ABSTRACTS OF REPORTS FROM THE

49th 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
49th Western Orchard Pest and Disease Management Conference

TABLE OF CONTENTS

LEPIDOPTEROUS INSECTS -- Section I
- Codling Moth -- Apple 1
- Codling Moth -- Pears 2
- Codling Moth -- Cherries 2
- Codling Moth -- Walnuts 2
- Codling Moth 3
- Peach Twig Borer 3
- Peach Twig Borer -- Peaches 4
- Peach Twig Borer -- Peaches and Plums 4
- Peach Twig Borer -- Almonds 4
- Peach Twig Borer -- Stonefruits 5
- Oriental Fruit Moth -- Peaches 5
- Navel Orangeworm -- Almonds 6
- Navel Orangeworm -- Walnuts 7
- Navel Orangeworm -- Almonds and Walnuts 7
- Fruittree Leafroller -- Apples 8
- Filbert Leafroller 8

ORCHARD MITES -- Section II
- European Red Mite 9
- Pear Rust Mite 11
- Pacific Mite 12
- Two-Spotted Spider Mite 1
- Spider Mite 14
- McDaniel Mite 15
- *Typhlodromus occidentalis* 15
- Orchard Mite -- *M. occidentalis* 16
- Pest Management on Apples 16

SPRAY RESIDUES, COMPATIBILITY, PHYTOXICITY, BEE POISONING & POLLINATION, CONCENTRATE SPRAYING AND OCCUPATIONAL EXPOSURE -- Section III 17

OTHER INSECT PESTS -- Section IV
- Pear Psylla 21
- San Jose Scale 23
- Cherry Fruit Fly 24
- Apple Aphid 25
- Predatious Hemiptera 25
- Leafhoppers 26
- *Campylomma verbasci* 26

DISEASES -- Section V
- Diseases of Pome Fruits 27
- Diseases of Stone Fruits 36

CONTRIBUTORS TO THE ABOVE ABSTRACTS 43

PARTIAL LIST OF PESTICIDES 45

S E C T I O N I

LEPIDOPTEROUS INSECTS

CODLING MOTH -- APPLES

H. F. Madsen and J. M. Vakenti:

The timing of and need for sprays was monitored in 6 apple orchards for the third consecutive season. One trap per hectare within an orchard plus traps in neighboring orchards is sufficient to sample the male population. A moth capture of 2 or more per hectare per week is a potentially damaging activity level. In the 6 orchards, 2 did not require sprays, 2 were sprayed twice, 1 received 2 1/2 sprays, and 1 was sprayed 3 times.

M. D. Proverbs and H. F. Madsen:

Two experiments, using different trap densities, were established to determine if codling moth can be controlled by male removal. Data from 2 seasons on moth captures and infested fruit indicate that this procedure is not sufficiently effective to prevent a gradual increase in codling moth density.

M. D. Proverbs:

The competitiveness of sterile male codling moths was tested by tagging males internally with ^{32}P. The data show that with wild females the mating frequency of sterile males was appreciably less than that of wild males. With fertile laboratory females, the mating frequency of sterile males was almost as great as that of fertile laboratory males. Evidently, the mating competitiveness of the sterile laboratory male to the wild male is reduced, not primarily because of radiation sterilization, but because of some deficiency in the laboratory colony.

J. D. Eves, J. D. Chandler, and R. L. Britt:

Guthion 50% WP applied at the rate of 5/8 pound per acre in three covers on alternate middles resulted in .002% codling moth damage on five-year-old trees. Codling moth sex pheromone trap catches averaged .9 moths per trap per week and peaked at 1.3 moths. No aphid or mite sprays were necessary.

Guthion 50% WP applied at the rate of 1/2, 3/4 and 1-1/4 pounds per acre in five covers resulted in no codling moth damage. Codling moth sex pheromone trap catches averaged 4.6 moths per trap per week and peaked at 20 moths. There was constant flight pressure.

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

Under heavy moth attack azinphosmethyl at 1/8 lb AI was 2X as effective as 1/2 lb AI methyl parathion on a 4-cover, 28-day schedule. Formetanate reduced injury over the control by about 2/3rds on a 4-cover program. The least damage was done when the 1st cover was made June 9 rather than the last of May. Three covers gave substantially poorer control than the 4-cover program under a constant season-long adult flight.

CODLING MOTH -- PEARS

P. H. Westigard:

Furadan and the synthetic pyrethroid FMC 33297 were evaluated for control of codling moth and for effects on non-target pests and beneficial species. Both chemicals provided commercial control of the codling moth. In addition, the 33297 gave control of the pear psylla. Furadan, on the other hand, gave excellent control of San Jose scale but failed to control pear psylla. Defoliation by spider-mites was more severe in both chemical plots than in the untreated check. A severe depression in populations of Deraeocoris brevis, a psylla predator, was noted on Furadan treated pear trees.

CODLING MOTH -- CHERRIES

Edward W. Anthon and Hal Moffitt:

Codling moth was caged and reared to the 3rd and 4th instar on Bing, Lambert and Van Cherries. Fumigation with 32g/m^3 methyl bromide for two hours at 24°C resulted in 100% control of codling moth larvae in harvested sweet cherries with no significant effects upon the quality of taste of the treated fruit.

CODLING MOTH -- WALNUTS

Dennis J. Culver:

A major disaster was avoided in walnuts in June concerning codling moth. Codling moth pheromone traps had completely failed to detect the June emergence of codling moth, but, as a result of logging the day-degrees from the start of the emergence of the overwintering brood of adults, the approximate day of the start of the emergence of the 1st brood adults in June was determined.

CODLING MOTH

M. T. AliNiazee:

The codling moth populations in the Willamette Valley of Oregon were monitored by using pheromone traps baited with codlemone®. The first moth was trapped on May 7, 1974 and a sharp peak occurred during the first week of June. Later moth flights were overlapping and no distinct peaks were noticed. Traps placed at 3 different locations about 7-10 miles apart showed slight differences in their flight patterns. Ten chemical treatments were tested against the codling moth. Among the tested compounds Furadan at two rates (0.5 lb, and 0.25 lb AI/100 gal), Guthion at 0.5 lb, Imidan at 0.5 lb, and MEP503 (an experimental FMC compound) obtained good codling moth control.

J. D. Eves, J. D. Chandler and R. L. Britt:

1,046 trap locations were again established in 10,000 acres of pome fruits in the Lower Yakima Valley. A computer SYMAP return of trap catch information was sent weekly to 500 growers and fieldmen. Over a three-year period, trap catches have been reduced from an average of 4.4 moths per trap per week in 1972, to 1.6 in 1973, to .9 in 1974.

A computer sort of the average catch per trap per week between apples and pears in 1973 and 1974 revealed the following:

1973 - apples, 1.53 moths per trap per week, pears 1.27
1974 - apples, 1.05 moths per trap per week, pears 0.67

A test on various Zoecon and other pheromones indicated that for effectiveness 1973 pherocon 1 > 1974 pherocon 1 > 1974 pherocon CM-X > 5 ml USDA pheromone. All season 1974 pherocon CM-X began failing in two to three weeks in the Yakima Valley.

PEACH TWIG BORER

J. D. Eves, J. D. Chandler and R. L. Britt:

Two experimental compounds in two encapsulations (septum and bullet) were placed in 20 locations for 20 weeks on an unsprayed orchard in the Moxee area. Traps and encapsulations were replaced at four-week intervals.

Season catch:	Pheromone II	(294141 bullet) -	1,851
	Pheromone VI	(294141 septum) -	1,741
	Pheromone VII	(327141 septum) -	745
	Pheromone I	(327141 bullet) -	600
		TOTAL	4,937

There was a significant difference between pheromones 294141 and 327141 but little significant difference between encapsulations.

PEACH TWIG BORER -- PEACHES

Edward W. Anthon:

Peach twig borer pheromone testing was continued this year with good success. This past season it was discovered that there had been impurities in the pheromone which we had been testing. The impurities were removed and our first trials this summer proved that the synthetic pheromone was more effective than live females.

Pheromone-baited sticky traps placed in an orchard that had not been sprayed for 5 years showed injury twig reduction of 81.4 percent. The distance between traps was 20 feet.

Edward W. Anthon:

Peach twig borer spray trials showed good control of this insect using Furadan, Dursban, Phosvel and Galecron.

R. D. McMullen:

Late June applications of chlorphenamidine 2 lb 95% SP per acre, PP484 2 lb 25% per acre, Phosvel 3 lb 45% per acre and Supracide 2 lb 45% per acre all gave control of the peach twig borer equal to the current recommendation of azinphosmethyl.

PEACH TWIG BORER -- PEACHES AND PLUMS

J. E. Dibble and J. D. Babcock:

The EC formulation of Galecron in contrast to the WP appeared to give slightly better control of PTB on both peaches and plums. These were July applications evaluated on fruit at harvest.

PEACH TWIG BORER -- ALMONDS

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

May sprays for control of peach twig borer were applied by handgun @ 400 gpa to almonds in Fresno County on May 10, 1974. Guthion 50W, S-2957 4E, Imidan 70W, Fundal 97SP, and Lorsban 25W, all at 0.5 lb. AI/100 gals., provided good reduction of 1st generation shoot strikes. Lannate 1.8L at 0.22 and 0.11 lb./100 gal., and Nudrin 1.8E at 0.22 lb./100, did not give satisfactory results.

J. E. Dibble and J. D. Babcock:

May applications evaluated as shoot strikes in June showed Lorsban, Supracide, Diazinon, Sevin, Galecron/Fundal and Phosvel to give between 3 a 8% control. A low rate of Phosvel, Lannate and Imidan resulted in 18-22% control.

PEACH TWIG BORER -- STONEFRUITS

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

Development of a synthetic sex pheromone thru cooperative research between U. C. Davis, Cornell University (Geneva), Washington State University and Zoecon Corporation was finally accomplished in 1974. Research on trapping techniques indicated that the following trapping system is satisfactory for PTB in California: Trap type - Pherocon I-C; Trap height - any convenient, but standard, height for each user; Cap changes - @ 6 week intervals; Change trap bottoms (liners) - @ 250 accumulated moths or 6 weeks, whichever occurs first; Tree quadrant - no preference; Preliminary work using 1st trap catches followed by day-degree accumulations to egg hatch indicate that this technique probably can be used to time May sprays, rather than looking for shoot strikes to time treatments. Peach twig borer pheromone caps can be combined in traps with oriental fruit moth caps, but lower total moth collections of both species will result in combination traps compared to pheromones used alone in traps.

ORIENTAL FRUIT MOTH -- PEACHES

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

Handgun sprays were applied @ 400 gpa to 3rd leaf peaches on May 23 for control of OFM. Fundal, S-2957, Lannate @ 0.22 lb./100 gals., Lorsban, and Diazinon gave the best control, while Imidan, and Lannate at 0.11 lb. AI/100 gals. resulted in less, but statistically unseparable, control than the first 5 materials.

J. D. Eves, J. D. Chandler and R. L. Britt:

Damage analysis on unsprayed peaches indicated 25.7% first brood OFM entries and 20.1% second brood entries on fruit for a total of 45.8% damage. Sex pheromone trap catches averaged 24.1 moths per week. 1973 fruit damage investigations revealed 13.5% fruit damage at harvest with trap catches averaging 68 moths per week and peaking at 310 moths per trap. 1973 was a dry spring, whereas 1974 spring weather was quite moist.

Preliminary investigations indicate that, in Washington, no OFM offspring of the first three broods go into diapause, and these investigations have revealed the possibility of a partial fifth brood.

A release of 15,000 of the parasite, Macrocentrus ancylivorus, on second brood OFM larvae resulted in 50% parasitism. The parasite emerged from second brood OFM larvae and parasitized 44% of the third brood OFM larvae. The parasite was recovered 500 feet from the original release site. Sex pheromone trap catches were reduced from 24.1 average moths per week through first and second broods to 3.8 moths per week through third and fourth broods.

J. D. Eves, J. D. Chandler and R. L. Britt:

96 trap locations were again established in 600 acres of peaches in the Parker-West Wapato area of the Lower Yakima Valley. A computer SYMAP return of trap catch information was returned to over 60 growers and fieldmen. Over a three-year period, trap catches have been reduced from an average of 11.3 moths per trap per week in 1972, to 2.6 in 1973, to .8 in 1974.

103 trap locations were again established for the second year in Pest District 1. 26 new trap locations were established in a Clark Road area. The Parker-West Wapato area had traps and return of information for three years. The Pest District 1 area had traps but no return of information for two years. Comparison of the average weekly trap catches for the three areas revealed that .8 moths were caught in Parker-West Wapato, 3.5 in Pest District 1, and 16.4 in Clark Road. The presence of traps reduces OFM populations; and the return of information dramatically reduces OFM populations.

NAVEL ORANGEWORM -- ALMONDS

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

Chemical control of navel orangeworm was attempted on 10 yr. old almonds in Fresno County during April and May 1974. Guthion 2S at 1.5 lbs AI/acre in 100 gpa (concentrate), and at 2.0 lbs AI/acre and 400 gpa (dilute) was applied to eight 5-acre reps per treatment on April 8-10, 1974. This treatment was timed to coincide with first egg hatch as determined from NOW egg traps. Second applications of Guthion at the smme rates were applied on May 1 to four of the previously treated reps; these treatments were timed to first egg hatch following the first treatment.

Navel orangeworm populations were timed throughout the season with pheromone traps using virgin females, light traps, egg traps, and eggs on mummy nuts. Results based on infested nuts at harvest,

showed the untreated check with 11.2% infestation, dilute 1 appl. = 7.3% concentrate 2 appl. = 6.9%, concentrate 1 appl. = 6.1%, and dilute 2 appl. = 5.1%. There were no statistical differences between the four treated plots, but all were significantly different from the untreated check. Egg traps changed weekly were the most reliable monitoring tool to show seasonal population trends, but there was no correlation between egg/trap and percent infestation in the various treatments.

NAVEL ORANGEWORM -- WALNUTS

G. S. Sibbett, W. H. Olson, L. C. Hendricks and C. S. Davis:

Ethrel® applied at maturity advanced harvest of Payne walnut two weeks and minimized infestation by Navel orangeworm when compared with normal harvest timing or a delayed harvest. Advancement of harvest date was most beneficial in warmer districts of California. Best kernel quality was obtained with earliest harvest date.

NAVEL ORANGEWORM -- ALMONDS AND WALNUTS

M. M. Barnes, D. L. Bruce, R. K. Curtis:

Investigations were continued on the seasonal development, food substrates, and chemical control of the naval orangeworm, a scavenger insect in walnut orchards which invades the new crop only after hull crack begins and for which no broadly applicable direct methods of suppression are available. Attempts in prior investigations to suppress populations of this insect adequately by early season treatments directed against the first brood, or by mid-season treatments against the second brood, each series in conjunction with treatments against the codling moth, did not have wholly satisfactory results because of later immigration into plots of 15-acre size. Emphasis was then placed on a continuation of post-hullcrack treatments. Three replicated experiments were conducted. These showed that 1) very complete coverage is required, i.e. airblast sprayer treatments at 600 gallons per acre failed but full coverage treatments at 1400 gallons succeeded in reducing damage by 50%, even though harvest was extended to time of normal second pick. Carbaryl and azinphosmethyl provided the best results; Bacillus thuringiensis and Dylox failed to exhibit control. Carbaryl (Sevin) treaments must be preceded or combined with acaricide suppression of two-spotted mite. Populations of the navel orangeworm develop significant levels in mid-summer on walnuts infested by the walnut blight bacterium.

Losses from this insect on almonds run as high as an average of 31%. Almond hulls are used in livestock feed which adds another factor in control as compared with walnuts. Variation in infestation from tree

to tree is extremely high (coefficient of variation 67%). A single carbaryl (Sevin) treatment applied at 50% formation of the hull suture provided 50% control, and a single carbaryl treatment 10 days later also provided 50% control indicating the desirability of two treatments. Field screening of 11 compounds was unsatisfactory because of late timing and high variability. A new common name for this insect is desirable as it is not a pest of oranges.

FRUITTREE LEAFROLLER -- APPLES

H. F. Madsen and J. M. Vakenti:

A field experiment was initiated to determine if male removal with sex attractant traps can control the fruittree leafroller. A total of 8,811 male fruittree leafrollers were trapped from June 18 to August 20 in two 5-acre blocks. Final evaluation of the method will be made by egg mass and larval samples during 1975.

FILBERT LEAFROLLER

M. T. AliNiazee: Chemical control of the filbert leafroller and the filbert worm.

Various insecticides were tested against the filbert leafroller, Archips rosanus and the filbertworm, Melissopus latiferreanus during the spring and summer of 1974. Among the tested compounds, Bacillus thuringiensis was the most effective chemical against the filbert leafroller, and Furadan against the filbertworm. Other chemicals tested obtained moderate to poor control.

M. T. AliNiazee: Sex pheromone of the filbert leafroller, Archips rosanus.

A female sex pheromone in the filbert leafroller was first detected during the spring of 1973. Extensive field studies were conducted with virgin females of the filbert leafroller which not only attracted the male filbert leafrollers, but also trapped a considerable number of the oblique banded leafroller males. This lead to the testing of the oblique banded leafroller pheromone, cis-11-Tetra decnyl acetate (cis-11-TDA), which proved to be effective against the filbert leafroller. A combination of acetate and alcohol of cis-11-TDA proved even more effective in trapping A. rosanus.

S E C T I O N II

Orchard Mites

EUROPEAN RED MITE -- APPLES

Stan Hoyt:

Benlate plus oil or oil alone applied at pre-pink, pink and petal fall were equally effective at preventing European red mite populations from developing through early July.

Summer sprays of Vendex, PGP 103, R28627 and ZR856 gave good control of European red mite in 2 separate plots. NC13292 provided a slow knockdown in one plot and its effect was aided to a large extent by predation. AC85258 was effective in one plot, but not in the other.

In two large plots Vendex gave a rather slow knockdown of European red mites but did provide long-term control.

R. S. Downing:

Pink bud sprays of Bay Bue 1452, Citrazon, R-28627, SD-14114, and Plictran gave good control of European red mite. Summer sprays of PP-213 and Plictran gave equally good control of European red mite and allowed some survival of T. occidentalis. Citrazon was not so effective against European red mite, but allowed a greater survival of T. occidentalis. UNI-1129 showed little toxicity to either mite.

J.L. Joos, B. Beardon, A. Berlowitz and C.S. Davis: Overtree sprinkler applications with the miticide Plictran to control European red mite, Panonychus ulmi Koch, on apples in Boonville, California 1974.

Control was obtained by the sequential injection of Plictran through overhead sprinklers on European red mite. Material rate was 1 pound of Plictran 50% WP per acre in the total treatment area of 10 acres. Sixteen sprinklers were used for control checks. This included four blocks at random with four sprinklers each plugged during application. The centers of each four blocks were used for sample reading to reduce to a minimum drift contamination of control blocks.

J. L. Joos, A. Berlowitz and C. S. Davis: Effectiveness of miticides on two-spotted spider mites, Tetranychus urticae Koch, and European red mites, Panonychus ulmi, Koch, on Golden Delicious apples, Sebastopol, California, 1974.

Of the six miticides studies (PGP-103, S-15126, Vendex, Plictran, Bay 1452, and V-36039, all gave control against European red mite. Effective control of two-spotted spider mite was obtained in the trials with Plictran, PGP-103, S-15126, and Bay 1452. All treatments were made to runoff by handgun and power sprayer. Triton B-1956 at 2 fl. oz./100 gals. was added to each dosage of S-15126 WP.

J. D. Eves, J. D. Chandler and R. L. Britt:

On two orchards that had not received delayed dormant applications red mite populations were closely monitored. Populations of Typhlodromus occidentalis built up earlier than normally is expected and were able to hold all phytophagous mite populations to very low levels. Secondary pest damage was observed in one orchard, but was not economically significant.

EUROPEAN RED MITE -- PEARS

P. H. Westigard:

Four juvenile hormone-like compounds from Zoecon Corporation were tested against the European red mite. Though these compounds acted relatively slowly, they provided in excess of 4 weeks control. The other experimental compound tested, ABG 6010, did not give commercial control and was phytotoxic to both the Anjou and Bartlett varieties. In this test Plictran and Vendex at .25 and .12 lb. AI/100 gave good control, though the low rate of Vendex was slow to knockdown red mite population.

EUROPEAN RED MITE -- LABORATORY TESTS

R. S. Downing:

Laboratory tests on potted Red Delicious trees with European red mite and two predator species showed the following results: Citrazon, effective against European red mite, low in toxicity to T. occidentalis and Z. mali; Plictran, R-28627 and Bay Bue 1452, effective against European red mite, low in toxicity to T. occidentalis, highly toxic to Z. mali. In Potter tower tests against T. occidentalis, Citrazon, UN1-1129, and Plictran were low in toxicity, but S-15126 was highly toxic.

PEAR RUST MITES -- PEARS

R. D. McMullen:

An evaluation of dormant, pink bud and calyx samples for pear rust mite showed that for any given sample size the variance of the mean was least for the calyx sample. Using the fruit cluster as a sample unit, 30 samples per acre are required to establish the presence of rust mites with 95% probability. The presence of more than 100 rust mites per 100 leaf sample taken biweekly during the summer indicates the need for examination of fruits. An average of 5 or more rust mites per fruit indicates need for treatment.

A. Berlowitz, J. L. Joos,and C. S. Davis: Effectiveness of pesticides and oil combinations in the reduction and maintainance of low levels of pear rust mite, Epitrimerus pyri Nalepa, on Bartlett pears in Kelseyville and San Jose, California, 1972-1974.

A two year study was made to determine the efficacy of pesticides and oil combinations against pear rust mite. Postharvest treatments were applied at given intervals from September through January. Post-treatment readings were made from September into the following spring to determine the most effective timing for applications. Lime sulfur and oil, polysulphide and oil, Diazinon and oil, Thiodan and oil, Kelthane MF, and oil (applied singly and back to back) were used in these trials. Summer treatments included Kelthane MF, Ethion, Diazinon, Vendex, Galecron, Thiodan, oil singly and back to back, Plictran and Chlorobenzilate. The most effective control was obtained with lime sulfur and oil in the first two weeks of post October harvest treatments. Diazinon plus oil, Thiodan plus oil, and polysulphide plus oil all gave substantial control at this time.

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

Oils plus endosulfan, leptophos, and Na polysulfide in the delayed dormant gave excellent control of russet on pear. Oil-ethion and oil-lime sulfur were less effective. Morestan in the pink and chlordimeform in the petal fall were the most effective materials after the dormant but not as effective as the delayed dormant in controlling russetting on Anjou and Bartlett pears. The best knock-down materials in July, when the mites were principally on the leaves, were: carbaryl (1/2#-1#), plictran (1/2#), carbofuran, Vendex and ethion. Going into the dormant period, Na polysulfide + oil was better than carbaryl in August and ethion + oil in September in reducing the number of fruit spurs with overwintering rust mites (2 vs 10 vs 11 of 20 spurs). An unsprayed block had 18 of 20 spurs infested.

PACIFIC MITE -- ALMONDS

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

Miticides for Pacific mite control were applied by handgun @ 400 gpa to almonds on July 10, 1974. Post-treatment counts at 7, 14, 21, and 28 days showed Vendex, R-28627, Bay Bue 1452, and Carzol provided outstanding control of Pacific mite, while ZR-856, ZR-1704, and ZR-1829 generally did not show appreciable miticidal activity. Vendex showed somewhat slower initial knockdown than the other materials. Survival of Metaseiulus occidentalis was best in the Vendex, and R-28627 treatments; Bay Bue 1452 and Carzol caused comparatively severe reductions in predaceous mites at 7 days post-treatment. Predator populations increased in the three Zoecon treatments, which resulted in eventual Pacific mite declines similar to the untreated check.

PACIFIC MITES -- ALMONDS AND STONE FRUITS

J. E. Dibble and J. D. Babcock:

Galecron/Fundal, Supracide, Supracide (low rate) plus PGSO-2 oil, and Phosvel (high rate) gave mite control for approximately 2 months. Lorsban, Diazinon and Imidan gave good suppression in combination with predators. Sevin, Lannate and Phosvel low rate did cause a moderate to extreme increase in the population.

J. E. Dibble and J. D. Babcock:

Omite, Plictran, Galecron/Fundal and Supracide all gave excellent control. Of special interest was the good to very good control given by the low rates of Phosvel (0.45 AI/100) and Dibrom (0.5 AI/100) in contrast to poor control at twice the rate.

PACIFIC MITE AND *M. OCCIDENTALIS* -- ALMONDS

R. E. Rice and R. A. Jones

Leaf samples for counts of Pacific mite and M. occidentalis were taken 4 and 6 weeks post-treatment from the peach twig borer control tests on almonds. Pacific mite counts were low in the Guthion, Imidan, and Fundal treatments, and were high in the S-2957, Lorsban, Lannate, and Nudrin treatments. Metaseiulus occidentalis counts were highest in the Guthion, Imidan, and S-2957 plots, intermediate in the Lorsban and Fundal treatments, and lowest in the Lannate and Nudrin treatments.

TWO-SPOTTED SPIDER MITES -- PEARS

J. L. Joos, A. Berlowitz, B. Beardon and C. S. Davis: Effectiveness of miticides on two-spotted spider mites, Tetranychus urticae Koch, on Bartlett pears, Ukiah, California, 1974.

Six miticides, PGP-103, S-15126, Vendex, Plictran, U-36059, and Bay 9306 were tested at various rates for control of two-spotted spider mites. Effective control was obtained in these trials with all materials except Bay 9306. Treatments were made to runoff by handgun and power sprayer. Triton B-1956 at 2 fl. oz./100 gals. was added to each dosage of S-15126 WP.

P. H. Westigard:

American Cyanamid's 85258 provided excellent initial and residual control, even somewhat better than that obtained with the organo-tins, R28627 and Plictran. ABG6010 did not give control and was phytotoxic to the ElDorado variety. Vendex at .25 lb. AI/100 gave slow knockdown of 2-spotted mite population and the addition of oil to Vendex improved initial as well as residual control. American Cyanamid's C1202114 did not give promising control results.

TWO-SPOTTED MITE -- PEACHES

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

Miticides were applied to Fay Elberta peaches for control of two-spotted mites in mid-July. Vendex, R-28627, and Bay Bue 1452 gave good control of the phytophagous mites, and of these three chemicals, Vendex also provided the best survival of phytoseiids and 6-spotted thrips. Reduction of 2-spotted mite in plots treated with ZR-856, ZR-1704, and ZR-1829 were generally much less than other treatments.

TWO-SPOTTED MITE -- APPLE

N. S. Luepschen, R. D. Morris and A. D. Bulla:

The effects of powdery mildew sprays on the suppression of two-spotted mites were observed on five replications of single tree plots. Five sprays were applied with a handgun beginning at petal fall. No miticides were used on these trees until after mite counts were made on July 11. A 5-leaf sample was examined, and average numbers of mites per leaf are presented in the table.

The use of a supreme type oil in combination with Benlate very significantly reduced the numbers of two-spotted mites. Karathane and sulfur showed the next best mite suppression.

The effect of powdery mildew materials on two-spotted mite suppression, 1974

	Treatment and rate/100 gals	Av. mites/leaf
'Rome' Apple	Check	231
	Dow EF-106 50 WP - 8 ozs	168
	Benlate 50 WP - 6 ozs	98
	Mag. 95 Sulfur/Karathane 35 WD - 6 lbs/8 ozs	65
	Benlate & Volck Supreme Oil - 2 ozs + 1 qt	35
	Karathane 25 WD - 8 ozs	35
	LSD - 5%	106
Jonathan' Apple	Check	53
	Benlate 50 WP - 6 ozs	46
	Karathane 25 WD - 8 ozs	9
	Benlate & Volck Supreme Oil - 2 ozs + 1 qt	3
	LSD - 5%	19

The following materials were tested:

Volck Supreme Spray Oil, (92% unsulfonated residue) Chevron Chem. Co.
Karathane 25WD, dinocap, Rohm and Haas Co.
Benlate 50 WP, benomyl, DuPont
Magnetic 95 Microfine Wettable Sulfur, 95%, Stauffer Chem. Co.
Dow EF-106 WP, (Plondrel), Dow Chem. Co.
Bay Meb 6447 25 WP, Triadimefon, Chemagro

SPIDER MITES -- APPLES, CHERRIES

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

Plictran was more effective on an equal weight basis than Vendex but Vendex appears to be one of the safest acaricides to Typhlodromus. BAY BUE 1452 and R-28627 were promising for resistant spider mite control. Tetradifon, used 10 years ago until resistance developed, was

ineffective on apples against ERM and two-spotted mites but gave control of McDaniel mite of cherries and was easy on predatory and cherry rust mites. Methyl parathion, phosalone, and Imidan knocked Typhlodromus down initially but the former 2 allowed the predators to resurge after 2 weeks.

MCDANIEL MITES -- SOUR CHERRIES

Donald W. Davis:

Plictran 3oz AI/100, Omite 6oz AI/100, SD 14114 (Vendex) 3oz AI/100, and Galecron SP 7.6oz AI/100 were applied as full volume post-harvest sprays to Montmorency sour cherries. At the time of application, July 25, there was an average of 719 McDaniel mites per 25 leaves. Five days later all acaricides showed about 96% control. At the time of treatment the spider mites were past the peak numbers. Mite populations in the untreated controls declined rapidly. Few Typhlodromus occidentalis were present and could not account for this decline. Stethorus sp. were numerous and were not killed by any of the acaricides. Together with sever mite damaged leaves, these predators probably accounted for the drop in mite numbers in the controls.

MCDANIEL SPIDER MITES -- APPLES

Stan Hoyt:

In one summer test Vendex, PGP103, R28627, and ZR876, provided good control of McDaniel spider mite. NC13292 gave a slow knockdown with the control aided to a large extent by predation. AC85258 gave a partial knockdown of the population.

TYPHLODROMUS OCCIDENTALIS -- APPLES

Stan Hoyt:

Pre-pink, pink and petal fall applications of Benlate plus oil or pre-pink applications of Carzol suppressed populations of Typhlodromus occidentalis until late June. Resurgence of predator numbers occurred in early July in these small plots.

In summer trails PGP103 (10 ounce rate), R28627 and AC85258 appeared to be toxic to T. occidentalis. Populations of predators on the NC13292 plot reached high levels in spite of declining numbers of active stages of prey. Since prey egg counts were not made, the increase could have been due to predation on eggs.

Predators were so numerous in some trials it was difficult to get an accurate reading on the effects of treatments. It is interesting to note that in one orchard, attempts to develop mite populations through the use of Sevin were uns ccessful. Three applications of the materi l failed to eliminate predators, suggesting selection of a resistant strain.

ORCHARD MITES -- *M. OCCIDENTALIS*

Edward W. Anthon:

Preliminary studies indicate that Fison NC13292 when applied to M. occidentalis laid unusually large numbers of eggs without much damage to the adults. Eggs from these treated mites hatched. This material is moderately effective against McDaniel mites.

PEST MANAGEMENT ON APPLES

J. D. Eves, J. D. Chandler and R. L. Britt:

Preliminary investigations reveal that tree fruits pest management recommendations in Washington have saved eight growers with 661 acres of apples more than $20,000 over the control group which did not use pest management practices. Pest management growers spent $29.00 for pest and disease control materials, whereas the control group spent $59.80. In the process, pest management recommendations have resulted in the release of 3,159.3 less active ingredient of pesticides into the environment than a comparable acreage of the control group. There was no loss of fruit quality or production.

S E C T I O N I I I

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

Iain C. MacSwan: Peach Coryneum Blight

Sprays were applied by Kinkelder sprayer (36 gals. per acre) to two blocks of twenty-one-year-old Improved Elberta trees on October 10, 1973. Each block, including the check, contained thirty trees. One hundred feet of peach twigs (1973 growth) selected at random from around the tree was removed from each of three trees from each plot on February 1, 1974. Numbers of infections per one-hundred feet of twigs were recorded.

Both bactericides, Kocide 101 86W 5 lbs. plus 1 gal. Volck Supreme Oil and Bordeaux 8-8, when applied in 36 gals. water per acre provided good control of Coryneum blight.

Iain C. MacSwan: Cherry Dead Bud

The increasing use of low gallonage air blast sprayers, usually of European origin, in the Willamette Valley generates many questions by growers such as 'will 20 or 30 gallons of water per acre give me good control of this or that disease?' The test was designed to assess the efficacy of a recommended bactericide when applied by one of these sprayers to control a common and serious bacterial disease (dead bud) of sweet cherries in the Willamette Valley. Sprays were applied by air blast sprayers - Kinkelder (20 gals. per acre and 100 gals. per acre) and John Bean sprayer (300 gals. per acre) - to three three-row plots in a mature Royal Anne/Corum sweet cherry orchard on November 2, 1973 and February 5, 1974. Each plot, including check, contained twenty-four trees. Disease readings were made on May 3, 1974 by assessing one-hundred buds on each of four trees per plot. The buds were on wood produced in 1973. The trees were selected at random.

Best control of dead bud was provided by the application of Kocide 101 plus Volck Supreme oil in relatively high rates of water - 300 gals. of water applied by John Bean sprayer and 100 gals. of water applied by Kinkelder sprayer. Least control of dead bud was provided when Kocide 101 plus oil was applied in 20 gals. per acre by Kinkelder sprayer.

Everett Burts and Stanley Hoyt: Effects of Overtree Sprinkling on Guthion Residues - Apple

One application of irrigation water through overtree sprinklers one day after sprays were applied removed about 40 to 50 percent of Guthion WP residues from apple foliage. A second irrigation one week later had little effect. Nufilm 17 significantly reduced the loss of Guthion from the sprinkling but Z1 had no effect.

Everett Burts: Aerial Spraying - Apple & Pear

Three cover sprays of Guthion EC or WP applied by aircraft through Beecomist dispensers gave good control of codling moth in four plots of apple this year. Aerial sprays of Galecron plus superior oil provided good control of adult pear psylla. Applications were made after some eggs had been deposited. Delayed dormant applications by aircraft of Diazinon-oil premix gave commercial control of San Jose scale and European red mite on apple. Some injury to bark and lateral buds occurred on one-year old wood. All materials were applied without water dilution except the Guthion WP which was diluted to make three gallons total spray per acre.

R. E. Rice and R. A. Jones: Chlordimeform hydrochloride (Fundal) - Almonds

Dilute spray applications of Fundal in mid-April and early May resulted in negligible breakdown of residues in either hulls or nut meats from 0 to 56 days after application. As hulls began to split and dry out, residues began increasing, and reached levels at harvest ca. 2 x those obtained at 0 days.

Everett Burts: Distribution & Persistance of Guthion on Foliage - Apple

Aerial applications of Guthion EC and WP through Beecomist dispensers provided more even distribution but less total deposit than an air-blast spray of WP. Residue decay curves were similar for all three applications.

P. H. Westigard: Concentrate spraying in high density pear plantings.

In 1974 a project was begun to evaluate modifications in spraying techniques which might be more applicable to high density dwarf pear orchards The results show that the deposits of Guthion averaged 1.18 ug/cm^2 applied at 140 gpa and 1.59 in 30 gpa. Significantly more pesticide was deposited in the upper portion of trees sprayed with 30 gpa ($\bar{x}$ = 1.55 ug/cm^2) than with 140 gpa ($\bar{x}$ = .81 ug/cm^2).

J. E. Dibble, G. S. Sibbett, J. H. LaRue and J. D. Babcock: Dormant Supreme & Superior Oil Applications - Stone Fruit

Low volume spray applications of Volck Supreme and PGSO-2 were applied in January or February to apricots, cherries, nectarines, peaches, and plums. Buds were tagged and the number of resultant blossoms and fruit were later counted. Very little effectswas recorded although slight variation did occur. San Jose Scale and European Red mite control was excellent.

Carl Johansen:

Bee Poisoning Hazard of Insecticides to Honey Bees

Material	lb/acre	hazard rating	residual time
BAY BUE 1452 WP	0.25-0.75	low	< 3 hr
BAY HOX 1901 EC	0.5 - 1	low	3 hr
BAY HOX 1901 WP	0.5 - 1	low	3 hr
BAY NTN 8629 EC	0.5	low	3 hr
" " " "	1	high	8 hr
" " " "	1.5	high	8 hr +
BAY NTN 9306 EC	0.5	low	< 3 hr
" " " "	1	high	8 hr
" " " "	1.5	high	8 hr +
Furadan F	1	very high	7 days +
Guthion EC	0.375	very high	< 7 days
Methoxychlor EC	3	low	< 3 hr
Methoxychlor WP	3	low	3 hr
Toxaphene	3	low	< 1 day

J. E. Dibble and J. D. Babcock: Non-crop targets

A series of droplet measurements were made with low volume (Spray-master @ 400 gpa) spray applications. Droplet traps were placed @ 20-1000 ft. downwind. The influence of nozzle type, gallonage and the addition of spray oil was determined. Resultant data was collected on droplet size and density and recorded as to number and percentage. Drift effect was further measured through leafhopper nymph kill at the various downwind stations.

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

A Berthoud VT1500 machine was compared to a full dilute speed sprayer (Orchardmaster 32-5) for pear psylla control from pink through harvest on high density planted trees. The machine was good in the ease of setting the desired distribution of material in the air stream. However, it was not easy to calibrate and the

machine mounted controls were hard to reach during turns. Psylla control with the concentrate machine was poorer overall and resulted in a higher nymph average and higher percentage of marked fruit.

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

Galecron EC applied at 1.0 Gal/acre in 600 Gal water under ideal drying conditons in late June produced severely blackened lenticels on Anjou and Bartlett pears. The marking was more pronounced nearest the sprayer. RH-218 EC at 1.0 Gal/acre in mid-May caused foliage burn and browning but no defoliation on pears and a faint EC ring on Newtown fruit in late July. Both Carzol and encapsulated Methyl parathion produced ring like russeting on Golden Delicious fruit during the cover season. Methyl parathion also caused enlarged lenticels on the fruit.

S E C T I O N I V

OTHER INSECT PESTS

PEAR PSYLLA -- PEARS

P. H. Westigard:

Two insect growth regulators (IGR's) ZR777 and ZR515 were tested as possible substitutes for Perthane in the area-wide dormant program. A reduction of about 50% in egg/nymph ratios with the 1.0 and .5 lb/acre rate of ZR777 was measured. No significant reduction was observed with ZR777 at .25 lb. or .5 lb. of ZR515. None of the treatments however provided commercial control.

ZR777 applied in May at .5 lb/acre did not appreciably reduce psylla levels, a 50-60% reduction in density was measured when the chemical was either (a) applied during the evening, or (b) applied in 2 applications of .25 lbs. spaced about 1 week apart.

The synthetic pyrethroid FMC 33297 provided excellent control at both .1 lb. and .025 lb. rates. In the third year of trials U36059 again gave outstanding control. Two experimental formualtions (R33864 and R33865) of Imidan were tested with R33864 giving the better control, while both compounds were improvements on the wettable powder formulation.

J. D. Eves, J. D. Chandler and R. L. Britt:

No sprays were applied to 1/2 acre of mature Bartlett and Anjou pears in an isolated area. At harvest 86% of the Bartletts would have been accepted for canning, 8% were lost to codling moth entries, and the remainder to bug and natural damage. None of the pears would have been rejected for pear psylla russeting. Pear rust mite russeting would have prohibited most of the pears from being accepted on the fresh market. Codling moth sex pheromone trap catches averaged 1.1 moths per trap per week for the season and peaked at 4 moths. Daeriocorus brevis counts of 3.2 per tray and an introduction of Anthocoris nemoralis in early July, which developed to counts of 2.4 per tray, combined to keep psylla below an ecomomic damage threshold level.

R. D. McMullen:

Dormant oil plus either endosulfan or ethion gave excellent control of overwintered pear psylla adults. In early June, endosulfan plus ethion gave 93% kill of adults and 98% kill of nymphs; endosulfan

alone gave 81% kill of adults and 91% kill of nymphs; azinphosmethyl plus ethion gave 67% kill of adults and 82% kill of nymphs. The above materials applied separately gave poor control. Seven insect growth regulators were applied for pear psylla control in September. The percent reduction of adult pear psylla varied from 92 to 84%. The perecnt reduction of nymphs varied from 6 to 49%. This poor reduction was due to the fact that mortality did not occur until the moult from fifth instar to adult, and because of production of supernumerary nymphs.

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

Chemical control. Dormant season. The most effective materials during Lab tests against overwintered adult femaels were U 36,059 CGA 18809, RH-218, and NIA 33297. The superiority of residual vs contact application varied for each product. NIA 33297 gave the best residual control and RH-218 gave the best contact control. The rate of perthane plus Thiodan 3EC had to be increased to 1.0 Gal plus 3 Qts/100 Gal to equal the results obtained with the numbered compounds. Out of the materials tested as ovicides DNOC and Morestan gave excellent lab results. ZR 777 and ZR 515 gave mixed results on repeated tests. Oil applied at dormant to prevent egg deposition was 98% effective in the lab and 85% effective in the field at 4 Gal/acre. Pink season. Morestan and NIA 33297 were the best materials. Soil applications of DS-15647 were ineffective. Petalfall season. The most effective materials were CGA 18809, RH-218, and chlorphenamidine plus Dithane M45 or Imidan WP. NIA 33297 showed a decreased activity at this time. Cover season. The most promising new materials were U 36,059, BAY BUE 1452, and CGA 18809. N-2596, DS-15647, AC202114 were poor psyllacides. NIA 33297 was also ineffective at this time.

Biological control. An isolated orchard in the upper Hood River valley sustained a very favorable percentage of honeydew marked fruit due to excellent biological control of pear psylla. No insecticide was applied after a dormant of perthane plus Thiodan plus oil and a pink of parathion plus Manzate 200. Deraeocoris brevis was the most abundant predator sampled. The orchard also contained Anthocoris melanocerus, Vespula pensylvanica, V. arenaria, green and brown lacewings, 5 species of coccinelids and 6 or more species of spiders. Honeydew damage was less than in many other commercial orchards.

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

Short interval overtree irrigation for psylla damage control was evaluated in a commercial orchard on small bearing high density planted trees. The irrigation interval was 1 hour per day 3 days a week from 8 May through 11 September. No insecticides were applied to the test block after a dormant of Ethion-oil plus perthane plus

thiodan and a pink of Morestan. The irrigated block had 13.7% marked fruit compared to 10.6% for the sprayed control and an irrigated and sprayed block. The irrigated block had the highest psylla nymph average, however, the percent honeydew damage was less than in many sprayed blocks of similar design and locale. Using 1973 pooled prices for Anjou pears the financial loss due to increased marking would be a maximim of $5.05 per acre. The cost of insecticides applied after pink was $57.76 per acre. Further study is necessary to determine if short interval over tree irrigation can be used commercially to economically reduce honeydew damage to fresh pack pears.

Everett Burts:

Dormant sprays of ZR777 and Altosid combined with oil did not kill overwintered pear psylla adults but did reduce egg and nymph populations resulting from treated adults. Summer sprays of these I.G.R.'s were not effective against nymphs. U36059 continued to show effectiveness against most stages of pear psylla in further testing this year. Imidan 70% WP and two synergized Imidan formulations provided better control of pear psylla this season than has been obtained with organophosphorous material in tests the past few years. CGA18809 and RH218 were also active against this insect.

SAN JOSE SCALE -- PEACHES/NECTARINES

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

Season-long trapping of male San Jose scale with virgin female pheromone traps showed an early spring flight in March resulting from overwintering immature males. The 1st generation flight occurred in June, the 2nd generation flight in mid-July to mid-August and an extended 3rd generation flight in September thru October.

SAN JOSE SCALE -- APPLES

Stan Hoyt:

Two summer sprays of parathion, Diazinon, Phosvel, Penncap, S2957, Dursban and Furadan gave good control of San Jose scale on new growth of apple trees, while summer sprays of CGA18809 or a pre-pink spray of parathion did not give effective control. None of the treatments, including oil plus parathion in the delayed dormant period, gave adequate fruit protection. Crawler emergence had not started prior to the first summer treatments so some infestation preceded treatment.

In large plot trials, delayed dormant sprays of oil + Dursban or oil + parathion were highly effective for control of San Jose scale, similar sprays of oil + Phosvel were slightly less effective, and pre-pink sprays of Phosvel or Dursban were relatively ineffective.

Several species of parasites and predators were observed feeding on San Jose scale in both commercial and abandoned orchards. In no orchard was the level of parasitism or predation sufficient for control.

CHERRY FRUIT FLY

M. T. AliNiazee: The western cherry fruit fly

The emergence of the western cherry fruit fly Rhagoletis indifferens in the Willamette Valley, Oregon was detected by using '3 x '3 square emergence cages. The first fly was found on June 7th, and the last fly on July 5th, with a peak on June 21, 1974. The first fly in Zoecon's ICPY traps was found on ~~July~~ June 14.

A two year field study conducted around Corvallis, Oregon, indicates that objects of different sizes, shapes, and colors were very attractive to the western cherry fruit flies. Among the most attractive objects were large spheres painted yellow, light green, dark green, red, and orange; cubes painted red, and orange; and large rectangles painted yellow.

CHERRY FRUIT FLY -- CHERRY

F. L. Banham:

Unbaited, double-faced yellow sticky boards h ng at eye-level at a density of 1 trap per tree, reduced the infestation of western cherry fruit fly by 47.4% in a 2-acre sweet cherry orchard.

Capture of black and western cherry fruit flies was increased 10.1% by fitting vertical, saturn yellow wings on Mago baited Pherocon ICPY traps. Zoecon apple maggot traps with attractant incorporated into the stickem caught 52.4% more flies than unbaited, yellow sticky boards. Unbaited, saturn yellow Prokobol traps caught 35.2% more black and western cherry fruit flies than unbaited yellow sticky boards and 47.1% more than Mago cap baited Pherocon ICPY traps.

F. L. Banham: Cherry Fruit Fly Dispersal

^{32}P labelled western cherry fruit flies were released in a 1-acre block of sweet cherries. A total of 33.2% were recovered in traps after 42 days. The recovery at various times following release and distances from the release site was as follows: 1 hour - 1% at 25 to 79 feet; 4 hours - 3.3% to 363 feet; 7 days 11% to 403 feet; 14 days - 12.4% to 839 feet; 28 days - 32% to 879 feet. Recovery was greatest during days 14 to 21. The ratio of marked flies to wild flies was 1:5.75.

APPLE APHID AND WHITE APPLE LEAFHOPPER -- APPLE

R. D. McMullen:

Bay Hox 1901 at 1 lb 40% per acre gave 100% control of the apple aphid and 78% control of the white apple leafhopper. There were no detrimental effects on predaceous mites, syrphid larvae or predaceous bugs. A rate of 3 lb 40% per acre gave 100% control of the leafhopper but populations of beneficial insects were significantly reduced.

APPLE APHIDS -- APPLES

J. D. Eves, J. D. Chandler and R. L. Britt:

Populations of 1.54 Coccinella transversoguttata plus .44 Daeriocorus brevis per teminal controlled + 400 apple aphids per terminal when no sprays were applied. .66 and less D. brevis maintained control when C. transversoguttata dispersed. No econimic level of fruit damage resulted.

PREDACEOUS HEMIPTERA

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

The toxicity of several insecticides to Deraeocoris brevis nymphs was determined to find a compatable codling moth material to be used in orchards with a beneficial number of this predator. Imidan at 4.5 lb per acre was the safest material tested. Carbaryl, Carbofuran, and encapsulated Methyl parathion killed 100% of the nymphs after 24 hours as contact sprays. Chlorphenamidine was more toxic as a residual spray than as a contact.

CONSPERSE STINK BUG -- PEACHES

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

Carzol at 6 oz/100 was equal to the Methyl parathion/Thiodan combination. Carzol at 4 oz. was next best followed by a relatively poor performance. by Dylox. Thiodan alone was unsatisfactory. Applications were made both by high and low volume. No real control differences were observed.

LEAFHOPPERS -- APPLES

Stan Hoyt:

Excellent control of leafhoppers was provided by Sevin, Thiodan, phosphamidon, Systox, Diazinon and Zolone, while Imidan and Guthion were ineffective.

CAMPYLOMMA VERBASCI -- APPLES

Stan Hoyt:

Tests for the control of C. verbasci were applied too late to prevent fruit damage although damage was reduced by all treatments. Guthion and Thiodan gave a high percentage kill of the bugs while Phosvel and phosphamidon were somewhat less effective.

S E C T I O N V

DISEASES

DISEASES OF POME FRUITS

M. Sanders, J. Yorston, and H. J. O'Reilly: Apple Scab (*Venturia inaequalis*) - Apple

Sprays were applied by handgun on plots of three MacIntosh trees replicated three times. For most treatments erradicant sprays were applied with the timing determined by using a De Witt Leafwetness Recorder. A regular schedule consists of erradicant sprays applied within 60 hours of an infection period plus two cover sprays (5 sprays). Treatments of 6 and 9 day delay consist of applications 6 or 9 days after an infection period (4 sprays). Three mite counts were taken during the summer months. Readings of leaf and fruit infections were taken.

Treatment (rates per 100 gal.)	Scab lesions per 150 leaves	Scab lesions per 100 fruit
1) Cyprex (12 oz.) regular schedule	0.3	1.3
2) Benlate (8 oz.) regular schedule	5.7	0.3
3) Benlate (4 oz.) + oil (1 qt.) - regular schedule	2.7	0.0
4) Benlate (8 oz.) - 6 day delay	4.3	5.7
5) Benlate (8 oz.) - 9 day delay	18.0	1.0
6) Benlate (4 oz.) + oil (1 qt.) - 6 day delay	6.3	3.7
7) Benlate (4 oz.) + oil (1 qt.) - 9 day delay	5.0	1.7
8) Benlate (4 oz.) + oil (1 qt.) + mancozeb (12 oz.) - regular schedule	5.0	0.7
9) Topsin (8 oz.) regular schedule	1.3	9.3
10) Topsin (8 oz.) - 6 day delay	8.7	28.0
11) Topsin (8 oz.) - 9 day delay	15.7	19.3
12) Difolatan (1 gal.) - ½ inch green + Cyprex (8 oz.) 1st and 2nd cover	8.0	2.0
13) Triforine (1 pt.) - regular schedule	24.7	18.0
14) Check - no scab sprays	286.0	2161.7
	$LSD_{.05}$ = 38	$LSD_{.05}$ = 1385
	$LSD_{.01}$ = 55	$LSD_{.01}$ = 2009

All chemical treatments gave significant control of both foliar and fruit scab infections. There were no significant differences between chemical treatments. Mite populations did not reach levels requiring sprays in any of the treatments.

N. S. Luepschen and R. D. Morris: Powdery Mildew - Apple

Five replications of single tree plots were sprayed to the point of runoff with a handgun and high pressure rig at 350-400 psi. The surfactant used was Triton B-1956 at 4 ozs/100 gal. Mildew evaluations were made July 31, examining 5 terminal shoots per tree (20 leaves on each). The number of leaves infected by mildew were converted to percentage.

With the infection of apple powdery mildew being low this year, Karathane, Benlate, Benlate plus oil, and sulfur/Karathane combinations showed good control. Chemagro's experimental Bay Meb 6447 shows considerable promise. The use of supreme type oil in combination with Benalte enabled us to reduce the fungicide rate by 65%. When compared to Benlate alone (Expt. C) it even showed a slight improvement in control.

Apple powdery mildew control trials, 1974, 'Jonathan' and 'Red Rome' varieties.

Experiment	Treatment and rate/100 gals	% leaves infected
A. Rome	Check	18.8
	Dow EF-106 50 WP - 8 ozs	3.4
	Benlate 50 WP - 6 ozs	1.8
	Benlate & Volck Supreme Oil - 2 ozs + 1 qt	1.8
	Mag. 95 Sulfur/Karathane 25 WD - 6 lbs/8 ozs	1.2
	Karathane 25 WD - 8 ozs	0.8
	LSD - 5%	4.4
B. Jonathan	Check	10.2
	Bay Meb 6447 25 WP - 6 ozs	1.6
	Bay Meb 6447 25 WP - 4 ozs	1.4
	Sulfur & Karathane - 16 ozs + 4 ozs	1.4
	Karathane 25 WD - 8 ozs	1.2
	LSD - 5%	3.6
C. Jonathan	Check	11.2
	Benlate 50 WP - 6 ozs	1.6
	Karathane 25 WD - 8 ozs	1.4
	Benlate & Volck Supreme Oil - 2 ozs + 1 qt	0.8
	LSD - 5%	5.0

The following materials were tested:

Volck Supreme Spray Oil, (92% unsulfonated residue) Chevron Chem. Co
Karathane 25 WD, dinocap, Rohm and Haas Co.
Benlate 50 WP, benomyl, DuPont
Magnetic 95 Microfine Wettable Sulfur, 95%, Stauffer Chem. Co.
Dow EF-106 50 WP, (Plondrell), Dow Chem. Co.
Bay Meb 6447 25 WP, Triadimefon, Chemagro

L. E. Lopatecki: Corticium Storage Rot - Apples

A mixture of Benlate and Captan applied to Spartan apples as a post-harvest dip reduced incidence of Corticium rot in storage 93%. When these two fungicides were used separately, they failed to produce a significant reduction of rotting. Good control was obtained with Difolatan.

B. G. Zoller and L. Hanke: Fire Blight - Pears

A prediction system (based on weather) for timing Fire Blight (Erwinia amylovora) control applications was utilized in four 10 acre Bartlett Pear blocks in the Sacramento Valley and Sacramento River districts of California. Blossom Erwinia amylovora populations were monitored twice weekly in three of the blocks plus in at least two standard treatment (3-5 day intervals) blocks in the same orchards. Treatments (copper sprays or dusts) to system orchards were applied after the first average 60°F daily temperatures of the season in each district and followed most but not all days of rainfall or simultaneous 60°F and 90% relative humidity.

Bloom began March 17. Blight bacteria were present in blossoms from mid-April through June. No apparent population differences existed between standard blocks (which received 9-16 treatments) and experimental blocks (which received 6-12 treatments). Slightly more blight developed in two experimental blocks than in their standard blocks when the former were not treated during predicted infection periods on two occasions.

B. G. Zoller and J. Sisevich: Fire Blight - Pears

A prediction system (based on weather) for timing Fire Blight (Erwinia amylovora) control applications was utilized on 300 acres of Bartlett pears in the Kelseyville (Lake County) district in California. Blossom Erwinia amylovora populations were monitored in six 20 acre blocks by plating washings of 200-blossom random samples (collected twice weekly from March 22 through May 31)

on Miller and Schroth's selective medium (with Mannitol) and counting colonies whose types proved pathogenic to green pear fruits and/or formed craters on Cross and Goodman medium.

Bloom began on March 22. Copper sprays or dusts were applied (May 7, 17, 25 and June 1) after the first average 60°F daily temperature of the season (April 29) on or following days of rainfall (May 17) or simultaneous 60°F and 90% relative humidity conditions (May 6, 7, 25, 26, 31). Blight bacteria were detected in blossoms continuously from May 3 - May 24, including samples collected in the morning after a freeze (May 18).

Four very new strikes per acre were observed (May 17) in 2 of 15 orchards under the program. The remaining orchards suffered almost no blight. Other orchards in the district had applied up to 8 control applications prior to April 29 and still suffered blight in May.

J. Sisevich: Fire Blight - Pears

A prediction system (based on weather) for timing Fire Blight (Erwinia amylovora) control applications was utilized in 115 acres of Bartlett pears in the Upper Lake (Lake County) district in California. For comparison, an additional 120 acres utilized an early season (April) standard 5 day interval program followed by the weather predicted system in May. Blossom Erwinia amylovora populations were monitored in 6-20 acre blocks by plating washings of 200-blossoms random samples (collected at least twice weekly from March 30 through May) on Miller and Schroth's selective medium (with mannitol) and counting colonies whose types proved pathogenic to green pear fruits and/or formed craters on Cross and Goodman medium.

Bloom began on March 22. System orchards received five copper sprays or dusts (May 6, 10, 11, 16, 24) after the first average 60°F daily temperature of the season (April 29) on or following days of predicted rainfall (May 11, 17, 18) or simultaneous 60°F and 90% relative humidity conditons (May 6, 7, 25, 26). Standard orchards received the same treatments in addition to 5-8 treatments prior to May 1. Blight bacteria were detected in blossoms nearly continuously from April 29 through May, including samples collected following freezes May 17 and May 18.

Epidemic very new blight was observed in one of three system orchards and one of three standard orchards on May 17. Each of the two or hards had received alterante row treatments. All remaining orchards suffered about 4 strikes per acre or less at the same time and had utilized every row treatments.

Iain C. MacSwan: Apple Scab, Powdery Mildew

Sprays were applied by handgun to single tree plots replicated three times of mature Rome trees at pink (May 2), early calyx (May 13), calyx (May 17) first cover (June 7) and third cover (July 2). Diazinon 8 lbs. per acre was applied on May 28, June 12 and July 12 by Kinkelder sprayer (20 gallons per acre) for control of codling moth. Leaf scab readings were taken on July 25, 1974 (100 leaves per tree) and fruit scab readings were taken on July 30, 1974 (approximately 200 fruits per tree). Mildew readings were taken on October 21, 1974 on 100 tips per tree. Russet readings were taken at harvest on November 1, 1974 by assessing 135-300 fruits per tree.

Fruit Scab. Significant control was provided by the following treatments (rates per 100 gals. water): Benlate 50W 6 oz., DPX 112 1.5 lb., DPX 10 3 oz. plus 1 qt. Volck Supreme oil, Triforine 20EC 4 oz. and 8 oz. plus 2 qts. Spectrum oil, Triforine 20EC 12 oz., DPX 10 6 oz., S-15126 50W 12 oz., and Triforine 20EC 4 oz.

Powdery Mildew. Significant control was provided by the following fungicides (rates per 100 gals. water): DPX 10 6 oz., Triforine 20EC 12 oz., Triforine 20EC 8 oz. plus 2 qts. Spectrum oil, S-15126 50W 12 oz., DPX 112 1.5 lb., Benlate 50W 6 oz., and DPX 10 3 oz. plus 1 qt. Volck Supreme oil.

Fruit Russet. None of the treatments increased incidence of fruit russet.

Iain MacSwan: Apple Scab, Powdery Mildew

Sprays were applied by handgun to single tree plots, replicated four times (Bravo 1.5 pts. replicated only three times), of mature Rome trees at full pink (May 1), calyx (May 13), first cover (June 7) and second cover (June 28). Diazinon 50W 8 lbs. per acre was applied by Kinkelder sprayer (20 gals. per acre) for control of codling moth on May 28, June 12 and July 12. Readings were taken as follows: Leaf scab, July 23 (100 leaves per tree); fruit scab, July 24 (approximately 200 fruits per tree); powdery mildew on October 10 (by assessing 100 tips per tree); and russet readings were taken on November 12, 1974 (harvest).

Fruit Scab. Significant control was provided by the following fungicides (rates per 100 gals. of water): Bravo 6F .75 pt. and 1.5 pt., BAY DAM 18654 50W 4 oz. and 16 oz., DS 25879 6F 1 pt. and 2 pts., Benlate 50W 6 oz. and XE 326S 95S .526 lb. and 2.105 lb.

Powdery Mildew. Excellent control was provided by BAY DAM 18654 50W 4 oz. and 16 oz., BAY MEB 6447 25W 8 oz., Bravo 6F .75 pt. and 1.5 pt., DS 25879 6F 1 pt. and 2 pts., XE 326S 95S .526 lb. and 1.052 lb., BAY BUE 0620 50W 8 oz. and Benlate 50W 6 oz.

Fruit Russet. XE 326S 95S 2.105 lb., DS 25879 6F 2 pts., and Bravo 6F significantly increased fruit russet. Russet caused by Bravo 6F severely marred the appearance of the fruit.

Iain C. MacSwan: Apple Powdery Mildew

Sprays were applied by handgun to single tree plots, replicated three times, of mature Jonathan trees at full pink (April 16), calyx (May 1), first cover (May 20), second cover (June 10) and third cover (July 11). The BAY BUE treatment received sprays only at first cover, second cover and third cover. Diazinon 50W 8 lbs. per acre was applied on May 28, June 12 and July 12 by Kinkelder sprayer (20 gals. per acre) for control of codling moth. Assessment of powdery mildew was made on October 9, 1974, when approximately 100 tips per tree were rated as diseased or healthy, and russet counts were made on October 7, 1974, by assessing at least 250 fruits per tree.

Best control of powdery mildew was provided by Karathane 25WD .75 lb. and Benlate 50W 6 oz.; less effective were PP 588 25EC 100 ppm, S-15126 50W 6 oz. and 12 oz., BAY DAM 18654 50W 4 oz., BAY BUE 0620 50W 8 oz. (received cover sprays only); least control was provided by PP 588 25EC 50 ppm. None of the test fungicides increased fruit russet. Karathane 25WD and S-15126 50W 6 oz. reduced fruit russet significantly. No phytotoxicity occurred in any of the plots.

Iain C. MacSwan: Apple Scab

Sprays were applied by handgun to single tree plots replicated three times of mature Richared Delicious trees at full pink (April 19), early calyx (May 12), first cover (May 20), second cover (June 11) and third cover (July 11). Diazinon 50W 8 lbs. per acre was applied on May 28, June 12 and July 12 by Kinkelder sprayer (20 gals. per acre) for control of codling moth. Leaf scab readings were taken on July 23 (100 leaves per tree) and fruit scab readings on July 24, (approximately 200 fruits per tree). Fruit russet readings were taken at harvest on October 24, 1974.

Best control of fruit scab was provided by Topsin M 70W plus 1 qt. Volck Supreme oil per 100 gals.; less effective were BAY DAM 18654 50W 4 oz., Benlate 50W 6 oz., Triforine 20EC 4 oz. plus 2 qts. Spectrum oil, Bravo 6F 12 oz. and Cyprex 65W .75 lb.; least effective were S-15126 50W 12 oz. and PP 588 25EC 100 ppm. Bravo 6F caused considerable russetting of fruit.

Iain C. MacSwan: Pear Scab

Sprays were applied by handgun sprayer to single tree plots replicated four times of ten-year-old Bartletts at full pink (April 12), calyx (April 26), first cover (May 17) and second cover (June 10). Diazinon 50W 8 lbs. per acre was applied on May 28, June 12, and July 12 by Kinkelder sprayer (20 gals. per acre) for control of codling moth. At harvest on September 3, 1974, over 100 fruits per tree were rated as diseased or healthy.

Best control of scab was provided by XE-326S 2.105 lbs; less effective were Cyprex 65W .75 lb., DPX 10 6 oz., XE-326S 95S 1.052 lbs., Topsin M 70W 3 oz. plus 1 qt. Volck Supreme oil, DPX 10 3 oz. plus 1 qt. Volck Supreme oil, XE-326S 95S .526 lb., Topsin M 70W 3 oz. plus .375 lb. Cyprex 65W, Benlate 50W 6 oz., DPX 112 1.5 lb. and S-15126 50W 6 oz.; least control was provided by PP 588 25EC 100 ppm and S-15126 50W 12 oz. No phytotoxicity occurred in any of the plots.

S. V. Thomson, M. N. Schroth, W. J. Moller, W. O. Reil and J. A. Beutel:

Applications of bactericides are often made in California pear orchards long before Erwinia amylovora bacteria are present in the flowers and before such measures are warranted. Monitoring pear flowers for the occurrence and population of E. amylovora in 1973 and 1974 revealed that fireblight bacteria did not colonize flowers during early or full bloom periods except in one orchard (Santa Clara 1974). Colonization occurred in secondary (rattail) flowers in most orchards. In some orchards as many as 18 applications of bactericides were applied even though bacteria could not be detected in the flowers. The development of a selective medium for E. amylovora has led to effective field monitornng techniques which are proving invaluable for the detection, study and control of the bacteria. In 1974, field trials were conducted in all major pear growing areas of the state to study the feasibility of monitoring E. amylovora populations, timing of sprays to correspond with population build-up and correlation of bacterial populations with weather.

Lenticel russet caused by a normal copper spray program was compared with that resulting when spray applications began only after E. amylovora was detected in the blossoms. Results obtained in 1974 show a substantial reduction in russet under a reduced application program.

County	Number of Sprays	% Lenticels Russetted
Glenn	0	6%
	4	12
	14	52
Sacramento	2 (one applied early)	32
	8	49
Santa Clara	0	16
	6	27
	14	52

County (cont'd)	Number of Sprays (cont'd)	% Lenticels Russetted (cont'd)
Mendocino	0	32%
	2	32
	3	52
	12	60
Lake	0	16
	5	51
	8	76

H. R. Cameron: Pear (Pyrus communis); Pear decline, mycoplasma

Tetracycline was injected into 20 mature bosc trees that had been in stages of slow decline for the past 5 years. Each treated tree was paired with an adjacent tree that had been declining at the same rate. The 20 tree pairs were selected by computer records from 10 years of decline ratings in a three thousand tree orchard. During the first year (1973) 3 gallons of 2 ppm oxytetracycline was injected by gravity into each treated tree in April and September. Three tubes from each gallon jug resulted in nine injection sites in each tree. In 1974, injection was at 100 ppm from six tubes per tree of expanded latex surgical tubing. Five hundred ml of the tetracycline was pumped into 18 inches of latex surgical tubing at approximately 30 lbs/sq. in pressure. The expanded tubing was connected to the tree with plastic quick-disconnects. The screw clamp holding the liquid under pressure was released and tetracycline uptake was completed in 20 minutes to 2 hours (depending on the moisture stress of the tree). In 1974, injections were in May and September.

During 1973, no differences between treated and non-treated trees were observed in shoot growth, fruit size or yield. In 1974 increased shoot growth was observed in all classes of treated trees, no increase in yield was noted except in the #5 rated trees. This increase was large percentage-wise but very small in actual tonage per acre. It is expected that continued increasing shoot growth will eventually result in higher yields.

Table 1. Results of tetracycline treatment one year after treatment.

Decline Rating	Treatment	Average Growth In Inches/Shoot	Yield In lbs/tree
3	200 ppm tetracycline	5.4	10.1
	non treated	3.5	10.7
4	200 ppm tetracycline	3.5	6.8
	non treated	1.2	7.3
5	200 ppm tetracycline	2.1	2.8
	non treated	.2	1.5

H. R. Cameron: Apple (Malus sylvestris); Nematode - Xiphinema & Pratylenchus

Nemacur, Ethyl 4-(methylthio)-m-tolyl isopropylphosphoramidate was applied in liquid and granular form to 4-5 year old Red Spur Delicious on MM-106 rootstocks. The soil was Willamette Silt Loam, organic matter 3-3.5% and pH 5.8 to 6.0. Trees had been planted immediately adjacent to stumps of previous peach orchard. The experiment consisted of eight replications of three tree blocks plus t o blocks at higher application rates. Each three tree block was composed of tree sites with approximately equal nematode populations. There was a liquid and granualr applicatoon plus a control tree in each block. Nematode samples were a composit of three 4" x 4" x 10" soil cores taken at each tree site. Roots extended through all but the top inch of the core. Pretreatment soil samples were taken March 2, 1973. Soil treatment was March 30th and post treatment samples were taken July 17th and November 2nd.

Nematode counts were reduced by application of Nemacur but there was also a considerable population reduction in the untreated control. There was no apparent increase in tree growth due to chemical treatment. The 30 and 45 lb. application rates were done for toxicology data and are not camparable with the rest of the experiment since they were only replicated twice and did not occur in areas of high nematode population. However, there does appear to be an increase in tree growth at these higher application rates. Rates above 20 lbs/acre are economically unfeasible. It should be noted that these trees have always been very vigorous and that there was no indication of the high nematode population until soil samples were analyzed.

Table 1.

Treatment	Formulation	Ave. Nematodes 100 cc of soil Pretreatment	Post treatment	Ave. Reduction	%	Tree Growth Ave. cm^2 Trunk increase
20 lbs actual/acre	granular	457.2	137.5	319.7	70.0	9.54
20 lbs actual/acre	spray concentrate	468.5	104.0	364.5	77.8	10.39
Untreated	---	401.2	205.1	196.2	48.9	9.02
30 lbs actual/acre	spray concentrate	200.0	116.0	84.0	42.0	15.96
45 lbs actual/acre	granular	272.0	48.0	224.0	82.3	13.04

DISEASES OF STONE FRUITS

A. W. Helton: Prunus Ringspot Virus in Italian Prune Cultivars

Two-year-old virus-free Richards Early Italian and standard Italian prune trees growing on several different rootstocks were infected with one of four strains of PRSV of differing virulence and observed for eight years. Results showed that 1) PRSV infection tends to stimulate both trunk and vertical growth rate, 2) the growth-enhancement effect is most prominent with mild-strain infection of young trees, 3) effects on both growth rate and yield are influenced as much by rootstock as by virus infection, 4) depending on rootstock and virus strain yields may be reduced as much as 1.5-fold or enhanced as much as 4.8-fold with mild-strain infection producing best results for the standard peach and plum rootstocks, and 5) infection tends to reduce fruit-casting but no correlations are apparent between yield of matured fruits and fruits cast in any virus/rootstock combination.

H. Ferris and M. V. McKenry: Spatial distribution of nematodes in peach orchards.

We are studying seasonal variations in the spatial distribution of nematodes in orchards on Lovell and Nemaguard rootstocks. Low populations of root-knot nematodes (Meloidogyne spp.) are present in the Nemaguard orchard. We had unexpected difficulty in finding a Lovell orchard with a high population of root-knot nematodes. We have not been able to find root-knot galls on the roots of the trees or the weeds in the Nemaguard orchard. There is moderate galling on the Lovell roots, however, root-knot populations in the orchard are relatively low. Preliminary surveys have shown extensive distribution of nematode-trapping fungi in both orchards. There was an increase in the number of root-knot eggs in August on both rootstocks. We have noted similar increases on grapes at this time of the year. Pin nematodes (Paratylenchus sp.) occurred in highest population densities on both rootstocks. Dagger nematodes (Xiphinema sp.) were more common in the Lovell than in the Nemaguard orchard.

J. M. Ogawa, B. T. Manji, and Ali El-Behadli: Tolerance of Plant Pathogens to Control Chemicals.

Tolerance of plant pathogens to fungicides and bactericides has not received the attention given to insecticides and miticides. Only recently researchers have started to take a good look into the mechanisms of tolerance and are attempting to find ways of living with it. History records many fungi adapting to chemicals but as soon as the fungi were transferred onto media free of toxicant the organism

reverted back to sensitive strains. More recently numerous reports tell of stable tolerant fungi developing on media incorporated with chemicals, and some of these reports have been overlooked when recommendations were made for field usage. Penicillium resistant to biphenyl in 1959 marked the beginning of the problem arising under commercial usage. Biphenyl resistant Penicillium was also resistant to another fungicide, sodium orthophenylphenate. Most significant is the widespread resistance of fungi to the new benzimidazoles, especially benomyl. Resistance of Erwinia amylovora to streptomycin is another example. A list of chemicals and tolerant pathogens is given in Table 1.

Tolerance development has led researchers to find alternate means of chemical control. The temporary control methods now used or suggested with fungicides are as follows:

A. Use of alternate fungicides according to tolerant strain population.

B. Limited usage in field and use primarily for postharvest applications.

C. Use of chemical combinations.

D. Use of another fungicide(s).

E. Increase chemical dosage.

With increasing occurrence of tolerant pathogens the following procedure appears mandatory with chemicals to be recommended or those in use.

1. Immediate and continuous monitoring for tolerant pathogens in field and testing alternate control chemicals.
2. Laboratory testing for possible development of permanent tolerance for all chemicals recommended.
3. Re-evaluation of recommendations for those chemicals which are implicated in tolerance development.

This brief outline is intended to bring light and emphasis on field tolerance and acquired tolerance in plant pathogens which have resulted in significant crop losses or necessary changes in fungicide or bactericide use.

Table 1. Partial list of fungi and bacteria tolerant to chemicals used under commercial practice.

Chemical	Pathogen	Crop	Reported by:
Bordeaux mixture	*Physalospora obtusa*	apple	Taylor, 1953
Biphenyl	*Penicillium digitatum*	citrus	Harding, 1959
	P. italicum	citrus	Harding, 1959
Na orthophenylphenate	*Penicillium digitatum*	citrus	Harding, 1962
	P. italicum	citrus	Harding, 1962
Dodine	*Venturia inaequalis*	apple	Szkolnik & Gilpatrick, 1969
Hexachlorobenzene	*Tilletia foetida*	wheat	Kuiper, 1965
Dimethirimol	*Sphaerotheca fuliginea*	cucurbits	Bent, 1971
Mercury	*Pyrenophora avenae*	oats	Noble, 1966
Benomyl	*Botrytis cinerea*	mums	Watson & Koons, 1973
		cyclamen	Bollen, 1971
		grape	McCain & Andersen, 1974
		strawberry	Nelson, 1974[a]
		cherry	Manji & Ogawa, 1974
	Cercospora apii	celery	Berger, 1973
	Cercospora arachidicola	peanuts	Littrell, 1974
	Cercospora beticola	beets	Georgopoulos, 1973
	Erysiphe graminis	bluegrass	Vargas, 1972
	Penicillium expansum	cherry	Manji & Ogawa, 1974[a]
	Septoria leucanthemi	daisy	Paulus & Netzer, 1974
	Sphaerotheca fuligenia	cucurbits	Schroeder & Provvidenti, 1969
	Venturia inaequalis	apple	Wicks, 1974
Thiabendazole	*Penicillium digitatum*	citrus	Harding, 1972
	P. italicum	citrus	Harding, 1972
Streptomycin	*Erwinia amylovora*	pear	Schroth, et al, 1972
	Pseudomonas apii	celery	Thayer, 1963

[a] Unpublished.

Iain C. MacSwan: Cherry Brown Rot Blossom Blight

Sprays were applied by handgun sprayer to single tree plots replicated four times on mature sour cherry trees (Montmorency) at popcorn (April 10) full bloom (April 18) and petal fall (April 29). Diazinon 50W 2.5 lbs. per acre was applied on May 31, June 12 and June 26 and Methoxychlor 8 lbs. per acre was applied on July 12. Both materials were applied by Kinkelder sprayer (20 gals. per acre) for insect control. Approximately 100 blossoms per tree were rated as diseased or healthy on May 6, 1974.

Good control of brown rot blossom blight was provided by Captan 50W 2 lbs., popcorn spray only of Benlate 50W 8 oz., popcorn and full bloom sprays of Benlate 50W 4 oz., Topsin M 70W 3 oz. plus 1 qt. Volck Supreme oil, Topsin M 70W plus 4 oz. Cyprex 65W, ferbam 76W 1.5 lb., Microcop 4 lbs. plus 1 pt. Sta-Stuck, COCS 50W 4 lbs., Ziram 76W 1.5 lb., Citcop 4E 2 qts., Citcop 4E 1 qt. plus 1.5 lb. ferbam 76W and Tri-copper sulfate 4 lbs; least effective were Kocide 404 3 qts., Cyprex 65W .5 lb. and Kocide 101 86W 2 lbs.

Iain C. MacSwan: Cherry Dead Bud

Sprays were applied by handgun to two-row plots of thirteen-year-old Black Republican trees in early December, 1973 (Bordeaux and Kocide, December 7; COCS, December 4; Citcop, December 10) and February 8, 1974. Each plot contained ten trees with the exception of the check which contained five. Disease readings were made on April 30, 1974, by assessing one hundred buds on each of three trees per plot. The buds were on wood produced in 1973. The trees were selected at random.

Best control of dead bud was provided by Kocide 101 86W 6 lbs. plus 1 qt. Volck Supreme oil. Citcop 4E provided control equal to that of a recommended bactericide, Bordeaux 12-12-100.

Iain C. MacSwan: Peach Leaf Curl

Seven fungicides with varying rates or with varying amounts of surfactants making a total of thirteen treatments were tested for control of leaf curl. Two sprays were applied by handgun to single tree plots replicated four times. Sprays were applied on December 31, 1973 and January 24, 1974 with the exception of PQ8 (10%) which was applied on January 14 and 28, 1974. One hundred leaves per tree on each of the four trees per treatment were rated as diseased or healthy on April 30, 1974.

All fungicides provided control equal to that of the recommended fungicides Bordeaux 12-12-100 and lime sulfur 8 gals./100. Fungicides tested were: (rates per 100 gals. water). PQ8 (10%) 2 pts., Ziram 76W 3 lbs. with 2 oz. or 12 oz. Biofilm, Bravo 6F 24 oz. with and without 2 oz. Biofilm, Ferbam 76W 3 lbs. with 2 oz. or 12 oz. Biofilm, Cyprex 65W 3 lbs. with 2 oz. or 12 oz. Biofilm and Bravo 6F 48 oz.

Iain C. MacSwan and Bernard J. Moore: Prune Brown Rot Fruit Rot

The test was designed to assess the efficacy of applying sprays at bloom time to control fruit rot at harvest time. Seven fungicides were tested; four of them at two rates making a total of eleven treatments. Sprays were applied by handgun to single tree plots of mature (16-year-old) Early Italian prune trees replicated four times at popcorn (April 10) full bloom (April 19) and petal fall (April 25). On September 4, 1974 pre-harvest counts were taken of one hundred mature fruits per tree and the number of rotted prunes recorded. Only fruits with evidence of sporodochial development were counted as diseased.

Although incidence of brown rot in fruit in the check trees was low Benlate 50W 2 lbs. per 100 gals. of water applied three times during bloom looks promising for control of fruit rot.

Iain C. MacSwan: Peach Brown Rot Blossom Blight

Sprays were applied by handgun sprayer to single tree plots replicated four times on mature Elberta peach trees at popcorn (March 22), late full bloom (April 3) and petal fall (April 12), with the exceptions of DPX which was sprayed on April 3 and 12 only, BAY MEB on March 26 and April 3 only, BAY DAM on April 3 and 12 only, Benlate 4 oz. March 26 and April 3 only, Benlate 4 oz. March 22 only and the two Topsin treatments which were applied on April 7 and 12. Approximately one hundred blossoms on each of four trees were rated as diseased or healthy on May 3, 1974.

Rain and late arrival of some fungicides prevented completion of plans for this trial - some plots received less than the planned number of sprays and some were sprayed late. Complete control was obtained in the plots sprayed with two sprays (late full bloom and petal fall) of DPX 10 8 oz. or two sprays (early and late full bloom) of Benlate 50W 4 oz. per 100 gals. water. Good control was provided by one spray (popcorn) of Benlate 50W 4 oz., three sprays of Triforine 20EC 4 oz., 8 oz. and 12 oz. without and with 2 qts. of Spectrum oil; two sprays (late full bloom and petal fall) of BAY DAM 18645 50W 8 oz., two sprays (early and late full bloom) of BAY MEB 6447 25W 8 oz., and two late sprays (early and full petal fall) of Topsin M 70W 3 oz. plus 1 qt. Volck Supreme oil. Poor control was provided by two late sprays (early and full petal fall) of Topsin M 70W plus Cyprex 65W 4 oz., three sprays of Bravo 6F and three sprays of Captan 50W.

Iain C. MacSwan and Bernard J. Moore: Prune Brown Rot Fruit Rot

Two hundred lot samples of fully matured Early Italian prunes were used to determine the efficacy of several fungicides, when used as a post-harvest treatment, to control brown rot fruit rot. Prunes were harvested and treated September 6, 1974. The fruit had received no previous fungicide treatment during the 1974 season. Each lot

of prunes was dipped for five minutes in a solution of the fungicide, air dried for three hours and then placed in hydrator boxes (50 per box - without lids) and stored at room temperature. Fruits were examined twice weekly and those affected by brown rot discarded.

Best control of brown rot fruit rot was provided by the sodium hypochlorite dip. Benlate 50W 6 oz. with and without the addition of 6 oz. of Botran 75W provided good control. The five minute dip in fungicide used in the test is probably too long to be practical for fruit packing houses; however, variations in the method of treatment may be developed.

G. R. Post and D. J. Ravetto: Lacy scab control on French Prunes - 1974

Samples of 200 fruit each from 63 French Prune blocks in the Marysville-Yuba City area were collected during June-July, 1974 and evaluated for lacy scab. The samples were divided into 4 categories - no scab symptoms (N), slight (S), moderate (M), and excessive (E) scab symptoms. According to prune industry people, prunes with scab lesions covering an accumulative area of 3/8" diameter or larger of the dried prune are scored as a cull. Using this as a guideline, categories 1 and 2 are not off grade whereas category 4 definitely is off grade or a cull. Category 3 may or may not be off grade depending upon leniency of grades, processing methods, etc.

Several different fungicides were applied during bloom through petal fall by the 20 growers surveyed. They were applied in either 100 gallons water/acre concentrate or 20 gallons water/acre by air or in dust formulation beginning around March 15 (approximately 50% bloom) through April 3 (petal fall). Fungicides used included Captan 50% WP (6-8 lbs/acre), Captan 10 dust (40-50 lbs/acre), Difolatan 4F (1 gallon/acre), and Benlate 50% WP (1.5 lbs/acre).

The results (Tables I & II) of the survey indicated the following: 1) Captan spray or dust during bloom, either by ground or air, was very effective in controlling lacy scab; 2) Difolatan spray, by ground or air was also very effective in controlling lacy scab; 3) None of the fungicides used were effective in controlling lacy scab when applied at or near petal fall whether applied by ground or air.

TABLE I. LACY SCAB CONTROL ON FRENCH PRUNES FROM GROUND AND AIR APPLICATIONS OF FUNGICIDES.

Treatment[3]	Ground[1] % Lacy Scab[2] N	S	M	E[4]	Air[1] % Lacy Scab N	S	M	E
CHECK	50.7	25.2	8.2	15.9	50.7	25.2	8.2	15.9
CAPTAN SPRAY	82.0	13.0	3.0	2.0	88.0	10.0	0.0	2.0
CAPTAN DUST	--	--	--	--	88.0	12.0	0.0	0.0
DIFOLATAN	89.0	10.0	0.0	1.0	96.5	2.0	1.5	0.0
BENLATE (PF)	43.5	43.5	6.5	6.5	39.0	36.0	20.0	5.00

[1]Fungicides applied either in 100 gallons water/acre concentrate or 20 gallons water/acre by air.

[2]Percent fruit with lacy scab symptoms from 200 fruit collected from each block.

[3]Fungicides applied March 15 (50% bloom) through April 3 (petal fall).

[4]N=no symptoms, S=slight, M=moderate, E=excessive scab symptoms.

TABLE II. COMPARISON OF LACY SCAB CONTROL ON FRENCH PRUNES FROM FUNGICIDE APPLICATIONS NEAR FULL BLOOM OR PETAL FALL.

Treatment[3]	Full Bloom[1] % Lacy Scab[2] N	S	M	E[4]	Petal Fall[1] % Lacy Scab N	S	M	E
CHECK	50.7	25.2	8.2	15.9	50.7	25.2	8.2	15.9
CAPTAN SPRAY	93.0	5.5	1.0	0.5	21.5	41.5	11.5	25.5
CAPTAN DUST	90.0	6.0	1.0	3.0	56.0	25.0	8.0	11.0
DIFOLATAN	89.0	10.0	0.0	1.0	42.5	34.0	7.0	16.5
BENLATE	--	--	--	--	43.5	43.5	6.5	6.5

[1]Full bloom occurred near March 24 and petal fall near April 3, 1974.

[2]Percent fruit with lacy scab symptoms from 200 fruit collected from each block.

[3]Fungicides applied March 15 (50% bloom) through April 3 (petal fall), 1974 in 100 gallons water/acre concentrate or 20 gallons water/acre by air.

[4]N=no symptoms, S=slight, M=moderate, and E=excessive scab symptoms.

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A PARTIAL LIST OF PESTICIDES REPORTED ON IN THESE ABSTRACTS

TRADE NAME	COMMON NAME
Agrimycin	streptomycin
Altosid	methoprene
Benlate	benomyl
Carzol	formetanate
Cyprex	dodine
Dibrom	naled
Dipel, Thuricide HP	*Bacillus thuringiensis*
Dowicide A	sodium orthophenylphenate
Dursban, Lorsban	chlorpyriphos
Dylox	trichlorfon
Furadan	carbofuran
Galecron, Fundal	chlordimeform, chlorphenamidine
Guthion	azinphosmethyl
Hexa CB	hexachlorobenzene
Imidan	phosmet
Karathane	dinocap
Kelthane	dicofol
Lannate, Nudrin	methomyl
Mertect flowable	thiabendazole
Milcurb	dimethirimol
Morestan	oxythioquinox
Omite	propargite
Phosvel	leptophos
Sevin	carbaryl
Supracide	methidation
Thiodan	endosulfan
Zolone	phosalone