ABSTRACTS OF REPORTS FROM THE 53rd ANNUAL WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

Imperial Hotel, Portland, Oregon

January 10, 11, 12, 1979

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.

These abstracts are reproduced by the
Oregon State University Cooperative Extension Service.

Abstracts of Reports from the
53rd Annual Western Orchard Pest and Disease Management Conference

TABLE OF CONTENTS

LEPIDOPTEROUS INSECTS -- Section I
- Codling Moth - Apples 1-3
- Codling Moth - Cherries 3
- Codling Moth - Pears 3-4
- Codling Moth - Pome Fruit 4
- Codling Moth - Pears and Apples 4-6
- Codling Moth - Control 6
- Leafrollers - Apple 6
- Navel Orangeworm - Almonds 7-9
- Orange Tortrix - Apples 9-10
- Peach Twig Borer - Peaches and Almonds 10
- Pheromone Trapping - Peaches 10
- Pheromone Trapping of Orange Tortrix and Obliquebanded Leafroller 10-11

ORCHARD MITES -- Section II
- European Red Mites - Apples 12
- European Red Mite, Apple Rust Mite, Metaseiulus occidentalis - Apples 12
- European Red Mite, Apple Rust Mite and Typhlodromus occidentalis - Apples . . 12
- McDaniel Mites - Apples 13
- Pacific Spider Mite - Almonds 13
- Pacific and Twospotted Spider Mites - Almonds 13
- Spider Mites - Pome Fruit 13-14
- Two-Spotted Mites 14
- Two-Spotted Mites - Almonds 14
- Two-Spotted Mite, European Red Mite, and Predators - Almonds 14-15
- Two-Spotted Mite, European Red Mite, and Predators - Peaches 15
- Integrated Mite Control - Pear 15
- Phytophagous Mite Control 15

OTHER INSECT PESTS -- III
- Pear Psylla - Pears 16-18
- Apple Aphid and White Apple Leafhopper 18
- European Fruit Scale - Apple 18
- San Jose Scale 19
- San Jose Scale - Apples 19-20
- San Jose Scale - Pear 20
- San Jose Scale - Peaches 20-21
- San Jose Scale - Pheromone Research 21
- Current Status of the Western Cherry Fruit Fly Phenology Model 21
- Relationship of Temperature to Pupal Developmental Rates in the Western Cherry Fruit Fly, Rhagoletis indifferens Curran 21-22
- Walnut Husk Fly - Walnuts 22
- Western Cherry Fruit Fly - An Area Wide Pest Management Program 22
- Woolley Apple Aphids - Apple 22

CONCENTRATE SPRAYING RESIDUES AND PHYTOTOXICITY
Aldicarb - Almonds 23
Air vs Ground - Carbaryl - Almonds 23
Air vs Ground - NOW - Almonds 23

DECIDUOUS ORCHARD DISEASES
Brown Rot Blossom Blight and Fruit Rot - Cherry (Corum) 24
Brown Rot Blossom Blight and Fruit Rot - Cherry (Royal Anne) 24-25
Brown Rot Blossom Blight and Fruit Rot - Cherry (Sour) 25-26
Brown Rot Blossom Blight and Fruit Rot - Early Italian Prune 26
Brown Rot - French Prunes 26-27
Brown Rot Blossom Blight and Fruit Rot - Peach (Elberta #2) 27-28
Brown Rot Blossom Blight and Fruit Rot - Peach (Elberta #3) 28-29
Leaf Curl - Peach 29
Mildew - Apples 29
Powdery Mildew - Jonathan Apples 29-30
Powdery Mildew - Rome Apples (#1) 30
Powdery Mildew - Rome Apples (#2) 30-31
Scab - Red Delicious Apples 31
Quiescent infections of Stone Fruits in California 31-32
Populations and degree of Benomyl-Resistant Monilinia fructicola 32-33
following orchard application of fungicides

S E C T I O N I

LEPIDOPTEROUS INSECTS

Discussion Leader -- John Procter

Codling Moth - Apples

Stan Hoyt

The Michigan codling moth phenological model was modified and put on the TFRC computing system. Excellent results were obtained in the prediction of first generation events. Validation from prior years also showed good agreement of actual and simulated events.

Excellent control of codling moth was obtained with Bay Sir 8514 at 4 ozs/100 and good control was provided by programs using Dimilin and Guthion at lower rates. Lorsban was less effective.

H.F. Madsen and B.E. Carty
Research Station, Summerland, B.C.

Chemical Control: Dimilin 0.14 kg/ha ai and Guthion 0.75 kg/ha ai gave good control of the colding moth in an orchard where populations were relatively low. Dylox 1.8 kg/ha ai was less effective. The percent injured fruit at harvest was as follows: Dimilin 0.5, Guthion 0.2, Dylox 3.2, and control 6.4.

Monitoring: Sex pheromone traps to monitor codling moth populations is the basis of the integrated pest management program on apples. A trap density of 1 per ha. and an economic threshold of 2 male moths per trap remains unchanged. In 1978, our pheromone caps were "home made" from pure pheromone and proved as attractive to male codling moths as commercial lures.

Male Removal: Experiments on codling moth control by male removal were conducted on three orchards: Young Orchard, isolated, trap density 10 per ha. In 1977, 81 male moths captured, infestation 0.03 percent. In 1978, 74 male moths captured, infestation 0.02 percent. Good control under conditions of complete isolation. Thorstenson Orchard, semi-isolated, trap density 10 per ha. Moths captured in 1977 was 166, infestation o.6 percent. Moths captured in 1978 was 860 with the infestation 8.0 percent. Illustrates the comeback powers of the codling moth. Rutt Orchard, not isolated, trap density 36 per ha. Moths captured in 1977 was 963, infestation 37 percent. In 1978, moths captured was 1663, infestation 60 percent. A disaster!

D. O. Hathaway
Yakima Agricultural Research Laboratory
Federal Research, Science and Education Administration
Yakima, WA 98902

Attractants and Traps for Monitoring Populations: The Kitterman insect trap in various colors was evaluated for codling moth during the summers of 1977-1978. The codling moth sex pheromone was used as bait at 1 mg per trap. Five replicates of the Kitterman trap were used for each of seven different colored traps, and five replicates of the covered wing trap were used at one trap per tree in a block of apple trees. The total number of moths caught in the Kitterman trap for 1977-78 was red, 199; blue, 194; yellow, 170; orange, 201; green, 215; white, 185; and gray, 197. There were 192 moths caught in the covered wing trap. The color of the trap did not seem to make much difference in the trap catch.

Evaluation of the Kitterman trap was also based upon a comparison of the trap with the covered wing trap, open wing trap, Sectar I®, and the one-gallon BAB trap. All of the traps were baited with 1 mg of attractant. The Kitterman trap caught as many if not more moths than any of the other traps tested.

Trap catch was recorded when the Kitterman trap was placed at three different height levels: 5, 8, and 12 feet in the apple trees. There were 62 moths caught at the 5-ft level, 127 at the 8-ft level, and 200 moths at the 12-ft level. A second test was repeated at the same heights with approximately the greatest number of codling moth males being captured in the top of the trees which was at the 12-ft level.

The Kitterman trap took more time to put together than the paper traps because we had to make a wire hanger for the trap; however, it is a more permanent trap and overhead sprinkling does not affect the shape of this trap as it does that of the paper traps. The Kitterman trap can be used to good advantage in monitoring field populations of codling moth, especially in an overtree sprinkled orchard.

P.S. McNally and M.M. Barnes, Dept. of Entomology
University of California, Riverside, CA 92521

Factors that were suspected of contributing significant variability to pheromone trap catches were investigated. Observations were made to determine whether or not a reduction in trap efficiency could occur by varying the pheromone substrate, varying the amount of sticky adhesive absorbed on the substrate, aging the substrate, and aging the liner. In addition, the efficacy of mass-trapping was determined in a previously uninfested orchard.

Jack D. Eves
Ag. Re. Con., Processer, WA 99350

Three cover sprays of Golden Delicious apples indicated the following effectiveness: Ambush .05E= Ambush .05W > Ambush .10E = Ambush .10W = Pounce .05 > Pounce .025 > FMC 35001 .375 > Guthion .25 > Pounce .0125 > Guthion .125 > FMC 35001 .25 > FMC 35001 .125 > check. Checks had 48.5% larval entries and only FMC 35001 at .125 exceeded 5%. McDaniel mite infestations ranged from 77 to 410 mites per leaf 21 days after the 3rd application on all treatments except the Guthions and checks.

Three covers of Ambush at rates of .05 and 1.0 of emulsifiable and wettable formulations were superior to Guthion at standard and pest management rates on Rome apples. Checks had 15.5% larval entries. McDaniel mites ranged from 96 to 198 mites per leaf 21 days after the 3rd application on all treatments except the Guthions and checks.

Codling Moth - Cherries

H. R. Moffitt - USDA - SEA/AR
3706 West Nob Hill Boulevard, Yakima, WA 98902

Cherry Fruit Fly: In 1978, for the first time, U.S. produced cherries were shipped to Japan, after modification of codling moth-based quarantine regulations based upon joint USDA-WSA research. A schedule utilizing methyl bromide for control of both codling moth and cherry fruit fly as follows: 40-49^{o}F, 64 g/m^{3}; 50-59^{o}F, 48 g/m^{3}; 60-69^{o}F, 40 g/m^{3}; and 70^{o} and above, 32 g/m^{3}. These data will be presented to the Japanese government for consideration for replacement of the existing approved treatment, i.e., 71.6^{o}F or above at 32 m/g^{3}, for the 1979 season. Research on developing a method for fumigation after packing is also underway.

Codling Moth - Pears

Helmut Riedl, S. A. Hoying and J. E. DeTar
University of California, Berkeley, CA 94720

Monitoring: The CONREL pheromone release system consisting of capillary microfibres was compared in replicated field tests to the standard red rubber septum. Catches did not differ significantly between the two pheromone formulations. Chemical control: One cover spray of Pydrin (.45 lb ai/acre) gave control equal to two cover sprays. High mite populations were associated with these treatments. Three sprays of Dimilin applied at .125 and .25 lb ai/acre provided acceptable control without inducing spider mites. Two sprays at these rates were too weak. Timing of the first spray is critical since Dimilin is ovicidal only during the early egg stages.

P. H. Westigard, 569 Hanley Road, Medford, Oregon

1) Application of sex pheromone is Conrel chopped fibers provided economic suppression of the codling moth in two pear orchards supporting low to moderate pest densities. In a third orchard with a 1977 fruit infestation of 80% pheromone treatments did not result in economic control. These were cooperative plots with USDA, Yakima

2) Dimilin (difluron) applied in a three spray program provided acceptable control of the codling moth. No disruption to pear psylla parasitoids was experienced with Dimilin used at 0.125 lb ai/acre but higher rates depressed natural enemy levels.

3) A single treatment of the synthetic pyrethroids applied at 1st cover (Mid-May) provided control of the codling moth through first brood period (July). High rates of permethrin used at the above timing gave seasonal control. Spider mite density was increased in all pyrethroid plots over those in check plots.

Codling Moth - Pome Fruit

R. W. Zwick and G. J. Fields, Mid-Columbia Experiment Station

Dimilin applied at 0.25 lb/100 gal 10 days after 1st moth flight in 3 cover sprays reduced entries into a subeconomic level on apples and was as effective as 3 covers of OP cover sprays at reduced rates in an adjacent commercial orchard. A high population of predaceous mites and low numbers of spider mites were present on the Dimilin plot at seasons' end.

Codling Moth - Pears and Apples

J. E. DeTar and Helmut Riedl
University of California, Berkeley, CA 94720

Characteristics of Codling Moth Phenology in Northern California: In the major pome-fruit areas of California the codling moth goes through two full generations and a partial third (normal year). Diapause sets in at the beginning of August. In contrast to areas with much winter chilling, spring emergence can extend from March to the end of July causing considerable overlap between generations. As a result, pheromone trap records are more difficult to interpret. The seasonal progression of heat units can help predict voltinism and assist in interpreting pheromone trap records. Post-harvest codling moth infestations: For the third year pear orchards in Solano Co. were surveyed for post-harvest codling moth activity. Build-up of populations in late summer causes high endemic populations the following year. Some orchards have experienced severe codling moth control problems in 1978. Populations from 2 orchards with high post-harvest infestations are being cultured for toxicological testing

Johannes L. Joos, Area Research Farm Advisor
Helmut Riedl, Clancy Davis, U. C. B.
University of California Extension
Room 100-P, 2555 Mendocino Avenue
Santa Rosa, California 95401

The new synthetic pyrethroids Ambush® (ICI) and Pounce® (FMC) gave excellent control of codling moth at the rate of .10 lb/ai/100 gallons of water. The low rate of .05/ai/100 also gave satisfactory control with the economic level threshold considered at 1%. Dimilin® the new group of insecticidal compounds interfering with the deposition of chitin gave satisfactory control at the high rate of 1 lb.-25 W formulation in 100 gallons of water. Lorsban® a chlorpyrifos compound gave satisfactory control at the high rate of 1 lb. of 50 W in 100 gallons of water.

Imidan® was used as a standard which is still effective after five years under field conditions. These field trials where made by handgun applications and timed with pheromone - trapped peak male flights and predicted egg hatch from "Bug-Off" computer model of codling moth with life cycle based on accumulated degree-days.

H.R. Moffitt, USDA, SEA/AR, 3706 W. Nob Hill Blvd., Yakima, WA 98902
P.H. Westigard, OSU, Southern Oregon Experiment Station, 569 Hanley Road, Medford, OR 95720
S.C. Hoyt, WSU, Tree Fruit Research Center, 1100 No. Western Avenue, Wenatchee, WA 98801
D.O. Hathaway, USDA, SEA/AR, 3706 W, Nob Hill Blvd., Yakima, WA 98902

Season-long control of the codling moth was achieved on pears in the Medford, Oregon area, for the second season in one block and for the first season in a 10-acre commercial block. The Conrel® chopped fiber system containing the sex pheromone was applied by helicopter with the formulation yielding an emission rate of about 310 mg per hectare per day. Three applications were made to the early harvested Bartlett's and four to the later maturing Bosc's. Evaluation was on the basis of the response of native males to pheromone-baited traps and the infestation in the fruit prior to and at harvest.

In the block treated with the pheromone for the second season, the infestation in the Bartlett's at harvest was 2.9% and in the Bosc's it was 3.8%. This compared to 22.3% and 54.6% in the untreated controls. Most of the infestation in the pheromone treated block is atrributed to migration of gravid females into the block and/or poor timing of the last application. Downgrading of the fruit due to pear psylla injury was reduced in the pheromone-treated Bosc's where 0.6% was downgraded compared to 8.2% in the standard chemical control block.

In the 10-acre commercial block, three applications of the pheromone were made and the infestation was 0.64% in the treated block and 3.4% in a 1.2 acre control. Biological control was not relied upon to control pear psylla in this block but damage was less than 0.64% despite the use of generally less effective and less costly materials for pear psylla.

Two blocks of apples in the Wenatchee area were treated with the pheromone in the Conrel fiber system using the same formulation, dosage, etc., as was used in pears. In both cases substantial infestation of codling moth occurred, during the first generation in one case and during the second generation in the other. The occurrence of such infestations had not been adequately explained but may be due in part to inadequate number of applications and poor application among other factors.

Codling Moth - Control

M.T. AliNiazee, Dept. of Ent., O.S.U., Corvallis, OR 97331

Four rates of Ambush and one rate of Dimilin was compared with standard chemical Guthion. All 4 Ambush treatments obtained excellent control of codling moth. Three miticides, SD 41706, CME 123 and UC 55304, were also tested for codling moth control. None were effective.

Leafrollers - Apple

H.F. Madsen and B.E. Carty, Research Station, Summerland, B.C.

Sampling: A limb tap sample proved more accurate and less time-consuming than a cluster sample to assess larval populations of leafrollers and other lepidopterous pests of apple. A sample taken at full bloom was optimum for the various species present during this early period.

Sex Pheromone Monitoring: Four species of leafrollers Archips argyrospilus, A. rosanus, Chloristoneura rosaceana, and Pandemis limitata were monitored with sex pheromone traps containing the specific lure for each species. Data obtained showed the first two species predominant in the northern Okanagan and the latter predominant in the southern Okanagan. With the exception of A. argyrospilus, there was no correlation between males captured and population assessment by other methods. C. rosaceana is attracted to A. rosanus pheromone as readily as it is attracted to its specific pheromone which creates problems in determining population densities.

Donald W. Davis, Utah State University

For the third consecutive season, Lithocolletis sp. leafminers were in epidemic numbers in northern Utah. Some orchards averaged nearly 10 mines per leaf by late 1978. Parathion timed with the moth flights was effective, but Guthion was not.

One series of single tree replicates using Pydrin at 2 oz AI/100 gallons on June 29 stopped all new attacks for the season. At application time there was an average of 1.8 mines per leaf. On August 30 the Pydrin trees averaged 1.5 mines and the adjacent Guthion treated trees averaged 4.9 mines.

Navel Orangeworm - Almonds

J. E. Dibble, University of California, San Joaquin Valley
Agricultural Research and Extension Center, Parlier.

Tests to evaluate a spring application versus a spring plus hullsplit program showed essentially no advantage in the double treatment. Orthene, Imidan and Guthion gave approximately 80% control. Cryolite, methomyl and Lorsban were poor. Sevin and Diazinon showed results between the above two groupings.

Charles E. Curtis, J. A. Coffelt, USDA, SEA/AR
Stored-Product Insects Research Laboratory
5578 Air Terminal Drive, Fresno, CA 93727

A sex pheromone of the navel orangeworm has been isolated, identified and synthesized. This work was done by a team of USDA researchers at the Insect Attractant's Laboratory in Gainesville, Florida.

Field tests were conducted in commercial almond plantings in Fresno County, California in September and October 1978, and indicated that the synthetic pheromone is attractive to feral males.

Tests comparing the pheromone with virgin females showed the pheromone could be used to trap males. Rubber serum bottle stoppers treated with pheromone gave good catches for two days, but catches dropped off rapidly as the pheromone aged in the field. There was some attraction for up to 14 days. Total catches for five traps for the first two days after loading rubber stoppers with the pheromone were 11 for 3µg load, 74 for 10µg, 84 for 30µg, 210 for 100µg, 1 for 0µg (blank) and 385 for traps baited with 3 ♀♀. To make the material useful, we hope to have it formulated to give a constant rate of release over a long period of time, i.e., at least 4 weeks.

Martin Barnes, Dept. of Ent., University of Calif., Riverside, CA 92521

The pyrethroids Ambush and Pydrin consistently outperform other insecticides in control of navel orangeworm. In small scale experiments in Kern Co. no buildup of mites has been observed at 0.2 lb per acre. A full program of development of Ambush is planned. Of presently registered insecticides, Guthion in May provides highly variable results (30-80% control). This is believed to be related to imprecision in timing. At 60 days before harvest (late June), results are more consistent but achieve only 65% reduction. Imidan and Lorsban at hullsplit yield 50% control.

Curtis Engle and Martin Barnes, Department of Entomology
University of California, Riverside, CA 92521

The age structure of overwintering navel orangeworm populations on mummy almonds was monitored from October 1977 through spring 1978. This investigation was performed with a view toward development of a heat summation model for improvement in timing spring sprays for navel orangeworm. In 1978 80% of the navel orangeworm population resided in the 6th instar and pupal stages in early spring prior to adult emergence. Laboratory investigations are presently underway to determine the developmental temperature thresholds for all pre-adult stages of the navel orangeworm.

J. E. Dibble, University of California, San Joaquin Valley
Agricultural Research and Extension Center, Parlier.

May applications of Guthion, Imidan, Sevin and Diazinon showed no advantage in using 6 pounds per acre of the formulated product over 4 pounds. Although there was not a great difference in percent control in this orchard, a ranking would place Guthion first followed by Sevin, Diazinon and then Imidan.

James E. Lindegren, Charles E. Curtis, and Tommy Yamashita
USDA, SEA/AR, Stored-Product Insects Research Laboratory
5578 Air Terminal Drive, Fresno, CA 93727

N. carpocapsae (Mexican strain) invasive stages were applied as a protectant to windrowed Nonpareil almonds which had been pre-moistened to simulate a late rain at harvest. One week after the initial application of 3 million or 6 million invasive stage nematodes per test plot, 47% and 63% respectively, of the navel orangeworm larvae and pupae were parasitized. Test samples examined two weeks after the initial application contained viable invasive stage nematodes but live navel orangeworm larvae were not found in either the test or the controls. There was no significant difference in nutmeat damage between the treatments and the control, probably due to the lack of reinfestation of navel orangeworm larvae in the windrowed almonds. The lack of navel orangeworm reinfestation in knocked almonds limits the usefulness of this nematode as a protectant to wet windrowed almonds.

A commercial sprayer, Air-O-Fan 375 with a double sided centrifugal fan and positive mechanical agitation, proved compatible as a delivery system for the application of N. carpocapsae. High temperatures are detrimental to the nematodes, but temperature increase as measured at the recirculating line, was only 1.2°C over a 30 minute period. A 0.5% reduction in viable nematodes was recorded after 10 minutes of agitation through the recirculating pump and an additional 5.3% mortality occurred after the nematode suspension had been applied. Nematode invasive stages can therefore be applied effectively with a commercial sprayer. However, parameters of temperature increase and nematode damage will be monitored in future applications with other commercial delivery systems.

Navel orangeworm adults were found to be very susceptible to the Mexican strain of N. carpocapsae and a testing procedure has been established utilizing adult navel orangeworm for determining the viability and comparative virulence of this insect parasitic nematode.

The adults and larvae of other Lepidopteran pests in almond orchards found to be experimentally susceptible to this nematode include peach twig borer, Anarsia lineatella Zeller, oriental fruit moth, Grapholitha molesta (Busck), oblique banded leafroller Choristoneura rosaceana (Harris) and western tent caterpillar, Malacosoma californicum (Packard).

R. E. Rice, University of California, Parlier 93648

Monitoring and Chemical Control of Navel Orangeworm: Egg deposition by navel orangeworm was monitored with NOW egg traps throughout the 1978 season in Fresno County. Two periods of oviposition were again observed in this area from overwintered NOW. First eggs were collected between March 23-30. The first peak of egg laying occurred during the week of April 6-13, followed by a two week decline. This decline was caused in part by stormy weather April 20-25. Eggs again increased during early May, with a second peak occurring between May 11-18.

First generation moths began emerging during late June and laid eggs during July, just as new crop nuts began to split. Heavy oviposition was then observed during August and again in late September-October.

Chemical controls for NOW were applied starting May 13 to three blocks of trees that had received winter nut clean-up and dormant sprays of diazinon and oil. These blocks were compared to a "control" block that had the sanitation and dormant treatments, but was not treated in May for NOW. Samples of nuts at harvest (9/13/78) showed reductions in NOW damage ranging from 64-89% in the blocks treated in May.

Populations of PTB moths were also significantly reduced by the May spray for NOW. Pheromone traps indicated that PTB populations remained at relatively low levels until September, when they again increased to levels similar to those in the check block. The combined effect of dormant and May sprays in the treated blocks resulted in negligible nut damage by PTB.

Orange tortrix - Apples

S. A. Hoying, Helmut Riedl and Carolyn Pickel
University of California, Berkeley, CA 94720

Orange tortrix populations were monitored using pheromone traps and by direct damage sampling in 2 sprayed and one unsprayed orchard in 1978. Damage in the sprayed orchards reached 14.6% in the unsprayed orchards 5%. Fruit set phenology was studied in relation to Orange tortrix damage induction. Multiple fruit clusters were preferred over single fruit as feeding sites.

Replicated spray experiments to assess the effectiveness of spray timing showed no significant differences between control and spray blocks.

Peach Twig Borer - Peaches and Almonds

J. E. Dibble, University of California, San Joaquin Valley Agricultural Research and Extension Center, Parlier

Dormant and delayed dormant applications of Supracide with and without oil, as well as Dylox and Diazinon plus oil were applied for PTB control. May shoot strike evaluations showed Supracide plus oil slightly but not significantly better than Supracide alone. Diazinon and oil continues to perform very well.

Pheromone Trapping - Peaches

Donald W. Davis, Utah State University

Several unexplained "hot spots" of Lepidoptera injury to fruit exist in Utah. These relate primarily to the Oriental fruit moth, peach twig borer, peach tree borer, and leafrollers. All of the traps, except for leafrollers, were placed in peach trees. 10 sampling sites were selected between Provo and Logan and checked nearly every week starting April 20 and ending September 6.

The area between Ogden and Brigham City has had severe peach twig borer problems during recent years. The moth flights did not match the rest of Utah. There was a major flight during late August and early September giving 3 distinct flights while all other areas had 2 flights.

The peach tree borers flew from early June through August, with some areas showing about 50 moths per trap per week for nearly a month. About 15 other Sessiidae species were also caught.

The pheromone used for leafrollers was for the fruittree leafroller. We caught almost no moths, in spite of earlier reports indicating that it was the primary leafroller problem in northern Utah.

The Oriental fruit moth flights continued to be centered about 20 miles north of Provo. Some moths were caught at Provo and some at Roy, near Ogden, indicating potential problems elsewhere. All catches were very low during 1978.

Pheromone Trapping of Orange Tortrix and Obliquebanded Leafroller

Carl Shanks, Jr. Southwestern Washington Research Unit
Washington State University, Vancouver, WA 98665

Adult populations of orange tortrix (OT), Argyrotaenia citrana, and oblique-

banded leafroller (OBLR), Choristoneura rosaceana, were monitored in 2 raspberry fields by sex pheromone traps (Zoecon). At Woodland, WA, both OT and OBL traps were used. Only OT traps were used at Vancouver.

At Woodland, OT populations were high in April but declined thereafter. OBLR adults did not appear until early June but highest populations did not occur until August. OT traps caught many OBLR adults but the reverse was true of OT adults. No larvae of either species were found in the field so it is believed that the traps attracted males from outside the field.

At Vancouver, OT traps caught low to moderate numbers of adult OT all season and small numbers of OBLR. No larvae were ever seen in the field.

S E C T I O N II

ORCHARD MITES

Discussion Leader -- Stanley Hoyt

European Red Mites - Apples

Jack D. Eves, AgReCon, Prosser, WA 99350

Commercial applications of Zardex at rates of .3, .4, and .5 lbs. a.i. per 100 controlled ERM equal to or better than Plictran. Predator mites were not adversely affected by any of the rates used.

Two - three rates each of 5 Mobay materials were tested for ERM control. In order of effectiveness on ERM adults the materials were: Product B > Product C > Bay bue 1452 > Bay KHS 0137 > Plictran > Bay SLJ 0312 > check. All materials were easy on predator mites except Bay bue 1452.

European Red Mite, Apple Rust Mite, Metaseiulus occidentalis - Apple

Stan Hoyt, Tree Fruit Research Center
1100 North Western Avenue, Wenatchee, WA 98801

DPX 3792 and XE 333 continue to show promise for integrated programs providing good knockdown of European red mite but allowing survival of apple rust mite and M. occidentalis. Kelthane and UC 55304 gave control of European red mite but were toxic to the other 2 species.

European Red Mite, Apple Rust Mite and Typhlodromus occidentalis - Apples

R.S. Downing, Agriculture Canada, Research Station, Summerland, B.C.

DPX 3792 25% W.P. was ineffective against European red mite and apple rust mite even at 6 lb per acre. Plictran 50% W.P. at 1 lb was the most effective but XE 333 25% flowable at 4 lb per acre was almost as effective against the European red mite and showed some selectivity as it was not too toxic to the apple rust mite. None of the acaricides showed much toxicity to Typhlodromus occidentalis.

Of the 5 fungicides used for mildew control only quinomethionate gave good control of European red mite. Dinocap did not cause an increase in the red mite population density as did wettable sulphur, thiophanate-methyl, and especially benomyl. Benomyl was the only one that was very toxic to Typhlodromus occidentalis.

McDaniel Mites - Apples

Donald W. Davis, Utah State University

One replicated series of miticides was applied to red delicious apples. Included were PP 199 at 30 grams AI/100 gallons, Plictran at 90 grams, Malonoben at 120 grams, and Omite at 180 grams. Initially all treatments were effective. By 4 weeks after treatment, Malonoben and Omite were no longer effective. PP 199 and Plictran continued to suppress the mites for 8 weeks.

One non-replicated experiment compared Plictran at 3 oz AI/100 gallons with Malonoben at 4 oz AI. The mites were mixed McDaniel and European red. For 3 weeks, Malonoben gave better control, then both species in the Malonoben treatment seemed to explode. 6 weeks after treatment there were about 20 X as many spider mites on the Malonoben trees than on Plictran trees. Typhlodromus mites were scarce in the Malonoben treatment.

Pacific Spider Mite - Almonds

Curtis Engle and Martin Barnes, Department of Entomology
University of California, Riverside, CA 92521

Four rates of Aldicarb 15G were applied to almonds: .625, 1.25, 2.50, and 5.0 lb A.I./acre. Satisfactory control was evident for 58 days after treatment in all but the lowest dosage. Leaf phytotoxicity was apparent and unacceptable at the 5.0 ln A.I./acre dosage. Future tests will concentrate on dosage levels ranging from .5-2.0 lb A.I./acre.

Pacific and Twospotted Spider Mites - Almonds

Stephen Welter, Irwin Ting, and Martin Barnes
University of California, Riverside, CA 92521

Spider mite infestations were shown to reduce both photosynthetic and transpiration rates severely, as shown by use of a field portable, dual isotope porometer. A portable "chlorophyll meter" appears to provide a rapid means of estimating the number of mite-days to which a leaf has been exposed. An experiment involving 16 replications of 4 levels of mite feeding was set up to evaluate effects on almond tree growth and productivity.

Spider Mites - Pome Fruit

R. W. Zwick and G. J. Fields, Mid-Col-mbia Experiment Station

Both Zardex and DPX-3792 were effective against spider mites and allowed high

survival of apple rust mite and 2 species of predatory mites. Malonoben was less effective on spider mites and destructive to predaceous species in plot tests. The use of Pydrin against pear psylla in dormants and covers for 2 years resulted in a moderate buildup of spider mites on small pear trees. Pydrin and Ambush caused mite flareups on pears when used in early May applications

Two-Spotted Mites

J. E. Dibble, University of California, San Joaquin Valley
Agricultural Research and Extension Center, Parlier

Mite populations 4 weeks after spring Navel Orangeworm sprays were substantially lower than the check in the blocks treated with Orthene, Imidan and Diazinon. They continued to remain lower through 70 days with Orthene. At 45 days they were the same or slightly lower with Guthion, Imidan, Methomyl, Diazinon and Cryolite. They were higher in Lorsban blocks and substantially so in the Sevin treatment. M. occidentalis populations were coming back appreciably in the Cryolite and Methomyl blocks on the 70 day count.

J. E. Dibble, University of California, San Joaquin Valley
Agricultural Research and Extension Center, Parlier

Heavy summer populations showed excellent control up to 3 weeks with Omite, Plictran, Morestan and NC-13293 (Fisons). Good control with DPX-3792 and Zardex whereas Superior oil, Kelthane, XE-333 and CME-12301 (EM Labs) were somewhat less effective.

Two-Spotted Mite - Almonds

J. E. Dibble, University of California, San Joaquin Valley
Agricultural Research and Extension Center, Parlier

June applications showed all materials tested except Superior oil and XE-333 to give two week control. Omite and Temik held the mite population down low through 4 weeks with Temik performing very well for over 8 weeks. Looking very good through 2 weeks were Plictran, Kelthane AP, Morestan, DPX-3792, Malonoben and Zardex. All of these compounds had broken by 4 weeks.

Two-Spotted Mite, European Red Mite, and Predators - Almonds

R. E. Rice, University of California, Parlier 93648

Zardex 0.8EC @ 0.8, 1.2, and 1.6 lb a.i. per acre was applied to almonds in July. The 0.8 lb treatment did not provide adequate suppression of

two-spotted mite but gave suppression of European red mite for 21 days; this rate had no apparent effect on Phytoseiidae. The 1.2 and 1.6 lb rates gave good suppression of 2-spotted and European red mites up to 21 days; evaluation of these two rates on phytoseiids was difficult due to low pre-treatment numbers.

Two-Spotted Mite, European Red Mite, and Predators - Peaches

R. E. Rice, University of California, Parlier 93648

Plictran 50W @ 2.0 oz a.i./100 gal, Vendex 50 W and 4 EC @ 2.0 oz, and DPX-3792 25W and 3EC each @ 2.0 and 4.0 oz were evaluated in July on peaches and nectarines. Vendex 4EC and Vendex 50W with 1 pt Atlox/100 gal provided good control of two-spotted and European red mites through 28 days post-treatment. The other materials and rates gave good control of two-spotted mite only up to 21 days. Phytoseiid mites survived in low numbers in most treatments during the first 21 days, and were increasing in all treatments at 28 days post-treatment. DPX-3792 and Vendex 50W appeared to be least disruptive to phytoseiids. Populations of Scolothrips sexmaculatus and Stethorus picipes were generally too low to evaluate.

Integrated Mite Control - Pear

S. A. Hoying and Helmut Riedl
University of California, Berkeley, CA 94720

Residual toxicity of Pydrin to Typhlodromus occidentalis and Tetranychus urticae: Slide-dip tests indicated T. occidentalis to be highly susceptible to this synthetic pyrethroid. The LD_{50} was ca. 13 times below the recommended field rate. Bioassays of leaves collected from trees sprayed with 3 rates (.11, .22, .45 lb ai/acre) remained highly toxic to phytoseiid mites throughout the season while twospotted mites were tolerant of residues with little mortality. After 24 weeks predator survival was still low (40 - 50%) in all 3 treatments. Tests with potted pear trees kept in a greenhouse gave similar results

Phytophagous Mite Control

M. T. AliNiazee, Dept. of Ent., OSU, Corvallis, OR

Three experimental miticides (CelaMarek compound CME 123 50W, SD 41706, and UC 55304) were evaluated for their efficacy against spider mites and for their effects on Typhlodromus arboreus. CME 123 at 0.2 and 0.4 rates was ineffective for the control of yellow and European red mite UC 55304 at 0.5 rate seems to be effective against these two spider mites. All 3 miticides were fairly toxic to T. arboreus.

S E C T I O N III

OTHER INSECT PESTS

Discussion Leader -- Pete Westigard

Pear Psylla - Pears

Jack D. Eves, AgReCon, Prosser, WA 99350

Two commercially applied dormant applications of Ambush, Pydrin, and Perthane plus oil with the aid of overhead sprinklers controlled pear psylla for the entire season. At harvest Pydrin appeared slightly more effective than Perthane and both were more effective than Ambush.

G. J. Fields and R. W. Zwick, Mid-Columbia Experiment Station

Pydrin and oil was more effective than Pydrin alone in laboratory tests on overwintering psylla. AC 222, 705, a synthetic pyrethroid, was more active than Pydrin in cover season applications. Pydrin used at 0.1#A1/A was less effective than 0.25#A1/A. Ambush with and without oil at dormant and post-bloom was less effective than Pydrin and Amitraz in commercial orchard tests. Amitraz WP was markedly more effective than the EC formulation.

Pear-clean, with and without Amitraz gave no control of psylla nymphs, but gave slightly less downgrading of fruit when used alone in late August.

Biological control of psylla failed where Pydrin was used but a Guthion spray in early June and Imidan in early August probably contributed to destruction of the beneficials.

Helmut Riedl and S.A. Hoying, University of Calif., Berkeley, CA 94720

Monitoring: Distribution of immature stages on dormant shoots, spur and terminal leaves was determined to define sampling units for eggs and nymphs. Based on studies of within and between-tree variability and the time necessary to sample and examine shoots and leaves optimal sampling programs are being developed to provide population estimates a) for population dynamics studies and b) for management decisions.

Chemical control: Pydrin sprays (.45 lb ai/acre) were applied according to tree phenology: delayed dormant, 5%, 40%, 75% and 100% leaf surface expansion. The 40% application (petal fall) extended psylla control until July with relatively low spider mite populations. Later applications improved psylla control but mite build-ups were extensive. Pydrin had no effect on rust mites, Epitrimerus pyri, which were equally high in all treatments including the check. Dimilin was ineffective on psylla and rust mites

P. H. Westigard, 569 Hanley Road, Medford, Oregon

1) A study of pear psylla honeydew damage in relationship to pest density and time of attack was begun in southern Oregon. Results from these studies conducted on the Bosc cultivar indicated a direct relationship between psylla nymph density and damage. Resultant damage from the highest psylla populations was characterized as 'frogging' to fruit surface but was restricted to the calyx end of fruit and did not result in fruit downgrading.

2) Studies continued on the effect of host plant modification using Alar on pear psylla density control. Tree growth using the above plant growth regulator was ca 1/3 of that in untreated plots. Bloom density resulting from 1977 Alar treatment was increased producing more fruit/tree at 1978 harvest time. Fruit size in Alar plots (1977 or 1978 treatment effect) was reduced. No difference in 1978 pear psylla levels were measured between Alar and check plots. This was attributed to the use of Dimilin for codling moth control and the associated buildup and control by psylla parasitoids

3) Irrigation applied shortly following summer chemical treatment for codling moth did not result in increases in fruit damage from this pest. No reduction in psylla rust mite or two-spotted mite densities were measured. However, reductions in psylla honeydew damage to fruit was evident

Donald W. Davis, Utah State University

One series of replicated plots was applied on June 8 using the following rates AI per 100 gallons: Dithane M-45 16 oz, BAAM EC 8 oz, BAAM WP 8 oz, Thiodan 8 oz, Ambush 2 oz, and Pydrin 2 oz. Dithane M-45 reduced nymphal numbers by about 50% during the month following treatment, but adult and egg counts were similar to the controls. Both of the BAAM formulations and Pydrin gave excellent control of all stages for more than a month. Ambush was nearly as effective as BAAM. Thiodan gave good results for 3 weeks, but then psylla began to increase rapidly.

Mite problems developed in all of the plots, with no consistent differences between treatments.

Everett Burts, Tree Fruit Research Center
1100 N. Western Avenue, Wenatchee, WA 98801

Three synthetic pyrethroids, Pydrin, Pounce and Ambush, were evaluated for control of overwintered adult pear psylla as dormant sprays applied by helicopter and airblast sprayers. When applied by helicopter all three chemicals reduced adult numbers. Late sprays (after some eggs had been laid) were more effective against adults. The use of oil as a carrier increased adult kill over that of sprays containing water as a carrier.

When airblast sprays of these three compounds were applied at dormant, delayed dormant or cluster bud stages of tree development, the earliest sprays

produced the greatest reduction of first generation nymphs but not the best reduction of adults. Apparently some of the eggs laid before sprays were applied survived the treatments. The dormant sprays were applied when the first eggs were found in the test orchard.

In a second set of plots applied with airblast sprayers, Pydrin provided better adult kill and reduction of first generation nymphs than Pounce. The addition of 1% oil improved control with both compounds. Only Pydrin plus oil was more effective than the standard treatment of Perthane, Thiodan and oil.

In summer sprays no new products were found to be effective against psylla populations of eggs, nymphs and adults. Again Pydrin was more effective than Pounce. While Pounce produced good adult kills, hardshell and fourth instar nymphs survived so that the population was only temporarily reduced.

Apple Aphid and White Apple Leafhopper

Stan Hoyt, 1100 N. Western Ave., Wenatchee, WA 98801

Pirimor and Croneton provided good control of both species, but these compounds were somewhat toxic to M. occidentalis and their use resulted in a build up of European red mite. Orthene was very effective against leafhopper and provided a knockdown of aphids, but it was toxic to M. occidentalis. Use of Orthene, however, did not result in an extensive build up of mites.

European Fruit Scale - Apple

G. J. Fields and R. W. Zwick, Mid-Columbia Experiment Station

Three or more covers of Penncap M during the summer protected Newtown fruit from crawlers which emerged from late June through September. These sprays did not, however, prevent crawlers from settling under bark scales on the trees. Conventional air carrier oil delayed dormants are not controlled European fruit scale on trucks and leaders of old Newtown trees.

R.S. Downing, Agriculture Canada, Research Station, Summerland, B.C.

The first emergence of adult males of the European fruit scale occurred at the pink bud stage of Newtown apple. Diazinon applied at this time was at least as effective in controlling the scale as 200 second Neutrol oil applied at the half-inch green bug stage. A 70 second Superior oil applied at the same time as the Neutrol oil was equally effective.

San Jose Scale

Stan Hoyt, 1100 N. Western Ave., Wenatchee, WA 98801

Under very heavy San Jose scale population pressure no post-bloom spray gave good fruit protection. A single crawler spray proved more effective than a spray timed to kill male pupae.

Pheromone was tested to trap males using virgin females in the first generation and synthetic pheromone in second. A total of 1780 males were caught in two traps in first generation, and over 25,000 were caught in 3 traps in second generation. Three trap designs were tested with the simplest and cheapest proving as effective as the others.

San Jose Scale - Apples

R.S. Downing, Agriculture Canada, Research Station, Summerland, B.C.

A single petal fall spray of diazinon applied to control the emerging adult males was as effective as 200 second Neutrol oil applied at the half-inch green bud stage to control the nymphs. Using a 70 second Superior oil or changing the concentration of emulsifier in the Neutrol oil from ½% to 1% made very little difference in the degree of control of San Jose scale.

J.F. Howell, Yakima Agricultural Res. Lab., Yakima, WA 98902

Lorsban, which has been shown to be effective against spotted cutworm, Amathes c-nigrum (L.) in the delayed dormant application (I and A Tests 1978), was similarly tested against San Jose scale.

The test plot was a single-row of Golden Delicious trees and 3 rows of Red Delicious trees, 50 trees/row. I treated 27 goldens and 38 reds total. The treated trees were scattered in the rows between seedling trees where the top graft had died but the root stock had developed. The trees were 8 yr. old but only 4-8 ft high. Four trees at the end of the rows were untreated. The trees were heavily infested and treated by the grower with parathion 25 WP and oil 2 wk prior to our treatment (except for the check trees). Three rates of Lorsban were used. All trees treated with ½ lb ai/100 gal received 2 applications, one April 25 and one July 10. For the 1 lb and 2 lb ai/100 gal rates, ½ of the trees had one application (April 25), and the remainder, 2 applications (April 25 and July 10). The delayed dormant application was a Lorsban and oil combination, but the summer apolication was Lorsban only. Each application was made with a handgun using a Bean® piston pump sprayer at a pump pressure of 500 psi. Each tree was sprayed to the drip stage, which required 0.4-1.0 gal of spray/tree. The efficacy of the treatment was determined by examining all the fruit produced (avg fruit/tree; reds 57, goldens 85) for the presence of scale at harvest.

On red delicious, there was no statistically significant difference in control between the grower-applied parathion and oil spray and the overspray of Lorsban and oil and Lorsban. Both treatments gave excellent control compared with the untreated check. On golden delicious, one application of parathion and oil was not efficacious.

San Jose Scale - Pear

P.H. Westigard, 569 Hanley Road, Medford, Oregon

Cooperative efforts with California and Washington researchers were conducted to establish a temperature-phenology model of San Jose Scale. Using a 50^{o} threshold, Jan. 1, first crawlers were found at about 500^{o} days compared to 470^{o}D in 1977. Crawlers of 2nd generation first recorded at about 2100^{o}D compared to 1900^{o}D in 1977.

Pheromone baited traps caught only 40 male scale from 7/27-9/14 but may have been installed too late in the season to coincide with 2nd generation flight. Unbaited traps caught three males over the same period.

San Jose Scale - Peaches

J. E. Dibble, University of California, San Joaquin Valley Agricultural Research and Extension Center, Parlier.

Supracide plus oil applications applied in March showed 100% control of SJS crawlers in May. Treatment without oil was not quite as effective nor was Dylox plus oil. Diazinon plus oil gave excellent control.

J.F. Howell, Yakima Agricultural Res. Lab., Yakima, WA 98902

Chlorpyrifos (Lorsban), which is registered for control of peachtree borer, Synanthedon exitiosa (Say), and is known to be effective against climbing cutworms (I and A Tests 1978) was tested for control of San Jose Scale.

The plots consisted of two 30-tree rows/treatment and were located in an abandoned orchard heavily infested with scale. Two applications at 3 rates were tested. The 1st application on April 25 (calyx red or delayed dormant stage) was a Lorsban and oil combination, but the 2nd on July 10 was Lorsban only. The applications were made with a handgun, using a Bean® piston pump sprayer at a pump pressure of 500 psi. Each tree was sprayed to the drip stage, which required 0.4-1.0 gal of spray/tree. The efficacy of the 1st treatment was determined by holding one 80-cm-long infested twig from each tree in a petri dish in the laboratory where the male scale emerged, and that of the combined treatments was determined by examining 10 fruit/tree at harvest for the presence of scale.

All treatments gave excellent control of the San Jose Scale.

San Jose Scale - Pheromone Research

R. E. Rice, Univ. of Calif., Parlier, CA 93648

Identification of the sex pheromone of San Jose scale, Quadraspidiotus perniciosus (Comstock) was accomplished with the cooperation of M. J. Gieselmann and W. L. Roelofs of Cornell University. Two biologically active components were isolated, and were then synthesized by Zoecon chemists. The components, (2)-3,7-dimethyl-2, 7-octadien-1-yl propionate (SJS-1) and 3-methylene-7-methyl-7-octen-1-yl propionate (SJS-2), occur in an approcimate 40:60 ratio in virgin female scales. Preliminary lab and field bioassays indicate that each component is equally attractive to male scale. Several trap designs were compared to the standard 1-pt. carton and 3x5 sticky card. The smallest and simplest trap was quite effective.

Current Status of the Western Cherry Fruit Fly Phenology Model

M. T. AliNiazee, Dept. of Ent., OSU, Corvallis, OR

A cherry fruit fly phenology model was further validated during 1978 season. Model predictions for emergence, oviposition, hatch and larval appearance were valid for the Willamette Valley. Further modifications might be required to make the model more accurate for other cherry producing areas such as Eastern Washington. We are currently experimenting with a high temperature cut-off and low temperature threshold.

Relationship of Temperature to Pupal Developmental Rates in the Western Cherry Fruit Fly, Rhagoletis indifferens Curran

J. Van Kirk, Dept. of Ent., OSU, Corvallis, OR

Western cherry fruit fly pupae enter diapause shortly after pupation and remain in diapause or quiescence throughout the fall and winter. Post-diapause development occurs in the spring with the onset of sufficiently high ambient temperatures, and eventually results in the emergence of the adult.

Field collected pupae reared to emergence in the lab require a chilling period in order to complete diapause development. Observation of emergence of pupae chilled at different temperatures have shown that 3°C is the optimal temperature for chilling in terms of attaining both rapid completion of diapause development and maximum synchrony of emergence.

Observations of emergence patterns of previously chilled pupae have been used to determine the postdiapause degree-day threshold for western cherry fruit fly pupae in the Willamette Valley.

An experiment is in progress to determine when pupae complete diapause in the field. Results of this experiment will be used with the postdiapause degree-day threshold in refining a phenological model used to predict emergence and oviposition of Rhagoletis indifferens in the Willamette Valley.

Walnut Husk Fly - Walnuts

Helmut Riedl, S. A. Hoying, Johannes Joos and J. E. DeTar
University of California, Berkeley, CA 94720

Trapping experiments using either rectangular or ice cream carton traps were carried out to investigate attraction to chemical as well as visual stimuli, effect of within-tree trap placement on catches, trap maintenance and the relative trapping efficiency through the season. The most important finding was that adding an ammonium carbonate charge to a fluorescent yellow rectangle increased catches 4 - 5 times over the apple maggot (AM) trap. Quadrant had no effect on catches but trap elevation and foliage density did. Further phenological studies confirmed earlier results that the onset and schedule of oviposition cannot be reliably predicted from trap catches. Data on within- and between-tree egg distribution were gathered (2.year) to develop the information for a sequential sampling plan. Monitoring of egg laying in conjunction with trapping of adults will be a more reliable system on which to base control decisions than trapping of adults alone.

Western Cherry Fruit Fly - An Area Wide Pest Management Program

M. T. AliNiazee, Dept. of Ent., OSU, Corvallis, OR

A management program utilizing aerial traps (Saturn yellow spheres) was further evaluated in 15 different orchards during 1978 season. The program involved elimination of all calendar sprays for cherry fruit fly control. Instead, the sprays were applied only when one or more flies were caught in the traps. Among the 15 study orchards, one grower saved 4 sprays, 2 growers saved 3 sprays, 5 growers saved 2 sprays and 6 growers saved 1 spray. The average savings to growers was about $26/acre. Approximately 50% of the sprays were reduced.

Woolley Apple Aphids - Apple

Jack D. Eves, AgReCon, Prosser, Wa 99350

One commercial summer application of PenCap-M was slightly better than Thiodan for controlling woolley apple aphids.

S E C T I O N IV

CONCENTRATE SPRAYING RESIDUES AND PHYTOTOXICITY

Discussion Leader -- Jack Dibble

Aldicarb - Almonds

J. E. Dibble, University of California, San Joaquin Valley Agricultural Research and Extension Center, Parlier

Applications of Temik 15-G granules to two sides of the tree and placed in shallow trenches were watered in for mite control. Hulls, shells and kernels were analyzed at harvest 79 days after application. The 1.25 and 2.5 aia treatments were low and showed little difference in the three fruit parts. The 5 lb. aia rate was substantially and probably prohibitively higher.

Air vs Ground - Carbaryl - Almonds

J. E. Dibble, University of California, San Joaquin Valley Agricultural Research and Extension Center, Parlier

Although the exact same dosage (aia) of Sevin was not applied by ground as by air (4.8 vs 4.0 lbs) there was a 55% greater deposit on hulls in the ground treatment than in the fixed wing application and 24% greater deposit than with helicopter application. This same percentage difference (ground vs fixed wing) existed also on almond shells. Kernal deposits were very low and similar. Dust application deposits on the nut kernals were the same as those from the sprays. Deposits on shells and hulls from both fixed wing and helicopter dust treatments were very close and appreciably lower than those from the sprays.

Air vs Ground - NOW - Almonds

J. E. Dibble, University of California, San Joaquin Valley Agricultural Research and Extension Center, Parlier

Ground applications of Guthion and Imidan at 50 gpa showed no significant difference when applied in the spring and evaluated at harvest. Air treatment by helicopter was less effective than by ground. However, the helicopter application resulted in 42% fewer worm infested nuts than the untreated whereas the ground treatments averaged 60% cleaner nuts.

S E C T I O N V

DECIDUOUS ORCHARD DISEASES

Discussion Leader -- Iain MacSwan,

Brown Rot Blossom Blight and Fruit Rot - Cherry (Corum)

Iain MacSwan, Extension Plant Pathology, OSU, Corvallis, OR 97331

Twelve fungicides and rates were tested on Corum Cherries in 1978: Benlate 50 WP 4 oz. plus Captan 50 WP 2 lb.; BAS 352 04F 50 WP 2 lb., 1.5 lb. and 1 lb.; Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., Triforine Flowable 5 fl. oz.; Bravo 500 1.5 pt. and 2 pt., Bravo 6F 1.5 pt., Captan 50 WP 2 lb. and Benlate 50 WP 4 oz. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated three times of mature Corum sweet cherry at full bloom (March 30) and petal fall (April 18) with the exception of Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., and Triforine Flowable 5 fl. oz. which was sprayed at full bloom (March 31) and petal fall (April 19). All received only full bloom and petal fall sprays as rains and quick bloom development caused omission of the pop-corn stage spray. Bravo 6F 1.5 pt. and Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8oz., and Triforine Flowable 5 fl. oz. were applied three weeks before harvest (June 5), two weeks before harvest (June 15) and one week before harvest (June 20). Insecticides: Diazinon 50 WP 1 lb. per 100 gallons was applied June 1 and June 12. Perthane 4EC 4 qts. per acre was applied by airblast sprayer on June 23 and July 3 for control of cherry fruit fly. One hundred blossoms per tree were assessed as diseased or healthy on April 12. Fifty fruits at harvest (June 26) were randomly selected from each replicate and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After one week numbers of fruits showing brown rot were counted and recorded.

Good control of brown rot blossom blight was provided by sprays of BAS 352 04F 50 WP at 1 lb., 1.5 lb. and 2 lb., Bravo 500 1.5 pt. and Triforine 18.5 EC 12 fl. oz. per 100 gallons of water. All treatments gave some control of fruit rot but best control was provided by bloom sprays as BAS 352 04F 50 WP 1.5 and 2 lb. and bloom plus pre-harvest sprays of Bravo 500 1.5 pt. per 100 gallons of water.

Brown Rot Blossom Blight and Fruit Rot - Cherry (Royal Anne)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Twelve fungicides and rates were tested on Royal Anne Cherries in 1978: Benlate 50 WP 4 oz. plus Captan 50 WP 2 lb.; BAS 352 04F 50 WP 2 lb., 1.5 lb. and 1 lb.; Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., Triforine

Flowable 5 fl. oz.; Bravo 500 1.5 pt. and 2 pt., Captan 50 WP 2 lb.; Bravo 6F 1.6 pt. and Benlate 50 WP 4oz. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times of mature Royal Anne cherry trees at popcorn (March 30), full bloom (April 7), and petal fall (April 18) with the exceptions of Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., and Triforine Flowable 5 fl. oz. which were sprayed at petal fall on April 19. Benlate 50 WP 4 oz. received sprays at popcorn and full bloom only. Bravo 6F 1.6 pt., Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz. and Triforine Flowable 5 fl. oz. were applied three weeks before harvest (June 5), two weeks before harvest (June 15) and one week before harvest (June 20). Insecticides: Diazinon 50 WP 1 lb. per 100 gallons was applied on June 1 and June 12 by airblast sprayer and Perthane 4EC 4 qts. per acre was applied on June 23 and July 3 by airblast sprayer for control of insects. One hundred blossoms per tree were assessed as diseased or healthy on April 17. Fifty fruits were randomly selected at harvest (June 27) from each replicate and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After one week numbers of fruits showing brown rot were counted and recorded.

Good control of brown rot blossom blight was provided by all treatments. All treatments reduced fruit rot but best control was obtained in plots receiving bloom sprays of BAS 352 04F 1 lb. and 1.5 lb. and Benlate 50 WP 4 oz.

Brown Rot Blossom Blight and Fruit Rot - Cherry (Sour)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Sixteen fungicides and rates were tested on Sour (Montmorency) Cherries in 1978: Benlate 50 WP 4 oz. plus Captan 50 WP 2 lb.; Benlate 50 WP 4 oz.; BAS 352 04F 50 WP 1 lb., 1.5 lb., and 2 lb.; RP 26019 50 WP 4 oz. and 8 oz. (applied at popcorn only); RP 26019 50 WP 4 oz. and 8 oz. (applied at popcorn and full bloom only); RP 26019 50 WP 4 oz. and 8 oz. (applied on all three sprays); Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., Triforine Flowable 5 fl. oz., Bravo 500 1.5 pt. and 2 pt., Bravo 6F 1.5 pt.; Captan 50 WP 2 lb.; BAY KGW 0599 25 WP 32 oz. plus Atplus 411F 1 pt. (full bloom and petal fall); and BAY KGW 0599 200 EC 19 fl. oz. (full bloom and petal fall). Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times of mature sour cherry trees (Montmorency) at popcorn (April 3), full bloom (April 10), and petal fall (April 25). RP 26019 50 WP 8 oz. was applied three weeks before harvest (June 29). Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., and Triforine Flowable 5 fl. oz. was applied two weeks before harvest (July 5). All sprays were applied one week before harvest (July 10) with the exception of RP 26019 50 WP 4 oz. and 8 oz. Insecticides: Diazinon 50 WP 1 lb. per 100 gallons of water was applied by airblast on June 1, June 12, June 23 and July 3 for control of insects. One hundred blossoms per tree were assessed as diseased or healthy on April 26. Fifty fruits were randomly selected from each replicate at harvest

(August 26) and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After one week numbers of fruits showing brown rot were counted and recorded.

Good control of brown rot blossom blight was provided by sprays of Benlate 50 WP 4 oz., Benlate 50 WP 4 oz. plus Captan 50 WP 2 lb., BAS 352 04F 50 WP 1 lb., 1.5 lb., and 2 lb. RP 26019 50 WP 4 oz. (one, two or three bloom sprays), 8 oz. (one, two or three bloom sprays), Triforine 18.5 EC 12 fl. oz., Captan 50 WP 2 lb., and Bravo 500 2 pt. per 100 gallons of water.

All treatments gave some control of fruit rot but best control was provided by sprays of Bravo 500 1.5 pt. and 2 pt. BAS 352 04F 50 WP 1.5 lb. and 2 lb., and RP 26109 50 WP 4 oz. and 8 oz. per 100 gallons of water.

Brown Rot Blossom Blight and Fruit Rot - Early Italian Prune

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Seven fungicides and rates were tested in 1978: BAS 352 04F 50 WP 1lb., 1.5 lb., and 2 lb., Triforine 18.5 EC 12 fl. oz., Benlate 50 WP 4 oz., Benlate 50 WP 4 oz. plus Captan 50 WP 2 lb. and wettable sulfur. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of Early Italian prune trees at full bloom (March 29) and petal fall (April 7), two weeks before harvest (August 2) and one week before harvest (August 8). Insecticides: Diazinon 50 WP 1 lb. was applied by airblast sprayer on June 6. At harvest (August 14) twenty-five fruits were randomly selected from each replicate and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After one week numbers of fruits showing brown rot were counted and recorded.

Insufficient blossom blight occurred to allow assessment of treatments. Excellent control of brown rot fruit rot was provided by the bloom sprays plus two pre-harvest sprays of BAS 352 04F 50 WP 1.5 lb. per 100 gallons of water.

Brown Rot - French Prunes

David H. Chaney, P.O. Box 628, Yuba City, CA 95991
William T. Manji, Dept. of Plant Pathology, UCD, Davis, CA 95616
Gilbert E. Cook, 644 Johnson Avenue, Marysville, CA 95901

When prune orchards in the Sacramento Valley have become infected with brown rot, it has been the usual practice to spray them with fungicides to retard spread. Recent research has indicated this practive to be of doubtful benefit.

After finding brown rot on young green prune fruits in a closely planted, sprinkler irrigated French prune orchard under sod culture in Spring 1978, a

control trial was initiated. The study was conducted to determine whether fungicides would be effective in suppressing further development of visible quiescent brown rot infections on the fruit. A randomized complete block design was used with nine treatments of five single-tree replications. From one to five Captan 50W sprays and from one to three Benlate 50W plus Captan 50W sprays were applied starting July 7 and ending August 4. Ortho Nutrient Buffer 0-8-0 was used as a wetting agent. Spray intervals were seven days for Captan and 14 days for Benlate plus Captan.

New infections were counted three times at two week intervals on marked limbs with about 200 fruits per replicate. Infected fruits were removed after each count to insure recognition of new infections at the next count. Brown rot counts were also made on samples of fruit taken from the mechanical harvester when the replicates were individually harvested on August 17. Data indicate no control of fruit brown rot with these sprays.

EFFICACY OF PREHARVEST SPRAYS IN REDUCING BROWN ROT (*MONILINIA FRUCTICOLA*) OF FRENCH PRUNE

Treatment[c]	No. of Applic.	% Brown Rot Fruit[a] Readings[b] 1	2	3	Total	Harvest Reading
Captan	1	0.6	5.5	4.7	10.8 x[d]	13.7 zy
	2	0.9	5.4	2.8	9.1 x	22.1 zy
	3	1.7	5.6	3.8	11.1 x	26.6 y
	4	0.7	3.9	5.1	9.7 x	22.3 zy
	5	0.4	4.3	1.8	6.5 x	21.2 zy
Benlate plus Captan	1	0.2	1.1	2.4	3.7 x	13.0 zy
	2	0.6	3.2	2.5	6.3 x	17.0 zy
	3	1.4	3.4	2.5	7.3 x	22.0 zy
Check	--	1.0	4.6	4.8	10.4 x	9.9 z

a Percent brown rot is the average of approximately 200 fruit/tree replicated five times.

b Disease development read four times, 7/14, 7/28, 8/7, and 8/17.

c Hand-gun sprayer, 3 gal/tree. Dosage: Captan 50W, 2 lb/100 gal, Benlate 50W, 6 oz/100 gal. Ortho Nutrient Buffer 0-8-0, 1 pt/100 gal.

d Numbers in vertical column followed by the same letter are not significantly different. P = 0.05.

Brown Rot Blossom Blight and Fruit Rot - Peach (Elberta #2)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Thirteen fungicides and rates were tested on Improved Elberta Peaches in 1978:

BAS 352 04F 1 lb., 1.5 lb. and 2 lb.; Captan 50 WP 2 lb. and 4 lb., Captan 50 WP 2 lb. plus Benlate 50 WP 4 oz., Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., Triforine Flowable 5 fl. oz.; Bravo 1.5 pt. and 2 pt., Bravo 6F 1.5 pt. and Benlate 50 WP 4 oz. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of mature Elberta peach trees at popcorn (March 8), full bloom (March 15) and petal fall (March 22). All sprays were applied two weeks before harvest (August 14) and Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz. and Triforine Flowable 5 fl. oz. were applied one week before harvest (August 21). Insecticides: Thiodan 1 lb. per 100 gallons of water was applied by handgun sprayer on July 15. One hundred blossoms per tree were assessed as diseased or healthy on May 23, 1978. Twenty-five fruits from each of the five replicate trees were selected at harvest (August 28) and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After nine days numbers of fruit showing brown rot were counted and recorded.

Good control of brown rot blossom blight was obtained from sprays of BAS 352 04F 50 WP at 1 lb. 1.5 lb. and 2 lb., Captan 50 WP 2 and 4 lb., Captan 50 WP 2 lb. plus Benlate 50 WP 4 oz., Triforine 18.5 EC 12 fl. oz., Triforine Flowable 5 fl. oz., Triforine 50 WP 8 oz., Bravo 500 1.5 pts. and 2 pts. and Bravo 6F 1.5 pts per 100 gallons of water. Excellent control of fruit rot was provided by bloom and two-pre-harvest sprays of Triforine Flowable 5 fl. oz. and Triforine 50 WP 8 oz. per 100 gallons of water

Brown Rot Blossom Blight and Fruit Rot - Peach (Elberta #3)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Twelve fungicides and rates were tested on Improved Elberta Peaches in 1978: BAS 352 04F 50 WP 1 lb., 1.5 lb. and 2 lb.; Benlate 50 WP 4 oz., Captan 50 WP 2 lb. plus Benlate 50 WP 4 oz.; Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., Triforine Flowable 5 fl. oz., Bravo 500 1.5 pt. and 2 pt., and Bravo 6 F 1.5 pt. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of mature Elberta peach trees at popcorn (March 10), full bloom (March 16) and petal fall (March 27). All sprays were applied one week before harvest (August 21) with the exception of Triforine 18.5 EC 12 fl. oz., Triforine 50 WP 8 oz., and Triforine Flowable 5 fl. oz. Insecticides: Thiodan 1 lb. per 100 gallons of water was applied by handgun sprayer on July 15 for control of insects. One hundred blossoms per tree were assessed as diseased or healthy on May 25, 30, 1978. Twenty-five fruits from each of the five replicate trees were selected at harvest (August 28) and placed on new brown paper on a plywood board, covered with cheesecloth then poly sheeting. The humidity was kept high by sprinkling the cheesecloth with water regularly. After nine days numbers of fruit showing brown rot were counted and recorded.

Excellent control of brown rot blossom blight was obtained from sprays of BAS 352 04F 50 WP 1 lb. 1.5 lb. and 2 lb., Benlate 50 WP 4 oz., Captan 50 WP 2 lb.

plus Benlate 50 WP 4 oz., Captan 50 WP 4 lb. and Triforine 18.5 EC 12 fl. oz. per 100 gallons of water. Good control was obtained from sprays of Bravo 500 2 pt., Triforine 50 WP 8 oz. and Triforine Flowable 5 fl. oz. per 100 gallons of water. Most treatments reduced the incidence of brown rot fruit rot but best control was obtained from blossom sprays of Triforine Flowable 5 fl. oz. and Triforine 50 WP 8 oz. per 100 gallons of water.

Leaf Curl - Peach

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Two fungicides and rates were tested in 1978: LS 74783 80 WP 1124.8 grams and LS 74783 80 WP 362.4 grams. A spray was applied at approximately 400 gallons of water per acre just prior to pink bud on March 2, 1978 by hydraulic handgun sprayer to single tree blocks replicated six times of mature Rochester peach trees. The block had received Bordeaux sprays for coryneum blight in November, 1977 and for leaf curl in December 1977 and January 1978. One hundred leaves per tree were assessed as diseased or healthy on May 19, 1978.

Good control of peach leaf curl was obtained from the sprav of LS 74783 80 WP at 1124.8 grams and 362.4 grams per 100 gallons of water.

Mildew - Apples

Jack D. Eves, AgReCon, Prosser, Washington 99350

Pink, petal fall, and 14 days after petal fall applications of Bayleton and Bay KWG 0599 provided excellent control of mildew on young Rome apples.

Mature Rome trees treated with pink, petal fall, and 14 days after petal fall applications in 1977 and petal fall and 14 days later applications in 1978 produced the following apple yield: Bayleton - 5,109 pounds, Karathane - 2,945 pounds, and check - 1,242 pounds.

Powdery Mildew - Jonathan Apples

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Four fungicides and rates were tested in 1978: RH 2161 2EC 1 pt. + 1 qt. Volck superior oil; RH 2161 2EC 1 qt.; Karathane 25 WP 12 oz. and Wettable Sulfur 4 lbs. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of mature Jonathan apple trees at pink (April 7), calyx (May 8), first cover (June 1) and second cover (June 13). Insecticides: Diazinon 50 WP 1 lb. per acre was applied on May 9 and June 6 and Guthion 2S 4 qts. per acre were applied on July 3. Both insecticides were applied by Bean airblast sprayer

in 300 gallons of water per acre. Powdery mildew: one hundred terminals per replicate were assessed as diseased or healthy on June 28.

All treatments provided control of powdery mildew equal to that of the standard Karathane spray.

Powdery Mildew - Rome Apples (#1)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Seven fungicides and rates were tested in 1978: BAY KGW 0599 200 EC 19 fl. oz.; BAY KGW 0599 25 WP plus Atplus 411F 1 pt.; Cyprex 65 WP 12 oz. plus Karathane 25 WP 12 oz.; Benlate 50 WP 3 oz. plus Manzate 200 12 oz.; RH 2161 2EC 1 qt.; RH 2161 2EC 1 pt. plus Volck Supreme Oil 1 pt.; and Wettable Sulfur 4 lb. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated six times of mature Rome trees at prepink (April 11), pink (April 24), first cover (June 1) (with the exception of BAY KGW 0599 25 WP 32 oz. plus Atplus 411 1 pt. per acre which was applied at first cover on June 5 and second cover June 16. Insecticide: Diazinon 50 WP 1 lb. per acre was applied May 9 and June 6. Guthion 2S 2 qts. per acre was applied June 3 and August 4. Plictran 50 WP 2 lbs. per acre was applied on August 4 in 300 gallons of water per acre by Bean airblast sprayer for control of insects. Powdery mildew: One hundred terminals per tree were assessed as diseased or healthy on June 12. Leaf scab: One hundred leaves per tree were rated as diseased or healthy on July 1. Fruit scab: All fruit was assessed for scab within a few days of harvest on October 19.

Excellent fruit and leaf scab control was obtained from sprays of both formulations of KGW 0599 (200 EC and 25 WP plus Atplus 411F). The Benlate plus Manzate combination and the Cyprex plus Karathane (for mildew control) formulation provided moderate control of scab. Poor control of scab resulted from sprays of RH 2161 2EC with and with Supreme oil and from wettable sulfur sprays. All treatments, except wettable sulfurs, controlled powdery mildew as well as the standard Karathane sprays.

Powdery Mildew - Rome Apples (#2)

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Seven fungicides and rates were tested in 1978: BAY KGW 0599 200 EC 19 fl. oz.; BAY KGW 0599 25 WP 32 oz. plus Atplus 411F 1 pt.; Benlate 50 WP 3 oz. plusManzate 200 12 fl. oz.; Cyprex 65 WP 12 oz. plus Karathane 25 WP 12 oz.; RH 2161 2 EC 1 qt.; RH 1161 2EC 1 pt. plus Volck superior oil 1 pt.; and wettable sulfur 4 lbs. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of mature Rome trees at pre-pink (April 13) (with the exception of RH 2161 2EC 1 qt. and RH 2161 2EC 1 pt. plus Volck superior oil 1 qt. which

was applied at pre-pink on April 11), pink (April 24), first cover (June 1) (with the exception of BAY KGW 0599 25 WP 32 oz. plus Atplus 411F 1 pt. which was applied at first cover on June 5), and second cover (June 16). Insecticides: Diazinon 50 WP 1 lb. per acre was applied on May 10 and June 6 and Guthion 2S 2 qts. per acre was applied July 3 and August 7. Both were applied in 300 gallons of water per acre by Bean airblast sprayer for control of codling moth. Powdery mildew: One hundred terminals per tree were assessed as diseased or healthy on July 5. Fruit scab and russet: Two orchard lugs of fruit, randomly selected, from each replicate tree were assessed for scab and russet within a few days of harvest on October 12.

Sprays of BAY KGW 0599 provided excellent control of leaf and fruit scab, Cyprex plus Karathane (for mildew) and Benlate plus Manzate gave good control. Poor control was found in plots sprayed with two rates of RH 2161 and wettable sulfur. All treatments provided as good, or better, control of powdery mildew as did the standard Karathane sprays. Significant reduction in fruit russet was provided by all treatments except Benlate plus Manzate.

Scab - Red Delicious Apples

Iain MacSwan, Ext. Plant Path., OSU, Corvallis, OR 97331

Five fungicides and rates were tested in 1978: Cyprex 65 WP .75 lb.; RH 2161 2EC 1 pt. plus Superior type oil 1 qt.; RH 2161 2EC 1 qt.; Ferbam 76 WP 1.5 lb.; and Ziram 76 WP 1.5 lb. Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times of Red Delicious apple trees at pre-pink (April 7), pink (April 13), calyx (May 8), first cover (June 1) and second cover (June 13). Insecticides: Diazinon 50 WP 1 lb. was applied on May 9 and June 6. Guthion 2S was applied 2 qts. per acre on July 3 and August 4. Plictran 50 WP 2 lbs. per acre were applied August 4. Insecticides were applied by Bean airblast sprayer in 300 gallons of water per acre. Leaf scab: One hundred leaves per tree were assessed as diseased or healthy on July 10. Fruit scab: All fruits were rated shortly after harvest on September 26. Best control of scab was obtained from sprays of Cyprex 65 WP.

Quiescent infections of Stone Fruits in California

B. T. Manji, J. M. Ogawa, E. Bose, and D. H. Chaney
University of California, Davis, CA 95616

Brown rot (Monilinia fructicola) infections which occur on stone fruits primarily during petal fall-shuck fall stage of growth which remain latent are called quiescent (latent) infections. G. C. Wade of Tasmania, P. T. Jenkins and C. Reinganum of Australia, have studied the disease on apricot and peach. Infections are common in areas of high rainfall during bloom. Quiescent infections are not common in California but can be found occasionally in orchards with a history of brown rot. This year, because of the

late-spring rains, infections were found in peaches, nectarines, sweet cheeries and French prunes. On peach and nectarine fruit the infections appear as brown specks or small necrotic areas, usually at the stylar end, on sweet cherries, as brown specks or brown depressions and on French prunes, as very dark, brown specks.

Green peach and French prune fruits with visible specks developed brown rot when incubated at 20^{0} C, RH 85%.

Populations and degree of Benomyl-Resistant *Monilinia fructicola* following orchard application of fungicides

D. Rough, J.M. Ogawa, M. Szkolnik, B.T. Manji, C.A. Frate, and E. Bose
University of California, Davis
N. Y. State Agricultural Experiment Station, Geneva, N. Y.

Benomyl-resistant isolates of the brown rot fungus, *Monilinia fructicola*, were first reported from California in 1977. Degree of benomyl resistance varies with isolates but generally it is low compared to strains found in other parts of the world.

A latin square plot design of four treatments and four replications of 80 trees each was established in 14 acres, Loadel peach orchard with a 22% benomyl-resistant population. The first spray was applied at pink bud and the second on part of the plots at 80% bloom. A third spray was applied four weeks before harvest. Benomyl-resistant populations increased in all treatments. Benomyl-sprayed plots had significantly greater resistant populations than captan sprayed or check plots. Benomyl alone and benomyl plus captan provided equivalent disease control with both better than captan alone. Data summarized in Table 1.

Table 1. Benomyl-resistant populations and brown rot control following orchard applications of fungicides.

Treatment[a]	% Resistant Blossoms[b]	% Blossom Blight	% Resistant Fruit[c]	% Fruit Rot
Check	44 y	71 u	33 y	53
Captan	42 y	68 u	30 y	51
Benlate	83 z	42 w	100 z	32
Benlate + Captan	86 z	41 w	87 z	32

[a] Applied by airblast sprayer, 400 gal/acre; one blossom and one preharvest spray; dosage: captan 50W, 2 lb/100, benlate 50W, 8 oz/100 gal.

[b] Percent resistant population based on 48 blossoms/treatment; percent blossom blight based on 100 blossom/tree, total of 48 trees/treatment.

[c] Percent resistant population based on 50 fruit/treatment; percent fruit rot based on 100 fruit/tree, total of 24 trees/treatment.

MINUTES OF

WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

53rd ANNUAL MEETING

IMPERIAL HOTEL - PORTLAND, OREGON

January 10-12, 1979

The 53rd annual meeting of the Western Orchard Pest and Disease Management Conference was called to order at 8:30 a.m. on January 10 by Chairman Harry O'Reilly. The names of people assigned to the various committees were read. It was stated that J. F. Swift would be retiring this year. Don Davis reported that there was a problem with the common name suggestion for Metaseiulus occidentalis, and that the name "western predatory mite" would be substituted.

The business meeting was adjourned at 10:00 a.m. until 8:30 a.m. Friday.

The second business meeting was called to order at 8:30 a.m. Friday, January 12. The treasurer's report was read. Minutes of the 1978 meeting were approved as mailed. The auditing committee reported the treasurer's records were in order.

Ron Covey, Resolutions Committee Chairman, proposed the following resolutions:

Be it resolved that:

1. We express our appreciation to the management of the Imperial Hotel for the excellent accommodations and courteous service during the 53rd annual meeting of the Western Orchard Pest and Disease Management Conference.

2. We express our appreciation to Chairman Harry O'Reilly, Secretary-Treasurer Darrell Hathaway, and section chairmen for their effective service in organizing this conference in a successful manner.

3. We extend our thanks to Joe Capizzi and his staff for making arrangements for publications of abstracts.

4. We extend our thanks to Joe Capizzi, Glenn Fisher, and Iain MacSwan for providing and operating the visual aids equipment.

5. We extend our thanks to Harry O'Reilly for compiling and recording his personal observations of the events that have occurred at the conferences during the past 53 years.

These resolutions were unanimously adopted by the membership.

A list of proposed officers for next year's conference was presented by the chairman of the Nominating Committee. They are: Dick Rice, Chairman; Don Berry, Chairman-elect; and Darrell Hathaway, Secretary-Treasurer. The slate of officers was unanimously approved by the membership.

It was decided that the three adjacent sectional meetings should be held again. They are: research, extension, and pest control management. The aspects of each section's work-related problems would be discussed at these various meetings.

The WOPDMC at its 53rd annual meeting voted to allow pesticide industry representatives to attend and participate in the business meetings.

The meeting was turned over to Chairman-elect Dick Rice. The new chairman has made the following committee and section chairmen assignments for the next meeting at Portland, January 16-18, 1980. The committees are:

Nominations:	H. Moffitt	Section chairmen are:	
	R. Downing		
	P. Weddle	Lepidoptera:	H. Riedl
		Mites:	D. McMullen
Resolutions:	B. Batiste	Other pests:	D. Davis
	L. Tanigoshi	Sprays, phyto-	
	D. Chandler	toxicity, etc.:	M. AliNiazee
		Diseases:	S. Thompson
Auditing:	J. Brunner		
	F. Banham		
	G. Fisher		

There being no further business, the meeting was adjourned at 10:00 a.m. January 12, 1979.

Darrell Hathaway
Secretary-Treasurer