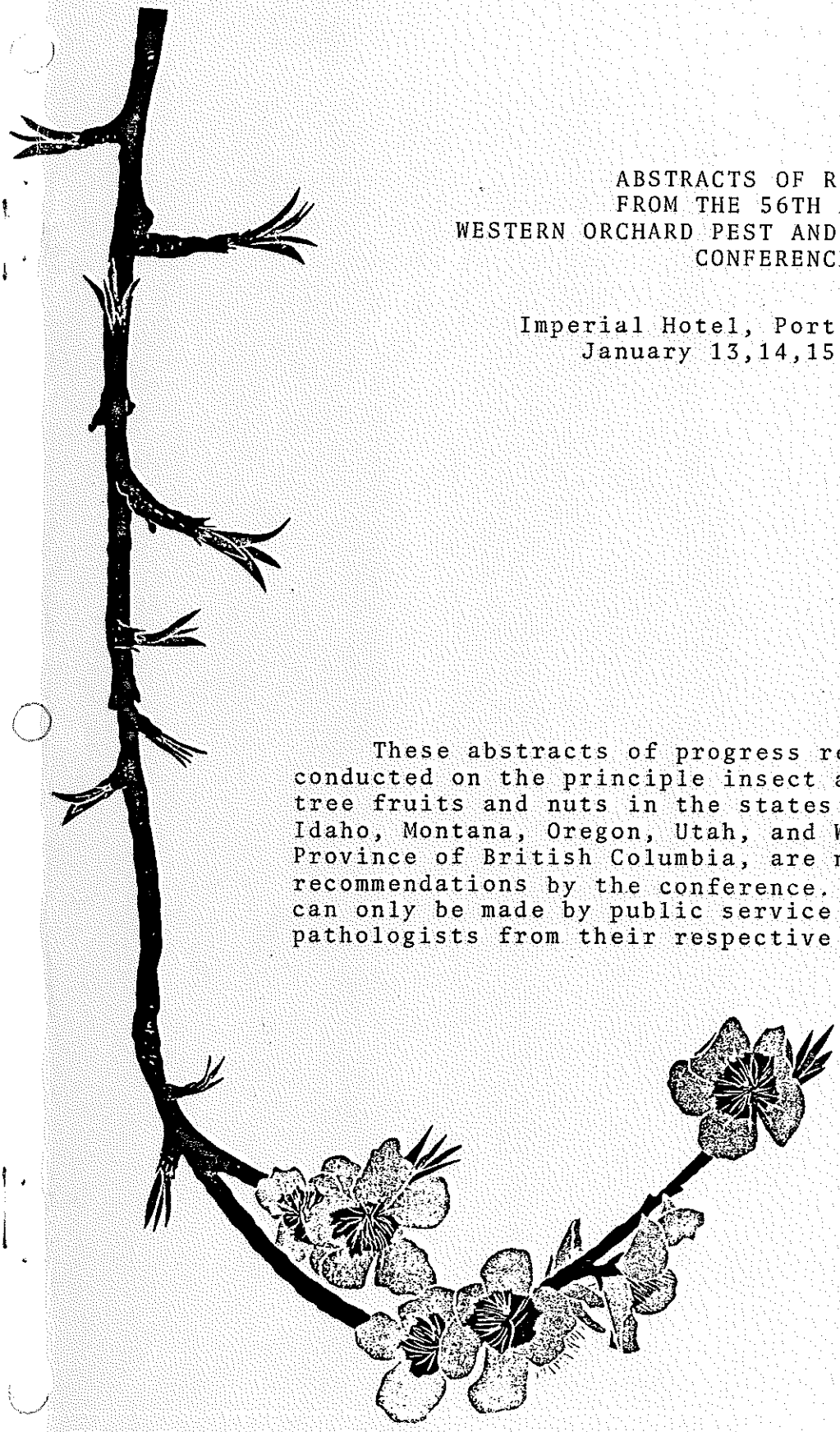
RON COLLINS



ABSTRACTS OF REPORTS FROM THE 56TH ANNUAL WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

Imperial Hotel, Portland, Oregon
January 13,14,15, 1982

These abstracts of progress reports on research conducted on the principle 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 by the conference. Official recommendations can only be made by public service entomologists and plant pathologists from their respective areas.

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S E C T I O N I

L E P I D O P T E R O U S P E S T S

Section Leader -- Fred L. Banham

Relationship of Pheromone Trap Catch to Filbertworm Damage

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Zoecon pherocon traps were monitored in abandoned and commercial filbert orchards for adults of the filbertworm, Melissopus latiferreanus. Nuts were collected throughout the growing season to record larval infestation. Harvest infestation was also noted. Seasonal infestation of nuts appears to correlate well with moth catch in pheromone traps. Greater harvest losses were sustained in orchards sprayed when cumulative trap counts reached 10 to 15 moths, than when sprays were applied at a 5 moth threshold.

Leafminer - Apples

Donald W. Davis
Utah State University

The tentiform leafminer, currently identified as Phyllonorycter elamaella, continues to damage Utah orchards. Usually, there is 2 or 3 years of marked activity in a given orchards. This is followed by several years of negligible injury. Larvae are heavily parasitized and many die from polyhedral virus infection.

Insecticide experiments were applied during the second flight period on July 1, using a high pressure sprayer at approximately 350 gallons per acre. Evaluation was made by counting the number of mines in a 25-leaf sample. Oxamyl and methomyl were used at 0.5 lbs AI/100. Three pyrethroids were used at 0.1 AI/100. For the first 6 weeks, in order of control, it was oxamyl, methomyl, cypermethrin, permethrin and fenvalerate. Late in the season, cypermethrin and permethrin gave slightly superior results. Oxamyl gave a seasonal average of 74% reduction in mine numbers, with a nearly 100% elimination of new mines starting after the spray application and before the third flight of early August.

Obliquebanded Leafroller - Apples

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The commercially available sex pheromone for the obliquebanded leafroller failed to attract males of this species in replicated trials in apple orchards. The sex pheromone of the European leafroller was attractive to males of obliquebanded leafroller indicating the species was present in the monitored orchards.

Pandemis Leafroller - Apples

Stan Hoyt
Washington State University, Tree Fruit Research Center,
Wenatchee, WA 98801

Delayed dormant sprays of Orthene or oil plus parathion, pre-pink sprays of Lorsban or Orthene, and summer sprays of Guthion, Penncap-M, or Orthene all provide excellent control of this leafroller. Supracide, FMC 35001, Diazinon, Guthion in pre-pink, and a low rate of methomyl in the summer were relatively ineffective.

Codling Moth - Apples

Stan Hoyt
Washington State University, Tree Fruit Research Center
Wenatchee, WA 98801

Applications of granulosis virus at 10 or 20 day intervals gave fairly good control of codling moth. Since this is a specific control, populations of several other pests developed on the virus treated trees.

First and third cover sprays of Ambush gave inadequate codling moth protection while three covers of Bay Sir 8514 and four of U56295 gave excellent control. High mite populations and extreme mite damage occurred on the U56295 plot.

U56295 [illegible]

Codling Moth - Pears

P. H. Westigard
Southern Oregon Experiment Station

Biweekly treatments of a granulosis virus (SAN 406 I) resulted in 0% infested pear fruit at the end of the 1st codlig moth generation (July 8) and 4.5% at harvest (Sept. 8). Infestation levels in the standard O-P treatment and the untreated plots were respectively 0 and 75% at harvest.

Tentiform Leafminer - Pome Fruits

R. W. Zwick
Mid-Columbia Experiment Station

Pheromone traps in a number of locations in Hood River and The Dalles captured substantial numbers of a leafminer identified as Phyllonorycter elamaella Dog & Mut. (1980) in April. However, only 2 infested pear leaves in Station block were noted during the growing season and even semi-abandoned apple trees were not infested by this leafminer species.

Codling Moth - Apples

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Yakima, WA 98902

Codling moths, collected in 1980 by banding trees, were stored in an outdoor insectary in constant shade (air temperature). First emergence was on May 12, 1981, followed by sporadic emergence of a few moths. A sustained heavy emergence began May 24. The temperature integrator, measuring air temperature, showed 3824° hr at 1st emergence and 5817° hr when sustained emergence began. In the laboratory at constant temperatures, emergence was begun at 4800 to 7500° hr. Egg hatch was at 1200 to 1400° hr in the laboratory. First egg hatch would be expected at a heat sum of 6200°-7000° hr under field conditions.

In the firld, first larval enteries were observed when the heat sum was 6589° hr.

Second generation moths were calculated to emerge beginning at 23,000° hr. Pheromone traps showed 2nd generation moths emerging at 21,935° hr. Daily about 400° hr were accumulated, therefore, there were 2-3 days between the expected and observed emergence dates. Sprays were applied when heat summations read 6589° hf for 1st generation and 24,215 hr for 2nd generation. Control was improved as reflected in pheromone traps, down from 862 in 1980 to 291 in 1981 males trapped, a 66% reduction.

Codling Moth - Apples

Jack D. Eves
AgReCon, Prosser, WA 99350

Ammo at .05 and 1.0 lb a.i./acre in three cover sprays was superior to Guthion in reducing codling moth infested apples. Ammo at .025 was equivalent to Guthion. European red mite and McDaniel mite populations were increased slightly in the Ammo treatments but damaging levels did not develop. There appeared to be only a minor effect on predator mites.

Codling Moth - Apples

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Cover sprays on two organically grown orchards in replicatd trials were made for the cotnrol of codling moth. This included: Bacillus thuringiensis Berliner (B.T.) alone, B.T. plus oil, oil alone, untreated checks. Bacillus thuringiensis was used at the rate of 2 qt/A and Supreme oil at 2 gal/A. All treatments were applied by a speed sprayer at 100 gal/A on Orchard No. 1 May 22, 28, 29/81, June 3, 4, 28/81, July 5, 11, 12, 27/81 August 4, 9, 17, 25/81, and September 7/81.

Orchard No. 1 was treated with B.T. and oil alone (12% damage), untreated check (79% damage); Orchard No. 2 damage with B.T. and oil treatments 29%, oil alone at 30%, B.T. alone 64%, and the untreated check at 62% damage. These trials show Bacillus thuringiensis Berliner alone will not prevent larval damage to apples. However, oil at 2 gal/A treatments in combination with B.T. in Orchard No. 1 and oil alone in Orchard No. 2 did have an effect on control of codling moth.

Codling Moth - Pome Fruits

R. W. Zwick
Mid-Columbia Experiment Station

Fenvalerate at 0.05 lbs AI/A in 3 cover sprays on apples gave economic control but was poorer than phosalone at 1.5 lbs AI/A both applied as concentrates seasonally. Fenvalerate applied with a low rate of hexakis in the first cover delayed spider mite buildup until September while phosalone and cyhexatin produced a buildup by early August. No phytoseiids were observed in the fenvalerate block while a small Typhlodromus population appeared late in the phosalone block.

Several pyrethroids, L-676,863, amitraz, and SN72129, gave codling moth protection in 4-spray, single-tree plot programs on Red Delicious and Newtown apples. Newtown variety was more heavily attacked than Red Delicious in this block.

A 6 moth/trap/night seasonal pheromone trap catch in a solid Bartlett block was protected from economic codling moth damage by just 1 cover spray of amitraz + Imidan in early July--3 weeks after first generation peak flights.

Peach Twig Borer - Peaches and Almonds

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An organically grown peach orchard of 2.23 acres near Beaumont, California was the site of a male peach twig borer mass trap-out study. The trap-out period lasted from April 17 to Sept. 4. Percent infestation of Fay Elberta peaches in the trap-out and nontrap-out sites were 11.5% and 27.3%, respectively.

In Madera County, California, peach twig borer larval feeding distribution was studied in an almond orchard under an imposed water-stress treatment. Results showed no significant differences in larval feeding distribution between the water-stress and control treatments.

Peach twig borer commercial pheromone rubber septa were field aged at weekly intervals for up to 9 weeks under summer temperatures. Pheromone longevity in the rubber septum was determined by allowing the septa to attract moths to a standard pheromone trap over a 5 day period in the orchard. Results showed that all rubber septa which had been aged for longer than 2 weeks had a significant reduction in trap catch.

A late season male flight study on peach twig borer moths was made in an almond orchard located in Fresno County. The commercial synthetic pheromone was used in Pherocon® 1C traps to attract males over a 3 night period. Moths did not begin to fly until 1AM or shortly thereafter at which time the average temperature was 63.3° ± 1.5°F. Peak flight occurred from 3 to 4 AM on all 3 nights (60.0° ± 1.0°F) followed by an abrupt decline in flight activity.

Peach Twig Borer

R. E. Rice and R. A. Jones
University of California, Parlier 93648

Applications of cypermethrin at 0.05 and 0.10 lbs. a.i. per acre, and Pounce at 0.10 lb. a.i. per acre, gave control of peach twig borer in almonds equal to or better than Diazinon at 2.0 lbs. a.i. per acre.

Peach Twig Borer

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University of California, Parlier 93648

Diazinon was applied to 4th leaf almonds at intervals of 300, 400, 500, and 600 D° after first flight of peach twig borer moths in April. Twig strike counts in early June showed that the 400° and 500° treatments gave significantly better control (93.6% and 94.9% respectively) than treatments applied at 300° or 600° (75.6% and 65.4% respectively).

Peach Twig Borer and Oriental Fruit Moth - Peaches

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Agricultural Research Service, USDA
Yakima, WA 98902

Pherocon 1-C traps were placed in 2 peach orchards in which at least 10 traps baited with 1 septa of the Zoecon peach twig borer pheromone and 1 septa of Zoecons' oriental fruit moth pheromone were placed in each sticky trap. No OFM or PTB were caught in these traps for a period of over a month while other traps located in the same orchard baited with 1 septa/trap of either PTB or OFM pheromone caught moths. The effectiveness of PTB and OFM formulated on rubber septa apparently was diminished by the combination.

Peachtree Borer - Peach

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Research Station, Summerland, British Columbia V0H 1Z0

Two trunk sprays of deltamethrin 2.5 EC at 1.0 g ai or fenvalerate 30 EC at 5.0 g ai/100 L timed by sex pheromone traps and applied by hand gun at the rate of 0.6 L/tree were superior to similar sprays of permethrin 25 WP at 5.0 g ai/100 L. All 3 treatments were significantly superior to 2 timed trunk sprays of endosulfan 50 WP at 75.0 g ai/100 L. Treatments were applied one week after the first male moths were captured in sex pheromone traps and 4 weeks later at peak moth emergence. The traps were deployed at a density of 1/ha. Washing of the tree trunks by undertree solid-set irrigation sprinklers did not appear to affect treatment efficacy when compared to no washing from trickle irrigation.

Peachtree Borer - Peach

Fred L. Banham, and R. Johnson
Research Station, Summerland, British Columbia

Male peachtree borer moths were strongly attracted to laboratory prepared attractant caps containing synthetic female sex pheromone but were not attracted to commercially available Zoecon peachtree borer pheromone caps which were supposed to contain the same chemical. The two types of attractant caps were put in seperated Pherocon IC traps. These were paired and deployed at a density of 1 pair/ha or plot at 5 locations. The location of each trap was rotated weekly. Traps baited with laboratory caps caught an average of 51.2 male moths/trap over 12 weeks while those baited with Zoecon caps caught 0.2 moths/trap.

Naval Orangeworm - Almond

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University of California, Riverside 92521

Under orchard conditions, the developmental time of Amyelois transitella is regulated by field temperatures. Recording high and low temperatures daily allows the use of temperature summation over time to determine partial or complete time for development of the moth.

Three hundred seventy-eight nonsplit Nonpareil nuts were caged singly while still attached to the tree in a Kern County almond orchard. At hullsplit, one or two newly hatched first-instar larvae were placed on each caged nut. Nut were inoculated in 6 cohorts, each separated by one day. All cages were checked daily for adult emergence and damage. Field temperature were recorded from weather stations within the orchard.

After 48 days, 198 moths had been recorded as emerged. Developmental time above 55°F from first instar to adult ranged from 718 to 1248 degree-days with a mean of 929 degree-days.

Naval Orangeworm - Almond

M.M. Barnes and C. E. Engle
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This pyralid moth continues as a major pest in California almond orchards. Its oviposition habits, infesting the new crop after hullsplit, and ovipositing about 50% within the opening hull, make it difficult to control with insecticide programs alone. Two cultural procedures, sanitation of mummies, which are the overwintering site, and early harvest, are important ingredients in control programs. Density of overwintering larvae is correlated with density of mummies in winter. Reduction of mummies in winter to less than 2 per tree will result in infestations ranging from 2-4% at harvest, if early harvest is practiced, and without use of insecticides. Mummy counts in June can be used to decide whether a hullsplit treatment is needed.

S E C T I O N II

O R C H A R D M I T E S

Section Leader -- Dick Rice

Phytophagous Spider Mites - Almonds

Rod R. Youngman and Martin M. Barnes,
University of California, Riverside 92521

Phytophagous spider mites are a serious pest problem in California almond orchards. At harvest, orchard irrigation is terminated to allow the ground to dry out to accommodate harvesting practices and equipment. There has been some speculation that spider mite populations increase as a result of the termination of orchard irrigation. In Madera County, 4-day interval mite counts were made on almond trees subjected to a period of increased water-stress prior to the 1981 harvest. Results showed no significant differences in mite counts between trees in the water-stressed and nonwater-stressed treatments; however, water-stressed trees showed severe defoliation and loss of color.

Two-Spotted Spider mites - Pears

P. H. Westigard
Southern Oregon Experiment Station

Avermectrin (L-676,863) used alone or in combination with petroleum oil provided excellent control of the two-spotted spider mite for nearly 8 weeks. The mite growth regulator SLJ 0312 also provided good control at rates of 4-6 oz. AI/100.

European Red Mites - Apples

Jack Eves
AgReCon, Prosser, WA 99350

Mobay compounds SLJ 0312 at 2 oz. a.i./100 gal and AMS 0896 at 1.9 Kg/Ha effectively controlled European red mites through 21 days. SLJ 0312 at 4 and 6 oz effectively controlled red mites through 35 days. The compounds, particularly AMS 0896, appeared to have no detrimental effect on predator mites. Plictran was more effective than either code compound tested and depressed mite populations faster.

McDaniel Mites - Apples

Jack Eves
AgReCon, Prosser, WA 99350

FMC 54800 at .02 and .04,FMC 54617 at .02 and .04, and Plictran at 1.0 lb. a.i./acre provided excellent control of McDaniel mites for over 21 days. FMC 54800 at .01 and FMC 54617 at .01 only moderately controlled McDaniel mites and Pounce at .10 offered poor control. The .02 and .04 rates of the FMC compounds depressed mite populations faster than Plictran. All compounds and rates were comparable to Plictran for minimal detrimental effects on predator mites.

Rust Mite - Pears

Russ Gleason
Route 2, Box 443, Yakima, WA 98908

Sevin applied in combination with early psylla spray gave excellent control of rust mite on pears.

Predatory Mites - Apples

Russ Gleason
Route 2, Box 443, Yakima, WA 98908

Supracide applied to a block having large numbers of Typhlodromus substantially reduced population at 1 1/2 quarts per acre, but had little apparent effect at 1 quart per acre. Application was made in the delayed dormant period at 100 gallons per acre in water acidified to about 6.5 pH.

Apples and Pears

Stan Hoyt
Washington State University, Tree Fruit Research Center
Wenatchee, WA 98801

NC21314 continues to show promise as a miticide on apples giving good control of McDaniel and two-spotted spider mites and European red mite. Moderate toxicity to apple rust mite and low toxicity to Typhlodromus occidentalis make it especially suitable for integrated programs. SLJ 0312 also shows promise for the control of the tetranychid mites but is high in toxicity to apple rust mite and T. occidentalis and caused some marking of the fruit on both apples and pears. FMC 54617, a pyrethroid, gave good knowndown of McDaniel spider mite, but populations rebounded after several weeks. High toxicity to predatory mites and poor control of European red mite make it of questionable value in Washington programs.

Avermectin and Vydate are promising materials for use on pears giving good control to two-spotted spider mites and pear rust mites.

Russeting of Golden Delicious apples was observed in association with high populations of apple rust mites prior to and during bloom. Injury was reduced to a low level by a single application of Plictran at the pink stage where a moderate population occurred but not where numbers were high. Untreated check trees had from 47 to 69% of the fruit russeted.

Typhlodromus spp. - Apple

R. W. Zwick
Mid-Columbia Experiment Station

The following cover materials had little or no effect on T. pyri in dilute handgun applications: Bayleton WP, Vangard WP, Penncap M, phosalone WP, and endosulfan WP. Phosmet WP at 0.75 lb destroyed T. pyri. Hexakis FL at 0.75 qt/A with oil gave good spider mite suppression while allowing Typhlodromus spp. survival.

Pear Rust Mite - Pear

R. W. Zwick
Mid-Columbia Experiment Station

UBI-T930 at petal fall failed to control mites on fruitlets as well as 0.25 lb/100 of cyhexatin. The synthetic pyrethroids and avermectin did not control PRM on foliage during July while amitraz WP gave good control.

Spider Mites - Pome Fruits

R. W. Zwick
Mid-Columbia Experiment Station

The synthetic pyrethroid S-3206 is the only pyrethroid tested to date which is effective against spider mites. All other pyrethroids caused red mite resurgence in a 3-cover program. Dicofol was very poor for spider mite control where it had been used within the past 2 years--tolerance had not been lost. L-676,863 was poor against ERM, but improved control resulted with addition of a medium oil. Delaying a delayed dormant oil application 1 week resulted in 50 percent and 2 weeks in 80 percent better control of ERM eggs on heavily infested apple trees.

S E C T I O N III

O T H E R I N S E C T P E S T S

Section Leader -- Jack Eves

Filbert Aphid - Filberts

Russell Messing
Oregon State University, Corvallis, OR 97331

Filbert orchards in the Willamette Valley were surveyed to catalog the predators (and other natural enemies) of the filbert aphid. Several species of Coccinellidae, Miridae, Chrysopidae, and Hemerobiidae were found to be common predators. A fungal pathogen (Triplosporium fresenii) and a Hymemopterous parasite (Mesidiopsus sp.) were also found to attack the aphid.

Phenological data and lab feeding studies showed Adalia bipunctata (Coccinellidae) and Deraeocoris brevis (Miridae) to be the most important predators. Adults of both species were shown to be susceptible to all commonly used filbert insecticides, although less so to Zolone.

In field trials, Metasystox-R was most effective in controlling filbert aphids; Diazinon, Zolone, Systox, and Thiodan were moderately effective; and Sevin was ineffective. In one case Sevin was shown to induce an aphid outbreak. It is thought that in some cases severe aphid outbreaks in commercial orchards are caused by insecticide induced predator mortality.

San Jose Scale - Apples

Johannes L. Joos
University of California, Santa Rosa, CA 95401

Under very heavy San Jose scale population pressure applications of: 1) Advantage® 4EC 1 lb. ai/A for two foliar; 2) Advantage 4EC 1 lb. ai/A plus FMC oil 4 gal/A dormant and two foliar treatments of Advantage 4EC 0.5 lb. ai/A; 3) Advantage 4EC 1 lb. ai/A plus FMC oil 4 gal/A dormant and two foliar treatments of Advantage 4E 1 lb. ai/A; 4) Advantage 4E 2 lb. ai/A dormant and two foliar Advantage 25WP 1 lb. ai/A; 5) Advantage 4EC 1 lb. ai/A dormant and one foliar Advantage 4EC 1 lb. ai/A; 6) Advantage 25WP 2 lb. ai/A two foliar; 7) Diazinon® 50WP 2 lb. ai/A two foliar; 8) Supracide® 2EC 2 qt/A dormant two foliar applications at 2 qt/A. San Jose scale pheromone traps were used to time crawler stage for foliar applications.

Counts made at harvest on the number of live scale on infestd fruit and new growth gave satisfactory control on pheromone timed foliar application alone. Advantage 4EC, when used with oil for a dormant application plus two foliar treatments, gave the best results. This treatment at harvest showed a 2% infestation compared to 53% in the untreated checks. Foliar treatments alone gave control at the 8% level.

San Jose Scale - Pears

Johannes L. Joos
University of California, Santa Rose, CA 95401

Under a moderate San Jose scale population pressure applications of: 1) Advantage® 4EC 1 lb. ai/A delayed dormant plus oil 4 gal/A; 2) Advantage 4EC 1 lb. ai/A two foliar treatments at the same rate; 3) Advantage 4EC 1 lb. ai/A delayed dormant plus 2 foliar treatments at 1 lb. ai/A; 4) Supracide 2EC 2 qt/A delayed dormant plus Diazinon 50WP 2 lb. ai/A two foliar treatments; 5) Supracide 2EC 2 qt/A delayed dormant. All applications treated with a handgun sprayer to drip on a 4 x 4 tree replication; delayed dormant 3/17/81 and foliar applications 6/27/81 and 7/11/81. San Jose scale traps and model was used to determine crawler stage for foliar treatments.

A high level of control was obtained with Advantage 4EC delyaed dormant plus 2 foliar applications. This treatment showed 2% infestation compard to 19% in the untreated checks. Advantage delayed dormant plus oil showed control to the 5% level, Advantage 4EC two foliar treatments or Supracide 2EC plus Diazinon 2 foliar treatments gave control to 8%.

San Jose Scale

R.E. Rice, R.A. Jones, S.A. Hoying
University of California, Parlier 93648

The San Jose scale phenology model was validated for crawler emergence following male scale collection in pheromone traps. First crawlers were trapped at 370 D°. Four distinct crawler generations were observed at Parlier, corresponding with the four flights of male scale previously documented for central California.

Walnut Husk Fly - Walnuts

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Field trials were performed in a 20 acre mature walnut orchard to evaluate baited Staley's No. 7 bait treatments with synthetic pyrethroid Fenvalerate (Pydrin) 2.4EC at reduced coverage for walnut husk fly control.

Four treatments, each consisting of 3-10 tree replications, were arranged in a randomized block design. Treatments included: full tree coverage without bait, alternate rows, every third row, one side of every row with bait plus synthetic pyrethroid, and untreated checks. Sprays were applied by a speed sprayer until run-off on 8/9/81. Nuts were inspected for damage at harvest on 10/1 and 10/5/81. Full coverage without bait resulted in a 25% higher level than other treatments with bait. The best control was obtained with alternate row full cover sprayed trees (6%) and one side of every row treated (7%). Infested nuts in the untreated checks showed 31% damage. The above informaiton suggests relatively low contact toxicity of Fenvalerate (synthetic pyrethroid) to adult husk flies. However, when applied with Staley's Bait No. 7, control was improved even when every third row received coverage.

Pear Psylla - Pears

R. W. Zwick
Mid-Columbia Experiment Station

Several synthetic pyrethroids gave comparable psylla control at approximately equal rates in prebloom and cover season tests. Laboratory tests of overwintering psylla showed no loss of contact or residual toxicity when COCS, sulfur, Na polysulfide, or Kocide were added to fenvalerate and sprayed immediately. Toxaphene WP was poor in laboratory and field tests alone, but when used as a dormant or petal fall with oil or as a combination with amitraz in September it gave suprisingly good nymph reduction.

San Jose Scale - Apples

Jack D. Eves
AgReCon, Prosser, WA 99350

Advantage in the dormant with and without oil, with and without foliar sprays, and at two rates was compared to standard Supricide dormant and Parathion foliar sprays in replicated plots. The compound's effectiveness in reducing percent scale infested fruit were: Advantage 1.0 plus 2 foliars Advantage 1.0> Advantage 1.0 plus oil = Advantage 1.0 plus oil plus 2 foliars Advantage 1.0> Supricide 2.0 Supricide 2.0 plus oil plus 2 foliars Parathion 1.0> Advantage 1.0 plus oil plus 2 foliars Advantage .5> Advantage 2.0 plus 2 foliars Advantage 1.0 > Supricide 2.0 plus oil > Advantage 2.0 plus 2 foliars Advantage .5> Advantage 2.0> no dormant 2 foliars Advantage 2.0> no dormant 2 foliars Advantage 1.0> no dormant Advantage .5> no dormant 2 foliars Parathion 1.0> check.

Advantage applied at scale timing in the 2nd cover codling moth spray was ≥ Guthion and Parathion for codling moth control.

Advantage was not effective in reducing apple aphid infestations but was very effective in reducing woolly apple aphid infestations.

The absence of oil in the dormant spray allowed high populations of European red mites to develop in early June. Foliar Advantage treatments did not appear to encourage red mite population increases over the standards or checks.

Foliar Advantage sprays encouraged McDaniel mite populations only when added to oil dormant sprays. Predator mite populations appear to be reduced by foliar Advantage sprays.

San Jose Scale - Pears

P.H. Westigard
Southern Oregon Experiment Station

Two rates of FMC 35001 (0.125 and 0.25 lb AI/100) and of SN 72129 (3.0 and 6.0 oz AI/100) were applied in 1st and 2nd cover periods for control of key orchard pests including San Jose scale. The 2nd cover timing was made to coincide with SJ crawler activity. FMC 35001 gave control somewhat better than that achieved with parathion (1.0 lb AI/100) while essential no scale suppression was obtained with SN 72129.

Pear Psylla - Pears

P.H. Westigard
Southern Oregon Experiment Station

Prebloom. Test 1: Three pyrethroid chemicals were tested at 0.15 lb AI/A in the dormant period for control of overwintering psylla adults. Though litte difference existed in control achieved, Cypermethrin appeared to provide somewhat longer residual activity. Test 2: The synthetic pyrethroid FRC 1292 used at 0.1, 0.2 and 0.3 oz AI/100 gave excellent control of overwintering adults and of eggs deposited prior to treatment.

Foliar period tests: Test 1: The insect growth regulator R0135223 applied at 0.12 lb AI/100 at petal fall and again at first cover period (May 11) provided psylla supression comparable to that of a single Amitraz treatment (May 11). The pyrethroid RV25494 also gave good control in this early seaon test.

Test 2: Use of avermectrin (L-676, 863) at rates ranging from 0.02 to 0.2 oz AI/100 used with and without oil (1%) provided control equivalent to that using Amitraz (0.4 lb AI/100).

Test 3: Nor Am's SN 72129 used at 3-6 oz AI/100 in 1st and 2nd cover timings gave excellent pear psylla control. The 6 oz rate gave somewhat better suppression of immature psylla that amitraz at 0.4 AI/100 FMC 35001 (Advantage) applied at 0.125 and 0.25 lb AI/100 appeared to increase psylla levels.

San Jose Scale - Apples

Stan Hoyt
Washington State University, Tree Research Center
Wenatchee, WA 98801

Orthene was ineffective as a prebloom control for San Jose scale, and FMC 35001 was only partially effective. When the latter material was combined with oil, control was comparable to that provided by oil + parathion. Supracide alone or with oil gave excellent control. FMC 35001 was toxic to predacious mites as a delayed dormant spray resulting in some increase of European red mite numbers.

Pear Psylla - Pears

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Dormant sprays were applied with airblast equipment to 1 acre blocks of 25-yr-old pear trees to compare SN 72-129 with fenvalerate for the control of overwintered pear psylla adults. Oil was included in both treatments. Both treatments provided good control of pear psylla through first generation. Adult kill with 72-129 was not as good as that provided by fenvalerate but nymph density was held below the damage level in both plots until June 11 when second generation nymphs began to develop.

Several pesticides were applied with handguns to one or two-tree replicated plots to evaluate the control of pear psylla in summer cover sprays. Treatments were applied 2 or more times depending on their residual life. Candidate materials were compared to amitraz and fenvalerate. Synthetic pyrethroids, including Baythroid, Cymbush, HAG 107 and Payoff, gave psylla control comparable to fenvalerate. L-676,863 and SN 72-129 were also effective. RO 13-5223 gave good control, but 4 applications were made instead of 2. DPX 3792 and AMS 0896 were less effective than the other materials. No treatment gave better control of pear psylla than 2 application of amitraz. Codling moth and phytophagous mite control was also evaluated. The first application of L-676,763 plus oil caused a mild spray burn on fruit and foliage of both Bartlets and d'Anjou varieties.

For common names, trade names and chemical names of material listed above see Insecticide and Acaricide Tests 6: 1981.

Apple Maggot - Apples and Other Orchard Fruits

Richard L. Westcott
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Identification of the apple maggot, Rhagoletis pomonella is usually made in the adult stage and it can be difficult to distinguish from our native snowberry maggot, R. zephyria. Although some excellent and detailed taxonomic work has been done on this sibling species group, the need to work with material collected in the Pacific Northwest seemed evident. The taxonomic characters which have proved of most value are the length of the ovipositor and the configuration of the male genitalia. Studies of specimens trapped in western Oregon indicate that the most reliable means of separation requires a male. The vast majority of females (which are more commonly taken in traps) posed no particular problem in identification. However, an extremely small overlap occurred betwen the species; further biological studies are needed to ascertain its significance.

Pear Psylla - Pears

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Agricultural Research Service
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Psylla in the orchard began oviposition March 2, 1981, with a heat sum of 889° hr beginning from January 20. In the laboratory the heat sums for each instar were: Egg 4380° hr, 1st instar 1853° hr, 2nd instar 781° hr, 3rd instar 597° hr, 4th instar 1131° hr, 5th instar 1927° hr. Total development (egg to adult) was at a heat sum of 10,669° hr.

The thermal death point for psylla eggs seems to be between 90-95°, which one depends on the duration. One, 2 and 3 days of simulated summer temperatures reaching a maximum of 95° 3° resulted in egg mortalities of 62, 73 and 80% respectively.

Pear Psylla - Pears

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Monitoring of 1 unsprayed orchard and 8 commercial pear blocks showed high pear psylla populations in the unsprayed block early in the season with decline as predator populations increased. One grower without disruptive sprays for codling moth successfully controlled mites and pear psylla with one 7.5 gal/A application of oil, one application of cyhexatin and one application of detergent. Predators were present in the orchard and declined slightly after the application of cyhexatin.

Migration of adult pear psylla, Psylla pyricola Foerster, was heavy in the pre-overwintering and overwintering generations. Adult pear psylla departed and entered pear orchards in large numbers at all levels of the tree height (1-4 m). Populations of pear psylla up to 258,000/hectare were detected in leaf duff during late fall, but few survived the winter. Tillage of the leaf duff in late fall destroyed a disproportionate number of predators with minimal impact on overwintering pear spylla.

Winter surveys of birds in pear orchards in the Yakima Valley in Central Washington indicated that only the Oregon junco, Junco oreganus (Townsend), occurred in large enough numbers to make a potential significant impact on insect populations. Individual juncos devour ca 1.3 pear psylla, Psylla pyricola Foerster; adults every 2 hours when present in the orchards during the winter. A major source of Deraeocoris brevis was detected. Bitterbrush (Purshia sp.) hosts a psylla, Psylla coryli, that serves as prey for developing populations of Deraeocoris early in the season.

A total of 105,590 lady beetles were released in 1981 including 5730 Harmonia conformis (Australia), 23476 H. axyridis (Japan), 73027 Menochilus quadriplagiatus (Hong Kong), 1730 Synharmonia conglobata (Yugoslavia), 1022 Propylaea 14-punctata (Yugoslavia) and 605 Calvia 14-guttata (Japan) with 42638 released in Yakima, 35210 in Parker Heights, 2058 at Wenatchee and 25684 in Husum. To date, no evidence of establishment of any of the released species has been collected.

Green Peach Aphid - Peach

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One early summer spray of fenvalerate 30 EC applied at 68 g ai in 560 L/ha by airblast sprayer gave good control against organochlorine-organophosphate resistant green peach aphids. Pre-treatment and 7-day post-treatment aphid counts on leaf cluster samples showed a decrease of 81.2% in the treated plots compared to an increase of 11.0% in the checks.

In the preliminary screening tests at two sites one early summer spray of CGA73102 25 EC at 400 g ai, deltamethrin 2.5 EC at 25 g ai or fenvalerate 30 EC at 160 g ai in 3370 L/ha applied by hand gun sprayer effectively controlled resistant green peach aphids. Each was equivalent to pirimicarb 50 WP at 500 g ai/ha applied by the same method. None of the treatments were phytotoxic or appeared to adversely affect phytophagous mite predators of the European red mite or the peach silver mite.

S E C T I O N IV

C O N C E N T R A T E S P R A Y I N G, R E S I D U E S, P H Y T O-T O X I C I T Y, a n d P E S T I C I D E D E V E L O P M E N T

Section Leader -- Dan Mayer

Pesticide Development

Dr. Irwyn A. Rammer
FMC Corp., 855 Parr Blvd., Richmond, CA 94801

Two pyrethroids, Pounce® and Ammo,™ are presently under development by FMC Corporation and have demonstrated a high degree of activiity against a broad spectrum of insect pests of food and fiber crops. Low mammalian toxicity, rapid knockdown and residual activity are several of the desirable characteristics of these two chemicals. Cotton, tomatoes, alfalfa, apples, pears, crucifers, lettuce, stone fruits, small grains, grapes and sweet corn are among the crops for which a conditional registration or an emergency exemption has been obtained or for which a permant registration is being sought.

Spray Residues
Codling Moth, San Jose Scale - Apples

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Yakima, WA 98902

Over-tree irrigation removes significant amounts of spray residue. Twenty-four hours of irrigation removed 30-40% of the azinphosmethyl, 39-56% of the phosmet residue. Parathion residues were not eroded by the irrigation water.

The LC_{90} for azinphosmethyl was: Adult codling moth 60 g/cm^2, larvae 80 g/cm^2, for phosmet against adults 1.75 to 3.38 g/cm^2.

The LC_{90} for Parathion against San Jose Scale was 4-6 ppm. Parathion residues in the tops of the trees fell to less than 5 ppm within 3 days in the dormant, delayed dormant and summer applications.

Sandoz granulosis virus SAN 406I was tested against codling moth at the followig rates: 0.52, 0.26, and 0.05 g tree. The pH of the water was 6.8 and 0.1% Triton B 1956 added. The treatments gave 72 to 82% control of 1st generation codling moths.

Pesticide Resistance Management

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Computer simulation was used to study evolution of resistance to pesticides under 4 main classes of resistance development conditions common to tree fruit pests. Results show that the influence of some biological and operational factors on the rate of resistance evolution depends on which of the 4 main classes is applicable. In general a reduced frequency - low dose strategy is recommended for supressing resistance, but tactics for retarding resistance when management objectives dictate the use of frequent applications and high dosage are discussed. Applications of the model to managing resistance in pear psylla, codling moth and plant feeding mites are discussed.

S E C T I O N V

D E C I D U O U S O R C H A R D D I S E A S E S

Section Leader -- Robert Spotts

Coryneum Blight - Peaches

Jack Eves
AgReCon, Prosser, WA 99350

Bravo at 2 and 4 pts/100 gal applied in fall, pink, and shuck split sprays provided good control of Coryneum blight on peach fruit comparable to or better than standard copper and Captan sprays.

Coryneum Blight - President Plums

Jack Eves
AgReCon, Prosser, WA 99350

Low level infestations of coryneum blight on President plum fruits were reduced by fall, pink, and shuck split sprays of 2 and 4 pts Bravo/100 gal.

Powdery Mildew - Golden Delicious Apples

Jack Eves, AgReCon, Prosser, WA 99350

Bayleton on large plots with a speed sprayer at 1 oz a.i./100 gal reduced leaf surface infection of powdery mildew on golden delicious apples by 2-3x over Karathane and check plots. Bayleton treated plots produced 27.5 ton/acre, Karathane 25.8 tone/acre, check 21.6 ton/acre.

Powdery Mildew - Granny Smith Apple

Jack Eves
AgReCon, Prosser, WA 99350

Bayleton was applied on 2 acre plots of Granny Smith apples with a speed sprayer at 1/2 and 1 oz a.i./acre. The 1/2 oz. rate reduced leaf surface infection of mildew by 1.2x and the 1 oz. rate reduced infection by 1.9x. Yield at 1/2 oz bayleton was 17.9 tons/acre, 1 oz-19.2 tons/A., and check 16.0 tons/A.

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

Iain C. MacSwan and Bashir Gashaira
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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times, except the Baycor and Bayleton treatments which had only four replicates, of mature trees. Spray dates: popcorn (March 13), full bloom (March 24), petal fall (April 14), 21 days before harvest (August 18), 14 days before harvest (August 25), and 7 days before harvest (August 31). Bravo 500 1.5 pt plus Benlate 50 WP 4 oz was applied at popcorn and full bloom and Benlate 50 WP 4 oz was applied at popcorn followed by Funginex 18.2 EC 12 fl oz at full bloom. Benlate 50 WP 4 oz was applied at popcorn, full bloom, and 14 days before harvest. Vangard 10 WP 4 oz and 6 oz and Bravo 500 1.5 pt and 2 pt were applied at popcorn, full bloom, and petal fall, and 14 days before harvest. Baycor 50 WP 4.5 oz and 6 oz and Bayleton 50 WP 4.5 oz and 6 oz were applied at full bloom, petal fall, 21 days before harvest, and 7 days before harvest. One hundred blooms per replicate were rated for disease on May 13. In another section of the orchard sprays were applied by John Bean airblast sprayer at approximately 100 gallons of water per acre to thirty-tree blocks each consisting of three adjacent ten-tree rows. Spray dates: (March 13), full bloom (March 24), and petal fall (April 14). Bravo 500 4.5 pt and 6 pt, Quintar 5F 25.6 fl oz, and Cyprex 65 WP 3 lb were applied at popcorn, full bloom, and petal fall. Benlate 50 WP 16 oz was applied at popcorn only followed by Funginex 18.2 EC 36 fl oz at full bloom. Disease readings were taken on trees of the center row on May 13.

Insecticides: Thiodan WP 1 lb per 100 gallons of water ws applied by handgun sprayer on July 15. Twenty-five fruits were collected at random from each of the four replicates at the time of harvest (September 8). The fruits were placed on brown paper on a plywood board and then covered with cheesecloth and clear poly sheeting. High humidity was maintained by regularly sprinkling the cheesecloth with water. After four days the number of fruits showing brown rot or other rot were counted and recorded. Brown rot blossom blight: All of the treatments applied by handgun sprayer and two treatments - Benlate 50 WP 16 oz at popcorn followed by Funginex 18.2 EC 36 fl oz and three bloom sprays of Quintar 5F 25.6 fl oz applied by airblast sprayer in 100 gallons of water provided excellent control. Fruit rot: Excellent control was provided by Baycor 50 WP 4.5 oz and 6 oz in 100 gallons of water applied at full bloom, petal fall, and 21 and 7 days before harvest.

Powdery Mildew - Apple (Jonathan)

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Oregon State University, Corvallis, OR 97331

Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times, except for check which was replicated three times, of mature trees at pre-pink (April 7), pink (April 14), calyx (May 6), first cover (May 20), and second cover (June 5). Disease readings were taken for powdery mildew and fruit russet on September 23. Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on May 27, June 25, July 22, and August 14. All treatments provided significant control of powdery mildew. No phytoxtoxicity occurred in any of the plots.

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

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Sprays were applied at approximately 100 gallons of water per acre by John Bean airblast sprayer to 24-tree blocks each consisting of three adjacent, eight-tree rows. Sprays were applied between popcorn and almost full bloom, due to rain and windy conditions, (April 14) and when Corum cherries were just into petal fall and Royal Anne cherries were at full bloom (April 16). Disease readings (total 400 blossoms) were taken on six trees in the center row of each block on April 28. Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on June 5 and 15. One hundred fruits were collected at random from each replicate at the time of harvest (June 30). The fruits were placed on brown paper on a plywood board and then covered with cheesecloth and clear poly sheeting. High humidity was maintained by regularly sprinkling the cheesecloth with water. After seven days the number of fruits showing brown rot or other rot were counted and recorded.

Brown rot blossom blight: (Royal Anne) - excellent control of blossom blight was provided by Benlate 50 WP 8 oz plus superior-type oil 1 pt applied at popcorn followed by a full bloom spray of Cyprex 65 WP 1 lb plus superior-type oil 1 pt, and Benlate 50 WP 8 oz plus superior-type oil 1 pt applied at popcorn followed by a full bloom spray of Funginex 18.2 EC 36 fl oz per 100 gallons of water. (Corum) - good control of blossom blight was provided by Benlate 50 WP 8 oz plus superior-type oil 1 pt applied at popcorn followed by a full bloom spray of Cyprex 65 WP 1 lb plus superior-type oil 1 pt per 100 gallons of wter, Benlate 50 WP 8 oz plus superior-type oil 1 pt applied at popcorn followed by a full bloom spray of Funginex 18.2 EC 36 fl oz per 100 gallons of water, and Benlate 50 WP 16 oz applied at popcorn followed by a full bloom spray of Captan 50 WP 1 lb per 100 gallons of water. Fruit rot and total rot: All treatments reduced fruit rots (brown rot and total rot) but best control was provided by a popcorn spray of Benlate 50 WP 8 oz plus superior-type oil 1 pt followed by a full bloom spray of Funginex 18.2 EC 36 fl oz per 100 gallons of water.

Brown Rot Blossom Blight and Fruit Rot - Cherry (Black Republican)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated six times of mature trees. Spray dates: popcorn (April 2 or 3), full bloom (April 10), petal fall (April 20), shuck fall (April 28), 21 days before harvest (June 22), and 7 days before harvest (July 6). Sprays applied at popcorn and full bloom only were Benlate 50 WP 4 oz applied at popcorn followed by Funginex 18.2 EC 12 fl oz at full bloom, DPX 3866 50 DP 4 oz applied at popcorn followed by Funginex 18.2 EC 12 fl oz at full bloom, Benlate 50 WP 4 oz applied at popcorn followed by Quintar 5F 6.4 fl oz at full bloom, and Topsin M 70 WP 8 oz applied at popcorn followed by Cyprex 65 WP 12 oz at full bloom. Bravo 500 1 1/2 pt and 2 pt were applied at popcorn, full bloom, petal fall, and shuck fall and Bravo 500 1 1/2 pt plus Benlate 50 WP 4 oz was applied at

popcorn followed by Bravo 500 1 1/2 at full bloom, petal fall, and shuck fall. Vangard 10 WP 2.5 oz and 3.5 oz were applied at popcorn, full bloom, and petal fall. Baycor 50 WP 3 oz and 4oz were applied at popcorn, full bloom, and 21 and 7 days before harvest. Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on June 5, 15, and 25. Sevin WP 2 lb per 100 gallons of water was applied by airblast sprayer on July 15. Fifty fruits were collectecd at random from each replicate at the time of harvest (July 13). The fruit samples, after combined, were placed on brown paper on a plywood board and then covered with cheesecloth and clear poly sheeting. High humidity was maintained by regularly sprinkling the cheesecloth with water. After seven days the number of fruit showing brown rot or other rot were evaluated and recorded.

Brown rot blossom blight: All treatments provided good control of brown rot blossom blight. Brown rot of fruit: Three bloom sprays of Vangard 10 WP 2.5 oz, three bloom plus shuck fall sprays of Bravo 500 2 pt, two bloom sprays plus two preharvest (21,7days) sprays of Baycor 50 WP 4 oz, a popcorn spray of Benlate 50 WP 4 oz followed by a full bloom spray of Quintar 5F 6.4 oz per 100 gallons of water provided good control of brown rot fruit rot. Total rot: Occurrence of other rot fungi, principally Rhizopus sp., was significantly reduced in fruit from plots receiving three bloom plus one shuck fall spray of Bravo 500 2 pt and a popcorn spray of Topsin M 70 WP 8 oz followed by a full bloom spray of Cyprex 65 WP 12 oz per 100 gallons of water.

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

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated six times of mature trees. Spray dates: popcorn (April 15), full bloom (April 20), petal fall (May 1), shuck fall (May 11), 21 days before harvst (July 2), and 7 days before harvest (July 14). Sprays applied at popcorn and full bloom only were Benlate 50 WP 4 oz applied at popcorn followed by Funginex 18.2 EC 12 fl oz at full bloom, DPX 3866 50 DP 4 oz applied at popcorn followed by Funginex 18.2 EC 12 fl oz at full bloom, Benlate 50 WP 4 oz applied at popcorn followed by Quintar 5F 6.4 fl oz at full bloom, and Topsin M 70 WP 8 oz applied at popcorn followed by Cyprex 65 WP 12 oz at full bloom. Vangard 10 WP 2.5 and 35 oz were applied at popcorn, full bloom, petal fall, and shuck fall and Bravo 500 1 1/2 pt plus Benlate 50 WP 4 oz was applied at popcorn only followed by Bravo 500 1 1/2 pt at full bloom, petal fall, and shuck fall. Baycor 50 WP 3 oz and 4 oz were applied at popcorn, full bloom, and 21 and 7 days before harvest. One hundred blooms per replicate were rated for disease on May 12.

Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on June 5, 15, 25, and July 5. Sevin WP 2 lb per 100 gallons of water was applied by airblast sprayer on July 15. Four hundred fruits were collected at random from six replicates at the time of harvest (July 20). The fruits were placed on brown paper on a plywood board and then covered with cheesecloth and clear poly sheeting. High humidity was maintained by regularly sprinkling the cheesecloth with water. After seven days the number of fruit showing brown rot or other rot were counted and recorded.

Brown rot blossom blight: All treatments provided good control of blossom blight. Brown rot fruit rot: All treatments look promising, but the low incidence of rot in the untreated fruit makes comparisons difficult.

Establishing Baseline Sensitivity of Monilinia fructicola to Fungicides

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The development of highly active, site-specific mode of action fungicides has given disease control a new dimension but with some drawback. Resistance of pathogens to these new compounds is quite common. To detect any change in the sensitivity of pathogens to a compound, a baseline must be established when the compound is released to researchers.

Benomyl baseline sensitivity level of 0.1 g/ml was established for Monilinia fucticola and M. laxa in 1967. Mycelial growth of M. laxa was completely inhibited at 0.1 g/ml while the average mycelial growth of M. fructicola was only 1 millimeter after 5 days. Benomyl sensitive isolates of M. fructicola (2-65 and MUK-1) tested in 1981 exhibited identical sensitivity to benomyl (Fig. 1).

Based on these on these baselines, benomyl-resistant M. fructicola was reported from California in 1977 and M. laxa resistance in 1980.

Baseline sensitivity can be expressed in different ways. The following ways should be considered:

1. Mycelial growth
2. Dosage response curve
3. Spore germination and growth

Figure 1 shows the mycelial growth of 2 benomyl-sensitice (2-65 and MUK-1) and 2 benomyl-resistant (1-81 and A7) isolates of M. fructicola.

Foamy Canker - Almond

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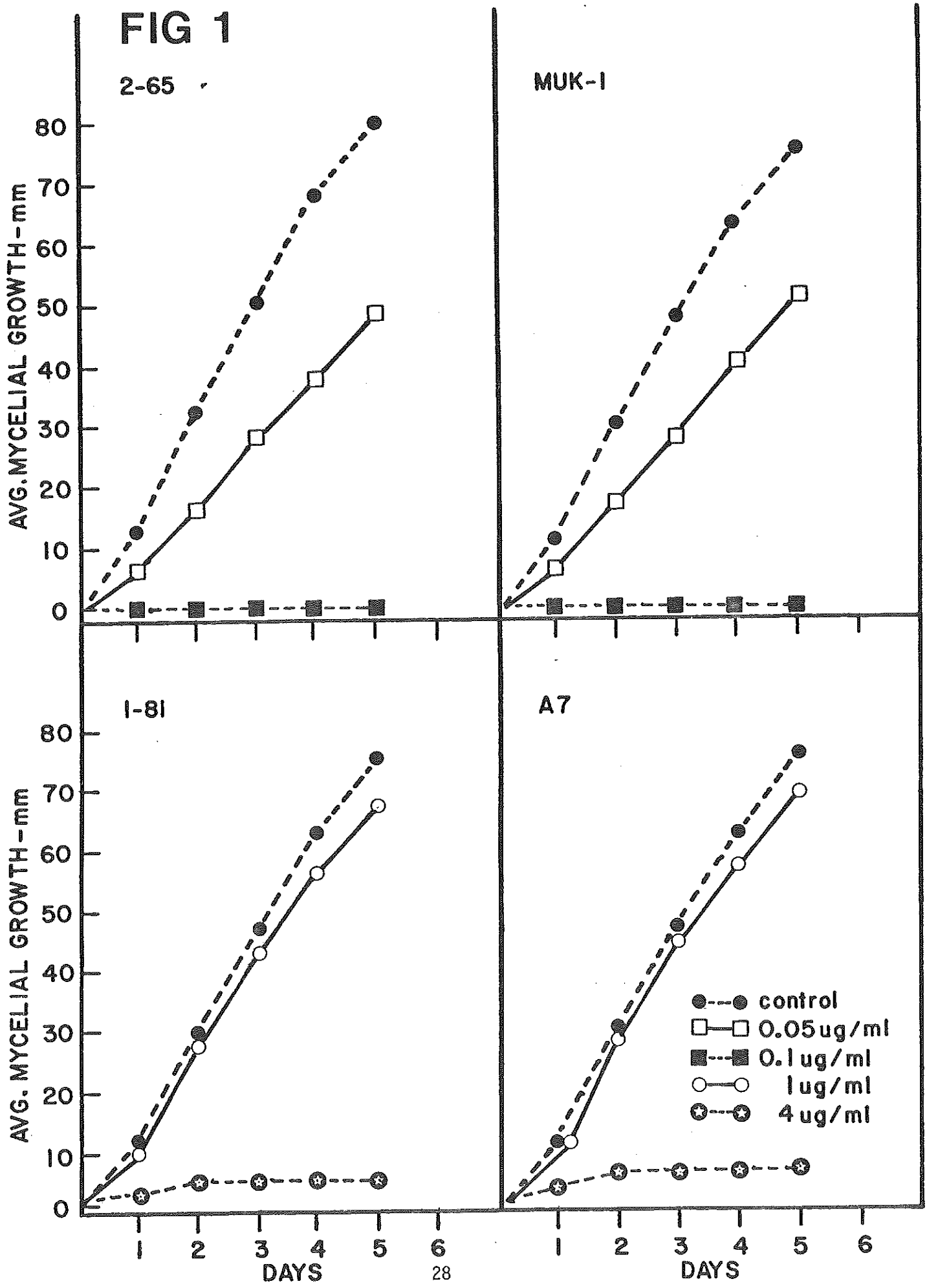
An apparently new disorder of almond was observed in orchards in the Sacramento and San Joaquin valleys in California during the summer of 1981. Symptoms are characterized by a profuse gumming on trunk, scaffolds, and older portions of current season growth,. The gum is chestnut to cinnamon color, very watery and does not form tendrils or balls. Usually, a frothy, white foam is associated with the gum. Internally, there are various patterns of streaking, flecking and reddish brown necrosis in the bark and the outer wood turns a light brown. Foliage on affected scaffolds collapses, turns brown and remains on the tree. The majority of the affected trees are 2nd leaf Carmels and the disorder has been observed in 3rd Carmels, 2nd and 3rd leaf Nonpareils and four individual (>10 years) Nonpareils. The casual agent in unknown and the disorder does not appear to be associated with a particular cultural practice. Foamy canker is proposed as a name for this disorder until its etiology is clarified.

FIG 1


2-65
MUK-1
I-81
A7
AVG. MYCELIAL GROWTH-mm
0
10
20
30
40
50
60
70
80
1
2
3
4
5
6
DAYS
control
0.05ug/ml
0.1ug/ml
1ug/ml
4ug/ml

Crown Rot - Apple
INHIBITION OF PHYTOPHTHORA CACTORUM BY BACTERIAL ISOLATES AND EFFECTS OF CHEMICAL FUNGICIDES ON THEIR GROWTH AND ANTAGONISM

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Six bacteria isolatd from soil produced antibiotics antagonistic to growth of P. cactorum on corn meal agar (CMA). One of the best bacterial isolates (B8) showed the largest zone of inhibition of CMA. This bacterial isolate was not significantly affected in its growth on CMA containing 50 and 100 ppm of Ridomil (metalaxyl), Aliette and mancozeb (Dithane M-45). Ridomil and Mancozeb completely inhibited the mycelial growth of P. cactorum on CMA containing 50 and 100 ppm but not by Aliette. The growth and antagonistic ability of B8 was not significantly affectd when grown on CMA containing 50 and 100 ppm of Ridomil, mancozeb and Aliette for 4 weeks. This suggests a possible combination of biological and/or chemical treatment for control crown rot of apple trees.

Septoria Leaf Spot - Blackberry (Marion)

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Sprays were applied by handgun sprayer to 6 plots each approximately 20 feet long of Marion blackberries replicated three times on April 6 (1/2 inch green), April 24 (fruit spurs 1 inch long), May 5, and June 18. On August 12, 100 leaves, randomly selected, per replicate were evaluated for the presence or absence of Septoria spots. Good control was provided by all treatments.

Scab - Apple (Red Delicious)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times of mature trees. Quintar 5F 25.6 fl oz per acre and 76.8 fl oz per acre and Quintar 5F 25.6 fl oz per acre plus Plyac 1 pt per acre were applied at green tip only on March 30. (This was not a true green tip but an early pre-pink). These plots also received sprays of Captan 50 WP 2 lb per 100 gallons of water at first cover (May 21) and second cover (June 3). Quintar 5F 3.2 fl oz per 100 gallons of water was applied at pre-pink (April 7) and pink (April 14) followed by Cyprex 65 WP 12 oz per 100 gallons of water at calyx (May 6), first cover (May 21), and second cover (June 3). Cyprex 65 12 oz per 100 gllons of water was applied at pre-pink (April 7), pink (April 14), calyx (May 6), first cover (May 21), and second cover (June 3). Disease readings were taken for fruit scab and russet on September 30.

Insecticides: Diazinon 50 WP 1 lb per 100 gllons of water was applied by airblastr sprayer on May 27, June 25, July 22, and August 14.

Best control of scab was provided by sprays of Cyprex 65 WP 12 oz per 100 gallons of water. Phytoxicity to fruit resulted from all spray schedules using Quintar 5F.

Powdery Mildew and Scab - Apple (Rome)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicatd five times of mature trees at pre-pink (April 16), pink (April 23 or 24), calyx (May 19), first cover (June 2), and second cover (June 17) except for Difolatan 4F 6.25 qt plus superior oil 2.5 gal which was applied at green tip only (April 10). Disease readings were taken for powdery mildew on June 26 and for fruit scab and russet on Oct 13. Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on May 27, June 26, July 22, and August 14.

Fruit scab: Excellent control of scab was provided by sprays of Bayleton 50 WP .5 oz plus Cyprex 65 WP 12 oz, Vangard 10 WP 2.5 oz and 3.5 oz, Baycor 50 WP 4 Oz, Cyprex 65 WP 12 oz plus Karathane 25 WD 12 oz, and Baycor 50 WP 2 oz plus Bayleton 50 WP .5 oz per 100 gallons of water. Poor control of fruit scab was obtained from applications of a SAT of Difolatan 4F 6.25 qt plus superior oil 2.5 gal applied at green tip only, and BAS 9018F 151 ml and 226.5 ml per 100 gllons of water. Powdery mildew: Good control was provided by sprays of Bayleton 50 WP .5 oz (plus Cyprex 65 WP 12 oz for scab control), Vangard 10 WP 2.5 oz and 3.5 oz, Baycor 50 WP 4 oz, Karathane 25 WD 12 oz (plus Cyprex 65 WP 12 oz for scab control), Baycor WP 2 oz plus Bayleton 50 WP .5 oz, and BAS 9018F 226.5 ml per 100 gallons of water. Fruit russet: A significant reduction of fruit russet was provided by sprays of Karathane 25 WD 12 oz (plus Cyprex 65 WP 12 oz for scab control), Vangard 10 WP 2.5 oz, BAS 9018F 151 ml, and Baycor 50 WP 4 oz per 100 gals of water.

Powdery Mildew and Scab - Apple (Rome)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated four times of mature trees at green tip only (April 3) and then cover sprays of Captan 50 WP 2 lb were applied at first cover (June 2) and second cover (June 17). Cyprex 65 WP 12 oz plus Karathane 25 WD 12 oz was applied at pre-pink (April 16), pink (April 24), calyx (May 20), first cover (June 2), and second cover (June 17). Disease readings were taken for powdery mildew on June 29 and for fruit scab and russet on October 13. Insecticides: Diazinon 50 WP 1 lb per 100 gallons of water was applied by airblast sprayer on May 27, June 26, July 22 and August 14.

Fruit scab: Best control was provided by Cyprex 65 WP 12 oz per 100 gallons of water (plus Karathane for mildew control) and Quintar 5F 76.8 fl oz per acre applied at green tip only (SAT). Powdery mildew: Best control was provided by Karathane 25 WD 12 oz (plus Cyprex for scab control) per 100 gallons of water. Fruit russet: no significant difference in russet occurred from any of the treatments.

Leaf Curl - Peach (Elberta)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicated five times of mature trees. Quintar 5F 25.6 fl oz and 51.2 oz, Bravo 500 1.5 pt and 2 pt and Ziram 76 WP 3 lb were applied on Devember 11, 1980 and January 6, 1981. One hundred terminals per replicate were rated for disease on May 19. In another section of the orchard sprays were applid by John Bean airblast sprayer at approximately 100 gallons of water per acre to thrity-tree blocks each consisting of three adjacent, ten-tree rows. Quintar 5F 51.2 fl oz and 25.6 fl oz, Bravo 500 4.5 pt and 6 pt, and Ziram 76 WP 8 lb were applied on December 11, 1980 and January 6, 1981. Disease readings were taken on trees of the center row on May 26.

Good control was obtained from handgun sprays of Ziram 76 WP 3 lb, Bravo 500 1.5 pt and 2 pt, and Quintar 5F 25.6 fl oz and 51.2 fl oz per 100 gallons of water and by airblast sprays of Ziram 76 WP 8 lb and Bravo 500 6 pt per 100 gallons per acre.

Brown Rot Blossom Blight and Fruit Rot - Prune (Early Italian)

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Sprays were applied at approximately 400 gallons of water per acre by hydraulic handgun sprayer to single tree plots replicatd four times of mature trees. Spray dates: (Apr. 6), full bloom (Apr. 15), petal fall (Apr. 21), shuck fall (May 11), 28 days before harvest (Aug. 4), 21 days before harvest (Aug 11), 14 days before harvest (Aug. 18), 7 days before harvest (Aug. 25), and 1 day before harvest (Aug. 31). Bravo 500 1 1/2 pt. and 2 pt. were applied at popcorn, full bloom, petal fall, shuck fall, and 14 days before harvest and Bravo 500 1 1/2 pt. plus Benlate 50 WP 4 oz was applied at popcorn followed by Bravo 500 1 1/2 pt at full bloom, petal fall, shuck fall, and 14 days before harvest. Bayleton 50 WP 4 1/2 oz and Baycor WP 3 oz, 4 1/2 oz, and 6 oz were applied at popcorn, full bloom, 21 days

before harvest, and 7 days before harvest, and 14 days before harvest followed by Bayleton 50 WP 2 oz at 7 days before harvest and 1 day before harvest. Dithane M22 Special 2 lb plus Triton B-1956 2 oz, Dithane M22 Special 2 lb plus Rovral 50 W .25 lb plus Triton B-1956 2 oz, Rovral 50 W .5 plus Triton B-1956 2 oz, Rovral 50 W .25 lb plus Triton B-1956 2 oz, Dithane M22 Special 2 lb plus Rovral 50 W .5 plus Triton B-1956 2 oz, Captan 50 WP 2 lb, and Benlate 50 WP 4 oz were applied 28 days, 14 days and 7 days before harvest. Fifty fruits were collected at random from each replicate at the time of harvest (Sep 1). The fruits were placed on brown paper on a plywood board and then covered with cheesecloth and clear poly sheeting. High humidity was maintained by regularly sprinkling the cheesecloth with water. After seven days the number of fruit showing brown rot or other rots were counted and recorded.

Brown rot blossom blight: Incidence of brown rot blossom blight in check plots was too low to allow assessment of treatments. Bayleton 50 WP 6 oz applied during bloom reduced crop by 75 percent. Fruit rot: All treatments provided good control of fruit rot.

S E C T I O N VI

T O P I C S N O T C O V E R E D U N D E R O N E O F T H E O T H E R S

Section Leader -- Norm Waters

(No papers submitted under this section)

SELECTED LIST OF CHEMICAL NAMES

Insecticides and Miticides

Common Name	Trade Name(s)
cypermethrin	(Ammo, FMC 45806) Cymbush
fenvalerate	Belmark, Pydrin
deltamethrin	Decis
oxamyl	Vydate
hexakis	Vendex
phosalone	Zolone
phosmet	Imidan
dibutylaminosulfenyl carbofuran	Advantage FMC 35001
cyhexatin	Plictran
avermectin	L-676863 (Merck)

Fungicides

Common Name	Trade Names
bitertanol	Baycor
chlorothalonil	Bravo
thiophanate	Topsin
triforine	Funginex
dichlone	Quintar
triadimefon	Bayleton
iprodione	Rovral

POWDERY MILDEW - McINTOSH APPLES

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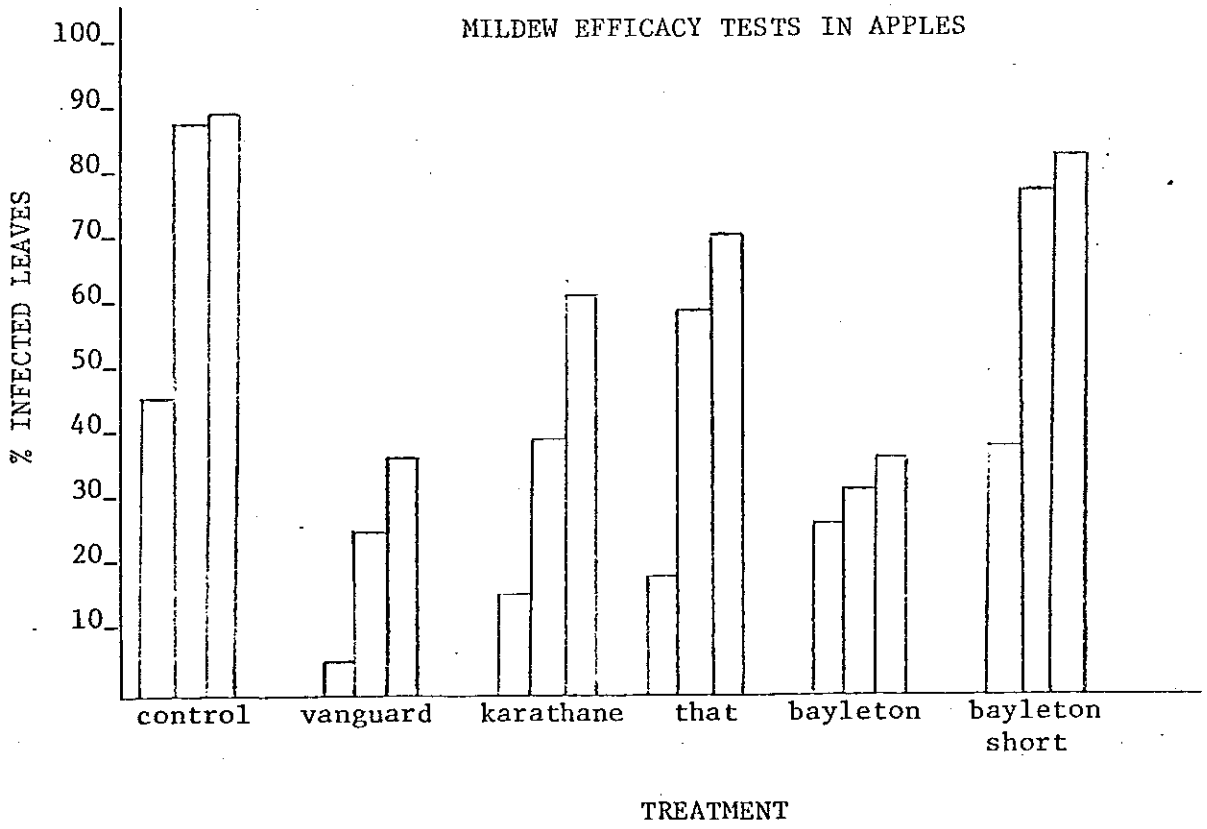
Powdery mildew efficacy trials on CGA64251, Bayleton, Karathane and That (flowable sulphur) were carried out in a mature McIntosh block at the Agriculture Canada research facility in Kelowna. A randomized block experimental design was used and the results show disease incidence. Three separate samplings were carried out on June 21, July 21, and August 11.

Bayleton and CGA64251 gave excellent control with low disease severity. Karathane and flowable sulphur gave satisfactory early season control but showed relatively high disease incidence and severity when later evaluations were made.

Bayleton was tested for kick-back capabilities but did not appear to have the ability to control the disease once secondary infections were established.



DECIDUOUS ORCHARD DISEASES

Utilizing Natural Competition Between *Monilinia* spp. and *Spicaria* spp. for Brown Rot Control Strategies

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Species of *Spicaria* were found to out compete *Monilinia* spp. in colonizing unharvested sweet cherries in Okanagan orchards. This aggressiveness effectively eliminates over-wintering cherry mummies as a source of spring inoculum. Laboratory evaluations on mummified fruit show almost no ability by the mummies to produce freshly sporulating *Monilinia*.

The over-wintering mummies of apricot, prune plum, plum and sour cherry were not affected by *Spicaria* in this way.

THE INCIDENCE OF SPICARIA AND MONILINIA ON CHERRY MUMMIES REMOVED FROM THE ORCHARDS AT VARIOUS TIMES.

		% Fungus After Incubation in a Moist Chamber at 20°		
Sampling Date	Crop	Spicaria	Monilinia	Other
Nov. 6/80	Cherry*	97	0	3
	Plum**	2	98	0
Dec. 11/80	Cherry	86	1	13
	Plum	5	95	0
Apr. 5/81	Cherry	81	0	9
	Plum	0	100	0

* 10 Cherry trees were sampled, 10 mummy clusters per tree were collected.

**The values given for plum were derived from a sample of 10 mummy clusters from a single Italian Prune plum tree located within the sample plot.