, peaches and plums. The author has seen heavy damage on fruit near Manteca, California, in 1961 on both nectarines and Elberta peaches. Box Elder bug normally is host specific to box-elder (Acer negundo L.), and infrequently a host to maple and ash in California. This insect feeds on seeds, foliage, and tender twigs of box-elder and does not attack male trees. A replication of 47 sleeves with introduction of seasonal nymphs and adults at different pear fruit growth stages gave us an excellent indication of damage that can develop from this insect.

CONSPERSE STINKBUG -- PEARS

W. W. Barnett, Gordon Morehead, D. Chaney, and C. S. Davis:

Cygon, Thiodan and Carzol were tested for control of the Consperse Stinkbug collected from the Sacramento Delta pear growing region. Cygon and Carzol provided control whereas Thiodan did not control Stinkbug from the Delta.

PEAR PSYLLA -- PEARS

Everett Burts:

In laboratory tests Bay 92114, Bay NTN9306 and Nemacur were not very effective against first and second instar nymphs of pear psylla. Also in lab tests Dimilin reduced the hatch of eggs deposited on treated pear seedlings. However, when Dimilin was applied to eggs just ready to hatch, it did not reduce hatch but high dosages provided significant nymph kill. In field tests cluster bud, petal fall and summer cover sprays of synthetic pyrethroids did not kill psylla nymphs, but reduced numbers of adults for short periods after treatment. None of the several other materials screened against nymphs in orchard sprays were promising. Mobil 9087 provided significant nymph kill. U36059 applied in seasonal programs

including dormant, delayed dormant and summer sprays by airblast equipment and from helicopter provided psylla control as good as or better than standard programs. In tree washes with a handgun sprayer Basic H detergent increased honeydew removal but did not increase nymph kill over plain water washes.

P. H. Westigard:

Prebloom - The application of Volck Supreme oil (10 gal/acre) prior to oviposition by overwintering females delayed egg laying by about one month and reduced the overwintering population by about 80%. In another test, the application of a second oil 2 weeks following the first resulted in control comparable to the Perthane treatment normally used. In trials to evaluate experimental compounds for overwintering adults, FMC 33297 used at .025 lb/100 or .05 gave control equivalent to Perthane at 1.0 lb/100. Upjohn's 36059 (1 or 2 pts/100) did not give economic control in these pre-bloom tests.

Summer - Of the experimental compounds tested, Mobile 9087 used at 1 or 2 pts/100 gave excellent psylla control. Upjohn 36059 at 2 pts also gave satisfactory results but this compound used at 1 pt did not provide commercial control. The synthetic pyrethroids FMC 33297 and ICI PP557 used in 3 cover sprays reduced psylla levels but did not prevent substantial fruit marking. Another pyrethroid, Shell 43775 gave excellent psylla control at either 0.1 or 0.2 lb/100.

R. D. McMullen:

The synthetic pyrethroid NRDC 143 controlled overwintering adult pear psylla at a rate of 0.1 lb. a.i. per acre. As a summer spray, 0.6 lb. was required and predators were drastically reduced. Three sprays of Altocid 5E (ZR515) reduced numbers of pear psylla but did not prevent fruit damage by honeydew.

R. W. Zwick:

Dormant and delayed dormant oil applications to prevent oviposition gave early season control comparable to the standard program. U-36,059 used season-long at 1 qt/100 was superior to the standard program based on chlordimeform. Several synthetic pyrethroids appear promising as dormant or foliage season materials.

PEAR PSYLLA PREDATORS -- PEARS

R. W. Zwick:

Campylomma verbasci nymphs from overwintering eggs which hatched at bloom controlled psylla for the summer with only 1 prebloom spray application needed. In another orchard, a complex of predators and parasites, mainly Deraeocoris, reduced psylla to low levels seasonally after 2 prebloom applications. Aerial nesting Vespula again eliminated psylla on a caged tree, but getting queens to establish colonies under cage conditions has been unsuccessful.

PEST MANAGEMENT -- PEARS

R. D. McMullen:

In 8 pest managed orchards, the number of pesticide treatments was reduced by an average of 1.8. For each pest the number of treatments was reduced as follows: pear psylla by 1 in 4 orchards and by 2 in 1 orchard; codling moth by 1 in 2 orchards; fruittree leafroller by 1 in 4 orchards; pear rust mite by 1 in 2 orchards; European red mite by 1 in 2 orchards.

WESTERN FLOWER THRIPS -- APPLES

R. W. Zwick:

Formetanate applied during bloom reduced thrips injury on apples significantly in air carrier and handgun applications. No unusual pollinator toxicity was noted in limited orchard applications.

SAN JOSE SCALE -- APPLES

Stan Hoyt:

Delayed dormant applications of Supracide or Supracide plus oil provided excellent control of San Jose scale. Two summer applications of Parathion, Diazinon, Phosvel, Pencap M or Dursban also gave good control.

Laboratory studies on San Jose scale resistance to parathion did not indicate any significant level of resistance in several field collected populations.

A. H. Retan, W. B. Hudson, and D. E. Johnson:

A delayed dormant spray of Volck Supreme oil applied at the rate of 6 gallons per acre in 360, 100 and 50 gals. of total spray per acre gave the following control in a 20-year-old apple orchard: 360 gpa - 98.8%; 100 gpa - 100%; 50 gpa - 97.6%.

SAN JOSE SCALE -- CHERRIES

Edward W. Anthon:

Excellent control of San Jose scale was obtained by a delayed dormant spray of the following materials: Lorsban + oil, Stauffer N-2596 + oil, Superacide, Superacide + oil, and Volck supreme oil.

CHERRY FRUIT FLY

F. L. Banham:

One spray of dimethoate or 2 sprays of diazinon applied to the lower halves of cherry trees did not provide adequate control of black or western cherry fruit fly.

Infestations of western cherry fruit fly maggots in sweet and sour cherries were reduced 53 to 68% by fumigating for 3 days with either CO_2 or $CO_2 + N_2$ at 21-23° C.

Unbaited saturn yellow Prokobol traps captured an average of 141 western cherry fruit flies per trap and Pherocon AM traps with incorporated bait 137 after 4 weeks. AM traps caught 33 and Pherocon Type 3 traps with baited stickem 20 flies per trap after 14 weeks. Fly captures on Type 3 traps were increased by 7% by exposing the sticky surface outwards rather than inwards.

CUTWORMS -- TREE FRUITS

J. F. Howell:

The bertha armyworm (*Mamestra configurata*) damaged peaches, nectarines, and apples just prior to or at harvest time in the Yakima Valley. Larvae were particularly abundant in September and October. Potatoes and sugarbeets were also heavily infested. Canada thistle is the preferred weed host. Fruit damage was confined to limbs that dropped down into the weedy ground cover. Peaches and nectarines were preferred over apples. Cherry leaves were resistant to attack.

Euxoa sp. were controlled in small plots in a grape vineyard with TH 6042 at 2 oz. AI/acre.

Western yellow striped armyworm *(Spodoptera praefica)* was controlled in micro-plots of mint with an introduced nematode *(Neoaplectana* sp.). It has also been effective in the laboratory against the black cutworm *(Agrotis ipsilon)*, alfalfa looper *(Autographa californica)*, cabbage looper *(Trichoplusia ni)* and *Diarsia pseudorosaria*. Other species have not been tested.

Apple trees that had received simulated cutworm damage (75% bud removal) consecutively for two years (1973, 1974) had a diminutive bloom in 1975. However, at harvest there were no significant differences in production or crop characteristics.

Spotted cutworm *(Amathes c-nigrum)* populations were much higher than in 1974, but quite similar to those of 1973. Biotic factors yet unidentified regulating the overwintering population appears to be the factor controlling spring populations that are damaging.

Of the 144 probable species of noctuids collected in orchards around Yakima Valley the past 3 years, 55 species were not represented in the collections this year. Adults of 29 species are present all season long, 22 species occur in spring, 22 in summer, and 19 in the fall.

CUTWORMS -- (GREENHOUSE BEANS)

Edward W. Anthon:

Under greenhouse testing conditions, the following materials gave excellent control of immature cutworms: Shell SD-43775, Dimilin TH-6040, Stauffer N-2596, Lorsban, and FMC 33297.

GREEN STINK BUG

Edward W. Anthon:

Under greenhouse conditions and by dipping the bugs for 5 seconds and then rearing them on small tomato plants, excellent control was obtained with the following materials: Carzol, FMC 33297, Lorsban, Shell SD-43775 and Stauffer N-2596.

GREEN PEACH APHID

Edward W. Anthon:

Thiodan, Monitor and Carzol looked good for the control of green peach aphid in the field.

LYGUS BUG

Edward W. Anthon:

Field caged experiments for the control of lygus in the field showed the following materials to give good control of this insect for a week: Carzol, Cygon, Furadan, Lannate, Guthion, Dimilin TH-6040, and Parathion. Thiodan and Lannate gave the longest residual action.

WALNUT HUSK FLY

L. B. Fitch, W. H. Olson, W. W. Burnett, and C. S. Davis:

Various types of Walnut Husk Fly traps were compared in several walnut orchards. The standard Gylcine and Lye Bait Traps consistently caught more flies than the Frick Traps. The one pint ice cream carton manufactured by Fonda and the one quart milk carton caught about the same number of flies. The one pint ice cream carton manufactured by Int. Liq. Cylindrical or SealRight consistently caught the least number of flies. The unlabeled white one quart milk carton and the Foremost one quart milk carton performed equally.

Other traps that look promising, possibly approaching the Gylcine and Lye Bait Pan, were the Zoecon A M Trap and a paper plate coated with Stickem^{R} using ammonium carbonate as an attractant. Staley's Protein Bait No. 7 was a very weak attractant.

Johannes L. Joos, W. C. Batiste, C. S. Davis, W. H. Olson, and R. R. Sanborn:

A new U. C. trap was tested on Walnut Husk Fly, Rhagoletis completa Gresson in 1975.

This new trap was tested for performance against the psychedelic trap now being used in commercial orchards to determine the presence and size of Husk Fly populations. Seasonal population density tests in 1975 in the North Coast counties of Marin and Lake, San Joaquin County, Butte County, Contra Costa County, and the Grand Junction area of Colorado showed very good performance. The chemical attractant used was ammonium carbonate. Simplicity of design, holding capacity of attractant, improved performance and availability of trap materials should help walnut growers determine accurately economic levels and timing for pesticides when needed.

S E C T I O N IV

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

A. H. Retan, W. B. Hudson, and D. E. Johnson: Alternate Row Spraying -- Apples

Alternate row spraying gave good pest control in a 15-acre apple block. Three cover sprays of Guthion 50W at 1 lb. per acre gave good codling moth control in 1974 and 1975. A single application of Plictran 50W at the rate of 1 lb. and Phosphamidon 80% EC at the rate of one-half pint per acre in the third cover spray gave adequate apple aphid control and European red mite control. All sprays were applied at 80 gpa with a conventional air-blast sprayer.

A. P. Gaunce: Increasing Pesticide Persistence -- Apples

Keltose, an alginate gelling agent, increased the persistence of diazinon. Higher residues were recorded 1 to 14 days after application with the maximum effect on day 4. Phosalone persistence was also increased, but no increase was noted with Guthion. The adjuvants caused plugging of sprayer screens because of larger mass media diameter of droplets.

R. W. Zwick:

The following experimental compounds were phytotoxic to fruit or foliage:

Pear - AC 85,258: extreme leaf and fruit causing burning and epidermal necrosis: DS 24465 EC - EC ring-spot on fruit; MO 9087 EC - light ring-spot on fruit; phosalone + malathion EC - severe EC ring-spot on fruit, necrotic spots on leaves; chlordimeform - both EC and SP gave ring-spot marks on fruit this year in some applications with premature ripening of Bartletts noted in some instances which may or may not be associated with the injury.

Carl Johansen: Honey Bee - Bee Poisoning

Following is a tabulation of results of bee poisoning trials of 1975 in ascending order of hazard to honey bees:

Material	lb/acre	residual toxicity
ethephon	1 pt/100 gal	low 3 hr
ethephon	1 qt/100 gal	low 3 hr
TH 6042 2.08 lb F	0.5 oz	low 3 hr
UBI-R677 1/2 lb EC	0.25	low 3 hr
UBI-R677 1/2 lb EC	0.5	low 3 hr
fenitrothion 8 lb EC	0.125 (in diesel)	low 3 hr
TH 6042 2.08 lb F	1 oz	low 8 hr

Material	lb/acre	residual toxicity
SD 43775 2.4 lb EC	0.1	low 8 hr
PP 557 2 lb EC	0.5 oz	moderate 8 hr
SN 11504 33% WP	0.5	moderate 8 hr
CGA 15324 4 lb EC	1	moderate 8 hr
fenitrothion 8 lb Ec	0.5	moderate 8 hr
BAY NTN 9306 6 lb EC	0.75	low 1 day
PP 557 2 lb EC	1 oz	high 8 hr
SD 41706 2.4 lb EC	0.1	high 8 hr
PP 557 2 lb EC	2 oz	very high 8 hr
BAY 92114 6 lb EC	1	very high 8 hr
SD 41706 2.4 lb EC	0.4	very high 8 hr
SD 43775 2.4 lb EC	0.4	very high 8 hr
fenitrothion 8 lb EC	1	very high 1 day
SAN 197 4.28 lb EC	0.25	moderate 3 days
dimethoate 2.67 lb EC	0.5	low 5 days
methidathion 2 lb EC	1	low 5 days
SAN 197 4.28 lb EC	0.5	low 5 days
CGA-18809 80% WP	0.5	very high 6 days
CGA-18809 80% WP	2	very high 6 days
SAN 197 4.28 lb EC	0.25	low 10 days
SAN 197 4.28 lb EC	0.5	low 12 days
carbofuran 4 lb F	1	low 14 days
carbofuran 4 lb F	1	high 14 days

S E C T I O N V

PHEROMONES

OMNIVOROUS LEAFROLLER -- PEACHES

R. E. Rice, and R. A. Jones:

The omnivorous leafroller Platynota stultana, was monitored in peaches throughout the 1975 season with a synthetic pheromone. Results of trapping showed a very long spring adult emergence period and flight, followed by lower but continuous adult activity through the summer. Adult populations again increased in September, and flights continued into late November.

PEACH TWIG BORER PHEROMONES

Edward W. Anthon:

New pheromone caps were placed in traps in peach trees every 6 weeks during the summer. The last pheromone cap was placed in the traps August 14 and caught male moths until October 27, a total of 10 weeks. This orchard has not been sprayed for several years and with a trap in every other tree and every other row 68% control of peach twig borer was obtained. Peak moth catches were June 11 and July 31.

CODLING MOTH -- PEARS AND APPLES

Johannes L. Joos:

I. Mass trapping techniques for the control of Codling Moth (Carpocapsa pomonella Linn.) in North Coast Counties of California 1973-1975.

1) A three year study was conducted on backyard control of Codling Moth with pheromone traps (Zoecon CM) in pears and apples. Control was obtained on an area basis in three locations.

2) Mass trapping of Codling Moth in two commercial orchards with no application of pesticides and two commercial orchards with a regular control program including untreated checks gave partial control.

Research methods of trapping out males or confusion of Codling Moth populations have been attempted in this area for over three years. The results show that with proper technology we can reduce larval damage to both pears and apples by mass trapping methods. On an area basis for backyard trees a three- to four-fold reduction of larval fruit damage was realized. In commercial orchards without pesticides an average (mean) reduction was made of 50 percent damaged fruit at harvest.

SAN JOSE SCALE -- MIXED STONEFRUITS

R. E. Rice, R. A. Jones, and M. L. Hoffman:

Seasonal flights of male San Jose scale monitored with virgin females in pheromone traps showed some variations compared to 1974 flights. In 1975, the 1st flight in March-April failed to develop, although mating was occurring as shown by subsequent crawler emergence in May. The 2nd flight developed during June as in 1974, but the 3rd flight in 1975 was delayed into August-September, rather than during July-August.

S E C T I O N VI

DECIDUOUS ORCHARD DISEASES

DISEASES OF POME FRUITS

Jack D. Eves: Powdery Mildew - Jonathan Apples

Afugan at 8 oz. per acre A.I. reduced infected leaf surface by 44% over Karathane and 52% over check at harvest. Afugan at 4 oz. per acre reduced infected leaf surface by 19% over Karathane and 30% over check. Afugan at the higher rate was slightly less effective in combination with Cyprex. Afugan and Afugan - Cyprex combinations had less detrimental effect on apple rust mite than Karathane.

H. R. Cameron: Pear Decline - Pears

Twenty matched pairs of boscpear trees were selected from a pear decline infected orchard. Trees were paired according to their rate of decline during the past ten years and their location in the orchard. Tetracycline was applied at 200 ppm in the spring of 1972 an additional application in the fall and a third application at 100 ppm in the spring of 1973. The amount applied varied with the condition of the tree but 12 liters per tree was used for the first two applications and five liters per tree in 1973. Shoot growth of treated did not increase in 1972, increased about 2 inches per shoot in 1973 and showed a dramatic increase in 1974. Fruit size decreased slightly in 1972, and failed to show a significant difference in 1973, or 1974. Yield of treated tree did not increase in 1973, and was not recorded in 1974.

W. O. Reil and J. A. Beutel: Pear Decline - Pears

Pressure injection of pear trees for pear decline causes remission of symptoms equal to the bottle transfusion (gravity feed) method in 1974-75 tests. One quarter inch holes were drilled 2 1/2 to 3" deep and a hollowed wood screw inserted only deep enough to seal the hole. One quart Terramycin® solution at 600 ppm was measured by a hydraulic ram and forced into the tree at 200 lbs. p.s.i. pressure. Young pear trees required lower dosage. Three injection holes per tree generally have been adequate on mature pear trees for good distribution.

Trees suffering from pear decline improved following each injection, if good psylla control was practiced. Based on the N. W. grading system trees improved 1/2 to 1 grade per year, if injected in the fall of each year.

Average NW Grade of Treated Trees

	Orchard 1	Orchard 2	Orchard 3
Number Trees	15	30	64
Years Treated	1972, 73, 74	1973, 74	1973, 74
	N.W. Grade		
1972	3.31	--	--
1973	2.31	2.77	3.23
1974	2.23	2.97	2.61
1975	1.42	1.77	1.31

Treatment for several minor element deficiencies have also been made with this machine with successful correction of both iron and zinc deficiencies.

W. O. Reil, W. J. Moller, and S. V. Thomson: Fireblight - Pears

Application of bactericides following initial detection of Erwinia amylovora in flowers continues to be an effective means of controlling fireblight in California pear orchards. Although the past year gave a low incidence of disease in most areas of the state, some orchards developed considerable blight infection late in the season.

E. amylovora was not detected until mid to late April in the warmer districts which correlated with cool spring climatic conditions of 1975; no hot weather occurred until late June. Populations of bacteria in blossoms remained high and did not decrease until late June.

Most blight spray programs terminated at the usual time of early to mid May, based on previous years' experience and shortage of blossoms in the orchard. However, due to populations of 10^4 - 10^6 bacteria/flower infections still occurred in many orchards. These infections were commonly in the form of "shoot blight" as well as in the few "rattail" blooms.

A correlation of 62°F mean and the initial detection of E. amylovora in previous years did not fit 1975 data and therefore a modification of our predictive approach was made. A sloping mean temperature line starting at 62°F on March 1st and decreasing to 58°F on May 1 is more closely correlated to present data.

Work on new identification methods which will shorten the time interval between sampling and positive identification is continuing. A specific antiserum has been developed which can be used to identify individual E. amylovora directly from the plate. Recent development of an immunofluorescent-labelling technique enables identification of individual E. amylovora cells in a blossom wash. This technique will be applied to field samples in 1976.

Efficiency of Reduced # of Applications of Bactericides in the Control of Fireblight

Spray Treatments	# of Applications	Fireblight Strikes in 240 Trees	
Control	0	50	a*
Normal	16	1	b
After 62°F Mean Reached	6	12	b
After 1st Detection of Bacteria	10	8	b

*Values followed by different letters are significantly different at the 0.05 level.

B. E. Bearden, W. J. Moller, and W. O. Reil: Monitoring Pear Scab in Mendocino County

The goals of this study were: to verify the emission periods of pear scab ascospores as related to pear growth stages and climatic factors; to test the reliability of the "Mills Tables" in determining infection periods and forecasting the appearance of symptoms; and to test the effectiveness of Benlate® applied within 48 hours of an infection period.

During 1975, in the Potter Valley area of Mendocino County, pear scab spore emission was very low through March, which encompassed the growth period from green tip to 1% bloom. Although infection was predicted in that period by the Mills Tables, no detectable scab infections resulted.

Primary spore emission increased with each successive rain and reached a peak on April 22-24 when a "heavy" infection period was predicted and resulted in 12% scabby fruit on unsprayed trees. Benlate® sprays applied up to 48 hours after infection were effective in preventing scab infection.

The Mills Tables appear to give a reasonably accurate, though possibly conservative, guideline for predicting pear scab infection under Mendocino County conditions.

DISEASES OF STONE FRUITS

J. M. Ogawa and B. T. Manji: Field Evaluation of New Fungicides for Control of Brown Rot Blossom Blight

Fungicides were evaluated for control of brown rot (Monilinia fructicola or Monilinia laxa) blossom blight on various stone fruits. A single blossom spray was applied with a handgun sprayer. Disease was evaluated by counting blighted blossoms or shoots. Data summarized in Table 1.

In the Fay Elberta and Dixon peach trials, all fungicides tested were significantly better than the control. Captan was less effective than other tested fungicides in the Dixon trial. Last spring blossom brown rot in peach orchards was very low and under higher disease incidence the results may have been different.

BAS 352, RH 3928 and DPX 10 were as effective as Topsin M and Benlate in all trials. RP 26019 significantly reduced blossom blight in the peach, nectarine and apricot trials; however, it did not control blossom blight in the French prune and Dake almond trials.

Table 1. Evaluation of fungicides for brown rot blossom blight control.

		Average Number Blossom Blight or Strikes/Tree					
Treatment	Conc/ 100 gal	French prune	Fay Elberta peach	Dixon peach	Almond	Blenheim apricot	LeGrand nectarine
BAY 6447 25W	8 oz	-	0.2 a	-	-	-	-
BAS 352 50W	12.8 oz	2.2 a	0.2 a	6.3 a	-	-	-
RP 26019 50W	8 oz	10.0 a b	0.2 a	4.3 a	172.2 b	36.8 a	0.2 a

Table 1. Cont'd

Treatment	Conc/ 100 gal	Average Number Blossom Blight or Strikes/Tree: French prune	Fay Elberta peach	Dixon peach	Almond	Blenheim apricot	LeGrand nectarine
RH 3928 50W	8 oz	3.8 a	1.2 a	5.3 a	26.0 a	16.0 a	0.4 a
ABG 2000 50W	16 oz	-	3.0 a	-	-	-	-
Bravo 6F	1.5 pt	-	3.8 a	9.7 a	-	-	-
Topsin M 70W	5.8 oz	4.2 a	0.2 a	8.2 a	19.0 a	33.5 a	-
Benlate 50W	8 oz	-	0.2 a	-	-	-	0.4 a
DPX 115 50W	2.5 lb	4.7 a b	-	4.3 a	-	-	-
DPX 10 50W	6 oz	2.0 a	-	7.3 a	-	-	-
Captan 50W	2 lb	9.5 a b	-	31.0 b	-	-	-
Control	-	12.8 b	17.6 b	48.8 c	198.2 b	305.0 b	9.6 b

J. M. Ogawa, B. T. Manji, and I. C. MacSwan: Evaluation of Fungicide Adhesives for Control of Coryneum Blight and Peach Leaf Curl in California

Summary: Addition of adhesives such as Bio-Film to Ziram and oil to fixed copper sprays did not increase their efficacy in control of peach diseases Coryneum blight and leaf curl under an exposure of 16 inches of rain.

In California, protective fungicides commonly used for control of Coryneum blight and leaf curl of peaches are ziram and fixed coppers. Residual action of 4 to 5 months is required to protect dormant buds and twigs from Coryneum beijerinckii and leaves from Taphrina deformans. English and Davis (2) reported that the efficacy of ziram and ferbam was not enhanced by the addition of adhesive oils for control of Coryneum blight and English (1) reported that captan and ziram were not enhanced by the addition of adhesive oils for control of leaf curl. MacSwan (3), on the other hand, using Bio-Film as an adhesive showed that ferbam provided better control of leaf curl than Bordeaux mixture, Kocide, or liquid lime-sulfur without an adhesive.

This study was made to determine if ziram with Bio-Film and COCS (copper oxychloride sulphate) with Volck Supreme oil would provide better disease control than the fungicides used alone under severe disease conditions.

The Red Haven peach plot was located on the University of California, Davis campus. Handgun sprays were applied on 5 single-tree replications using 4 gallons of spray per tree. Data were obtained by randomly cutting shoots and evaluating Coryneum by counting dead buds and lesions on the twigs and obtaining percentage of leaves affected with Taphrina.

Results show that all treatments provided excellent control of the two diseases with no difference in efficacy between fungicides with and without additives. Ziram plus Bio-Film gave better control of leaf curl than COCS with or without oil (Table 1). This confirms the studies made previously in California (1, 2).

Because the total rainfall from the time of application could have a bearing on final disease data, precipitation records in California for this period were compared to the average. The average rainfall in inches and the departure from normal for 1974-75 were Nov. 1.06 (-0.98), Dec. 3.43 (+0.22), Jan. 0.23 (-3.65), Feb. 6.21 (+3.42) and March 4.08 (+2.13) for an average of 15.01 and departure from normal of (+1.14) for Davis (4). Within our plot rainfall record showed a departure from normal of (+0.09).

Judging from previous and current results in California, in areas of higher rainfall, such as in the state of Oregon, addition of adhesives is beneficial, but under exposure to 15 to 16 inches of rainfall no benefits are derived in control of Coryneum blight or leaf curl of peaches.

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1. English, H. 1958. Fall applications of ziram and ferbam effectively control peach leaf curl in California. Plant Dis. Rep. 42:384-387.

2. English, H., and J. R. Davis. 1962. Efficacy of fall applications of copper and organic fungicides for the control of Coryneum blight of peach in California. Plant Dis. Rep. 46:688-691.

3. MacSwan, I. C. 1972. Stone fruit disease reports. Fungicide and Nematicide Results of 1972. Vol. 28, p. 47.

4. U. S. Dept. of Commerce. Climatological Data, Calif. for 1974 and 1975. National Climatic Center, Asheville, N. C. 28801.

Table 1. Comparison of fungicide with and without adhesive on control of peach shot hole and leaf curl.

Treatment[a]	Amount per 100 gal.	Shot hole[b] Avg. no./twig[b] dead buds	Shot hole[b] Avg. no./twig[b] lesions	Leaf curl[b] percent
Ziram 76% plus Bio-Film	2 lbs 12 fl oz	2.2 a[c]	31.4 a[c]	1.6 a[c]
Ziram 76%	2 lbs	5.2 a	34.6 a	1.9 ab
COCS 50% plus Volck Supreme oil	4 lbs 2 gal	12.6 a	27.6 a	6.6 b
COCS 50%	4 lbs	11.4 a	32.8 a	6.9 b
Untreated	---	52.0 b	80.4 b	86.5 c

[a] The spray applied on Nov. 6, 1974 with handgun sprayer using 4 gal/ tree. Replications consisted of 5 single-tree replications.

[b] 50, 35 cm twigs were cut in the orchard and examined in the laboratory.

[c] Statistical comparisons were made using the Duncan's multiple range test. P = .05.

DISEASES OF NUTS

W. H. Olson, W. J. Moller, L. B. Fitch, and R. B. Jeter: Walnut Blight - English Walnuts

Three screening trials were conducted in 1974-75 by applying sprays by air blast sprayer on large plots replicated four or five times on Ashley walnut trees. Materials used in these trials included: 1) Copper Count®N, 8-5-100 Bordeaux, PQ8. 2) Copper Count®N, Kocide® 101, 8-5-100 Bordeaux, COCS. 3) 4-2.5-100, 8-5-100, 12-7-100, and 16-10-100 Bordeaux mixtures.

Two spray timing trials were conducted, one in 1974 by air blast sprayer on large plots replicated four times on Ashley walnuts. In this trial, an 8-5-100 Bordeaux mix was applied once at 40 percent pistillate bloom, or twice: once at 40 percent pistillate bloom and at 50% post pistillate bloom. In 1975 a timing trial was applied by handgun on individual tree plots replicated 10 times on Ashley walnuts. Kocide® 101 was applied according to three timing schedules: 1) prebloom spray only, 2) a prebloom spray, and a 40 percent pistillate bloom spray, 3) a prebloom spray, a 40% pistillate bloom spray, and an early postbloom spray.

Walnut blight control was evaluated three weeks after the final spray applications were made. Daily rainfall records were kept, and weekly high temperatures were observed.

No significant difference between any of the materials tested or rates of Bordeaux tested could be found with the exception of PQ8 which was no better than the untreated check in blight control.

Timing trials indicated that sprays applied at a particular stage of nut development were beneficial in controlling blight only if rains followed. Due to rapid nut growth, control was reduced when sufficient time lapsed between an application and rainfall.

In 1975, prebloom sprays and rainfall prior to the appearance of nutlets had no influence on the percentage of blighted walnuts.

H. R. Cameron: Eastern Filbert Blight - Filberts

Eastern Filbert Blight, incited by Apioporthe anomala has become established in a 75 square mile area of Clark and Cowlitz counties of Washington and Columbia county, Oregon. The infected area is triangular in shape and is about 22 miles north of Portland, Oregon. The disease, in combination with lax orchard management, has destroyed seven orchards. An additional 13 orchards have varying degrees of infection. The cultivar 'Daviana' is the most susceptible of commonly grown selections. 'Barcelona' and 'Du Chilly' are considerably less susceptible but trees are still killed once the infection is established. Ascospores are released from September through May. Asexual spores of a Phlomapis type fungus are released during the summer. The sexual and asexual stages have not been proven to be part of a single life cycle. No chemical control has been found but ABG 2000 has shown promise against the asexual isolate in laboratory test. The use of stringent sanitation practices has not materially reduced infection after one year. One or both of the filbert bud mites appear to provide a point of entry for the fungus. Other wounds that expose the xylem also permit infection.

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A PARTIAL LIST OF PESTICIDES

REPORTED ON IN THESE ABSTRACTS

TRADE NAME	COMMON NAME
Afugan	--
Benlate	benomyl
Bravo	daconil
Carzol	formetanate (hydrochloride)
Citrazon	--
COCS	copper oxychloride sulfate (fixed copper)
Copper Count	copper amonium carbonate
Cygon	dimethoate
Cyprex	dodine
Dursban	disulfoton
Dylox	trichlorfon
Furadan	carbofuran
Galecron	chlordimeform
Guthion	azinphosmethyl
Imidan	phosmet
Karathane	dinocap
Kocide	copper hydroxide
Lannate	methomyl
Lorsban	chlorpyrifos
Monitor	methamidophos
Morestan	oxythioquinox
Nemacur	--
Orthene	acephate
Pencap	--
Perthane	--
Phosvel	leptophos
Plictran	tricyclohexylhydroxytin
Sevin	carbaryl
Supracide	methidathion
Terramycin	--
Tetracycline	--
Thiodan	endosulfan
Vendex	--
Ziram	--
Zolone	phosalone