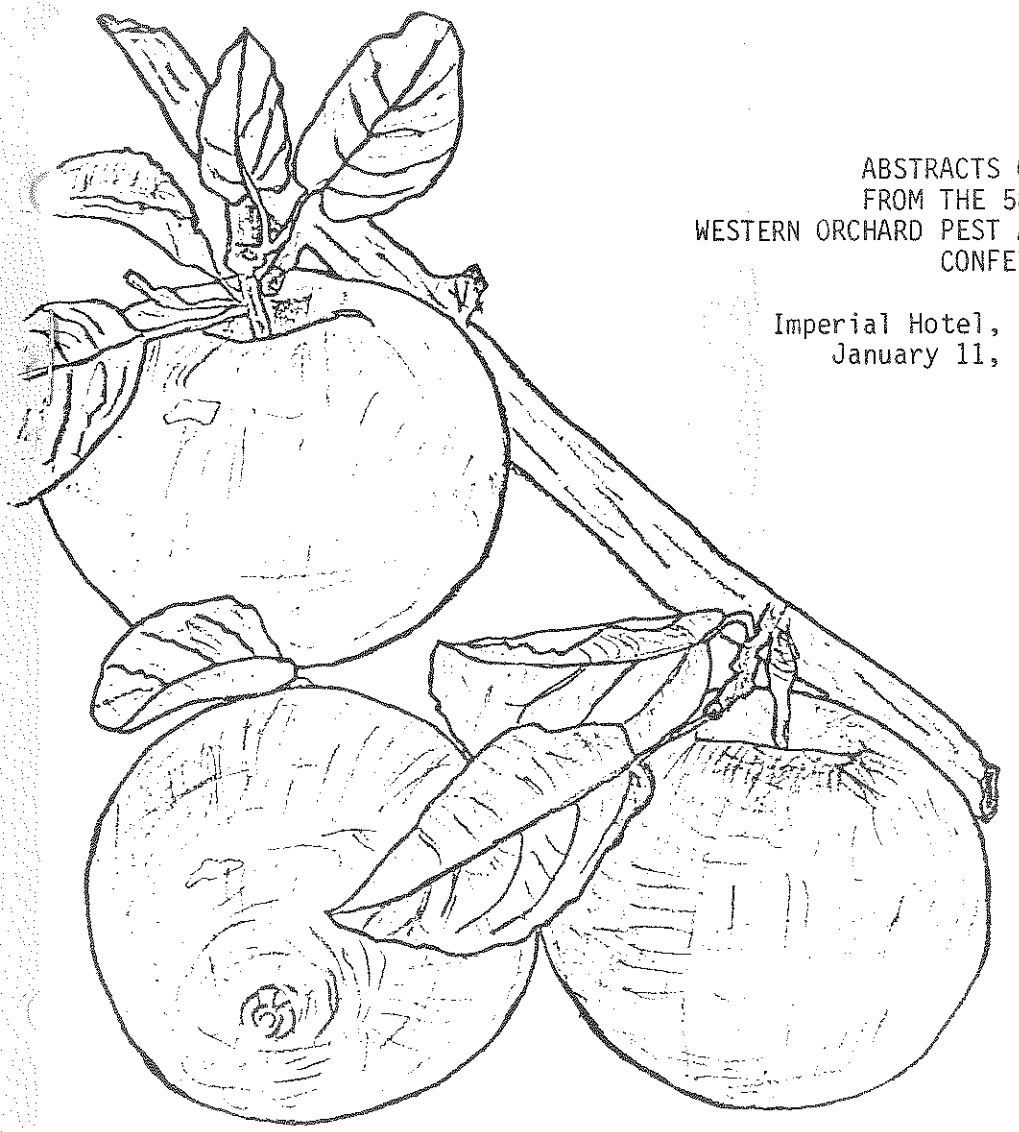

ABSTRACTS OF REPORTS FROM THE 58th ANNUAL WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

Imperial Hotel, Portland, Oregon
January 11, 12, 13, 1984

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, Hawaii, 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 area.

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ABSTRACTS OF REPORTS FROM THE 57TH ANNUAL
WESTERN ORCHARD PEST AND DISEASE MANAGEMENT CONFERENCE

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S E C T I O N I

DECIDUOUS ORCHARD DISEASES

Section Leader -- Steve Savage

I. Deciduous Orchard Diseases

Scab - Apple (Rome)

Iain C. MacSwan
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Cyprex 65 WP 12 oz (plus Bayleton 50 WP 4 oz), Cyprex 65 WP 12 oz (plus Karathane 25 WD 12 oz), Baycor 50 WP 2 oz (plus Bayleton 50 WP .5 oz), DPX 6573 40 EC 4.43 ml, 17.7 ml, and 70.8 ml, Cyprex 65 WP 12 oz (plus Bayleton 50 WP 2 oz) per 100 gallons water provided acceptable control of scab when applied in a normal schedule - prepink, pink, calyx, and 1st and 2nd covers. LWH 672251 10 WP 4 oz (plus Cyprex 65 WP 12 oz) applied at early full bloom, calyx, 1st and 2nd covers provided control equal to the above treatments.

Scab - Apple (Red Delicious)

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Bravo 500 .5 gallons applied at 3/4 - 1" green-tip stage followed by Cyprex 65 WP 8 oz, Baycor 50 WP 4 oz, Vangard 10 WP 2.5 oz per 100 gallons water applied on a normal schedule - prepink, pink, calyx, 1st and 2nd covers provided scab control equal to that of Cyprex 65 WP 12 oz. Bravo 500 .5 gallons applied at 3/4 - 1" green-tip stage followed by Cyprex 65 WP 8 oz at pink, calyx, 1st and 2nd cover provided control equal to that of above treatments.

Scab & Russet - Apple (Rome)

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Bravo 500 1 gallon plus Thiodan 50 WP 1 lb or Karathane 25 WD .75 lb or Diazinon 50 WP 1 lb and Bravo 500 1 gallon per 100 gallons water applied at prepink, pink, calyx and 1st cover provided excellent control of scale. Bravo 500 alone or in combination with the insecticides did not increase fruit russet and no phytotoxicity to leaves occurred.

I. Deciduous Orchard Diseases

Scab and Powdery Mildew - Apple

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During 1983 treatments were applied to randomized single-tree plots (2 replications) of mature 'Golden Delicious' and 'Rome Beauty' on M7 rootstock. Trees were sprayed to runoff at 300 psi with a handgun. Approximately 2.5 gallons of spray were applied to each tree. Spray dates and growth stages were: March 24 (half-inch green), April 12 (prepink); May 4 (petal fall), and May 23 (cover spray). Bravo 500 F was applied only on March 15 (green tip). Leaf scab and mildew counts were made on all leaves of 10 shoots per tree and fruit scab counts on 50 fruits per tree on July 6. Two moderate to severe primary scab infection periods were recorded during March, April, May, and June.

Under the low scab pressure in this test, no significant differences could be determined between any fungicides. Under moderate powdery mildew pressure, CGA 71818 (1.5, 2.5, and 3.5 oz/100 gal), Funginex (10 oz), Ro-15-1297 (0.5 oz), Rubigan (2.8 oz), A815 (3.3 and 6.6 oz), and Vangard (2.5 oz) gave acceptable control. Higher rates of A815 and CGA 71818, as well as addition of Ortho X77 to Ro-15-1297, appeared to improve mildew control, but differences were not statistically significant. Use of Bayleton at half-inch green did not improve mildew control when compared with beginning application at pink. No phytotoxicity was observed with any fungicide.

Powdery Mildew - Apple (Rome)

Iain C. MacSwan
Extension Plant Pathology, Cordley 1089
Oregon State University, Corvallis, OR

DPX 6573 40 EC 4.43 ml, 8.86 ml, 17.7 ml and 70.8 ml, Bayleton 50 WP 2 oz (plus Cyprex 65 WP 12 oz) and 4 oz (plus Cyprex 65 WP 12 oz), Bayleton 50 WP .5 oz (plus Baycor 50 WP 2 oz) per 100 gallons water provided control of powdery mildew equal to that of Karathane 25 WD 12 oz (plus Cyprex 65 WP 12 oz) per 100 gallons water when applied in a normal schedule - prepink, pink, calyx, 1st and 2nd covers. LWH 672251 10 WP 4 oz (plus Cyprex 65 WP 12 oz) and 12 oz (plus Cyprex 65 WP 12 oz) when applied only at early full bloom, calyx, 1st and 2nd covers provided control equal to the above treatments.

I. Deciduous Orchard Diseases

Powdery Mildew - Apple (Jonathan)

Iain C. MacSwan
Extension Plant Pathology, Cordley 1089
Oregon State University, Corvallis, OR

Rubigan 1 EC 3.75 oz, Bayleton 50 WP 2 oz, DPX 6573 40 EC 9 ml and 70.8 ml per 100 gallons water provided acceptable control of powdery mildew when the sprays were in a normal schedule - prepink, pink, calyx, 1st and 2nd covers. LWH 672251 10 WP 4 oz per 100 gallons water provided acceptable control when applied at late full bloom, calyx, 1st and 2nd covers.

Powdery mildew, Apple

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Trees were sprayed by handgun to runoff Mar 29 (½ in green), Apr 8, Apr 15 (pink), May 4 (petal fall) and May 12 and 24. Treatments were applied to single trees in a randomized block design and replicated five times. Terminal mildew was evaluated May 24 and Jun 3. Ratings for terminal mildew were determined by multiplying percent mildew-infected terminals by a severity factor based on a scale of 0.1 to 1.0. Mildew russet was determined on 100 fruit per tree at the time of harvest. Data on terminal mildew as well as fruit russet data were subjected to analysis of variance and means were separated by Duncan's Multiple Range Test.

All fungicide treatments reduced terminal mildew. All experimental fungicide treatments resulted in less terminal mildew than found on the standard Karathane treatment. Mildew russet was reduced by all fungicide treatments. The Ortho XE-779 treatment was not as effective as the standard Karathane treatment in controlling mildew russet.

Treatment and rate per 100 gal		Date of evaluation and disease rating May 23[1,2]	June 3[1,2]	% mildew russet[2]
Check (unsprayed)		89.4a	76.2a	53.2a
Karathane 18.25% WP	12 oz	53.3b	24.2b	9.9cde
+ B1956	6 oz			
DuPont DPX H6573 45% EC	0.62 oz	36.4b	2.7c	6.2de
DuPont DPX H6573 45% EC	1.24 oz	7.5c	8.7c	3.8e
DuPont DPX H6573 45% EC	2.48 oz	11.4c	1.4c	2.7e
Ortho XE-779 25% WP	2.0 oz	15.6c	6.5c	28.0b
Rubigan 12.5% EC	3.0 oz	7.1c	4.2c	9.2cde
Rugiban 12.5% EC	3.0 oz	7.9c	2.5c	18.7bcd
+ B1956	6 oz			
Vangard 10% WP	2.48 oz	7.5c	3.7c	19.9bc
Maag Ro 15-1297 4 EC	1.0 oz	5.2c	2.6c	12.8cde
Maag Ro 15-1297 4 EC	2.0 oz	2.9c	1.3c	13.8cde
CG 71818 10% WP	1.50 oz	5.0c	2.1c	13.8cde
CG 71818 10% WP	2.50 oz	5.3c	2.1c	13.0cde
CG 71818 10% WP	3.50 oz	3.8c	1.5c	9.0cde

[1] Percent infected terminals X severity index factor
[2] Numbers followed by the same letter are not significantly different, P = 0.01.

INTEGRATED APPROACH FOR CONTROL OF APPLE CROWN ROT

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Integrated/multifaceted approach was planned that includes chemical, biological, and cultural treatments, for control of crown rot of apple trees, caused by Phytophthora cactorum.

Soil drenches with Ridomil (1 g ai/tree) followed by Ridomil + mancozeb (1 g ai/tree) around the base of naturally infected trees under orchard conditions prevented the growth of P. cactorum in infected bark of the tree. Soil drenches with Ridomil followed by Ridomil + mancozeb also prevented infection of apple trees with P. cactorum under orchard conditions.

Five bacterial isolates from local soils produced diffusible antibiotics antagonistic to the growth of P. cactorum on corn meal agar. The growth and antagonistic ability of one bacterial isolate B8 (Enterobacter aerogenes) showing the largest zone of inhibition was not significantly affected when grown on corn meal agar containing 50 and 100 ppm of Ridomil, Aliette or mancozeb for 4 weeks. Under greenhouse conditions, B8 significantly reduced infections by three isolates of P. cactorum in sterile field soil. Bacterial antagonist B8 significantly reduced the population of viable P. cactorum spores in the top 30 mm of soil where spores generally survive. Twenty-one isolates of the bacterium Bacillus subtilis were antagonistic to growth of all P. cactorum isolates on corn meal agar. Six bacterial antagonists provided significant reductions of infection on McIntosh seedlings grown in sterile soil.

All nitrogen fertilizer treatments, ammonium sulphate, ammonium nitrate, calcium nitrate and urea, significantly increased percent infection compared with untreated control. No significant differences in percent infection were observed between untreated control and hardwood compost, softwood compost, and steer manure treatments. Total spur length and trunk diameter were not affected by any of the fertilizer and other treatments. Surflan and Roundup significantly reduced the growth of P. cactorum on corn meal agar. Neither the growth of B8, nor its antagonistic effect on P. cactorum, was affected by any of the herbicides tested.

All these results suggest that a combination of chemical, biological, and cultural treatments may be possible for control of crown rot of apple trees.

I. Deciduous Orchard Diseases

Scab - Pear (Bartlett)

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Five Bartlett pear trees as single-tree replicates in a random block were sprayed with solutions of registered and experimental fungicides. Trees were sprayed by handgun to runoff, on March 31 (pink) and April 20 (petal-fall). Five trees were left unsprayed as a check. Fruit scab was evaluated on 50 fruit per tree on June 7. Flower clusters were counted on flagged limbs prior to bloom and final fruit set counted in June. Untreated trees had an average 29.3% fruit scab. All treatments gave good control; control given by experimental compounds was not significantly better than control given by Cyprex.

Powdery Mildew - Pear (Comice)

David Sugar
Oregon State University
Southern Oregon Experiment Station
Medford, Oregon 97502

Five Comice pear trees as single-tree replicates in a random block were treated with solutions of registered and experimental fungicides. Trees were sprayed by handgun to runoff, on April 5 (pink) and April 21 (90% petal-fall). Five trees were left unsprayed as a check. On Sept. 19, one box of fruit was harvested from each tree, and graded as either US#1, US#2, or cull, with respect to russet only. Untreated trees averaged 70.3% US#1. Treatments ranged from Karathane @ 12 oz, 77.4% US#1, to Baycor 2 oz + Bayleton 0.5 oz, and Uniroyal A815, 3.33 oz, 88.3% US#1. Statistical analysis showed treatments and check not differing significantly ($p=0.05$).

Average fruit size on trees treated with Bayleton did not differ significantly from fruit size on check trees.

Deciduous Orchard Diseases

Preliminary evaluation of DPX H6573 on control of blossom brown rot (*Monilinia laxa*) of apricot.

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Benomyl (Benlate 50W), triforine (Funginex 1.6 E.C.) and a new sterol inhibitor fungicide, DPX H6573 E.C. were applied on single trees of Blenheim apricots at red bud and early petal fall stages. Fifty blossoms on each of four quadrants were evaluated for brown rot on March 11, 1983. Disease incidence was high because of continued rains during bloom. Disease data are summarized in the following table.

TREATMENT [a]	RATE/100 GAL (a.i.)	% BROWN ROT [b]
DPX-H6573 E.C.	0.5 oz	6.0
	1.0 oz	2.5
	2.0 oz	2.0
Funginex 1.6 E.C.	1.8 oz	28.7
Benlate 50W	3.0 oz	33.0
Check	--	100.0

[a]Two blossom sprays applied with hand-gun sprayer, 5 gal/tree at late redbud and petal fall (2/17 and 3/1/83).

[b]DPX-H6573 - One tree for each rate. Funginex, Benlate and unsprayed check, three single-tree replications. Percent brown rot based on 50 blossoms/quadrant, 200 blossoms/tree. Disease evaluated on 3/11/83.

I. Deciduous Orchard Diseases

Brown Rot Blossom Blight - Cherry (Montmorency)

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Oregon State University, Corvallis, OR

All treatments provided good control of brown rot blossom blight - DPX H6573 40 EC 17.4 ml, 35.70 ml, 70.87 ml and 141.75 ml, RO 15-1297 4 E 78.125 ml and 126.25 ml plus .8 oz X77, Ronilan 4.17 F 170 ml, Baycor 50 WP 3 oz and 4.5 oz plus Agridex 1 pint, Benlate 50 WP 2 oz and 4 oz (popcorn) then Funginex 18.2 EC 9 oz at full bloom, A 815 30 WP 8 oz, Rubigan 1 EC 2.25 oz, Bravo 500 1.5 pint and 2 pints per 100 gallons of water. All sprays were applied at popcorn, full bloom and petal fall except the Benlate/Funginex treatments which were applied only at popcorn and full bloom.

Brown Rot Blossom Blight - Cherry (Black Republican)

Iain C. MacSwan
Extension Plant Pathology, Cordley 1089
Oregon State University, Corvallis, OR

All treatments provided good control of brown rot blossom blight - Baycor 50 WP 3 oz and 4.5 oz plus Agridex 1 pint, Ronilan 4.17 F 170 ml, Bravo 500 1.5 pint and 2 pints, Benlate 50 WP 4 oz, DPX H6573 40 EC 35.43 ml and 141.75 ml, Rubigan 1 EC 2.25 oz and 3.75 EC, A 815 30 WP 8 oz, RO 15-1297 750 EC 50 ml and 100 ml at popcorn followed by 4 E 78.12 ml and 156.25 ml at full bloom and petal fall. All sprays (rate per 100 gallons) were applied at popcorn, full bloom, and petal fall except the Benlate treatment which was applied only at popcorn and full bloom.

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

Iain C. MacSwan
Extension Plant Pathology, Cordley 1089
Oregon State University, Corvallis, OR

DPX 965-75 75 WP 5.33 oz. and 10.66 oz. per 100 gallons of water applied at popcorn and full bloom for blossom blight control followed by sprays 14 and 7 days preharvest provided good control of both blossom blight and fruit rot - equal to that provided by Benlate 50 WP 4 oz/100.

I. Deciduous Orchard Diseases

Fungicides for Control of Cherry Powdery Mildew

Sherman V. Thomson

Utah State University

Fungicides were applied to 7-year-old and 9-year-old cherry trees in commercial orchards using a randomized block design with 6 and 5 single-tree replicates in Santaquin and Willard, Utah, respectively. Trees were on Mahaleb rootstock, spaced 18 x 18 ft and approximately 10 ft tall. The soil in Santaquin was a clay loam and in Willard a sandy loam. Precipitation was abnormally high throughout the season. Treatments were applied as dilute sprays approximately every 2 weeks with a handgun at 100 p.s.i. to the point of runoff. Application dates were May 13 (first bloom), May 26 (full bloom), Jun 14 (shuck fall) and Jul 14 (first color) in Santaquin and May 13 (full bloom), May 26 (shuck split), June 10 (shuck fall) and Jul 13 (first color) in Willard. No other pesticides were applied in the orchards. The incidence of mildew was not evident until Jul 10. There were no apparent symptom differences among treatments when the Jul 13 and 14 applications were made. Ten terminals were examined from each of the treated trees on Aug 1 and given a visual severity rating of 1 = healthy to 4 = heavy sporulation, severe distortion and necrosis.

All fungicides tested provided fair control of mildew although under light infection pressure. Infections occurred late in the season and it appeared that only the last application was responsible for the observed differences. No phytoxicity was observed.

Treatment and rate/100 gal.	Powdery Mildew Rating* Santaquin	Willard
CGA 71818 10W 2.5 oz.	1.9 a**	2.3 a b
Rubigan 12.5EC 16.4 oz.	2.0 a	2.1 a
Benlate 50W 6.0 oz.	2.0 a	2.2 a
Baycor 50W 4.0 oz.	2.1 a	2.1 a
Bayleton 50W 2.0 oz.	2.1 a	2.6 a b
Vangard 10W 6.0 oz.	2.1 a	2.0 a
Rubigan 12.5EC 8.2 oz.	2.2 a	2.3 a b
That Big 8 Sulfur 64F 1.5 pint	2.3 a	2.7 a b
DPXH6573 45EC 1.06 oz.	2.3 a	2.2 a
Check	3.7 b	3.0 b

*Rating 1 = healthy, 4 = heavy sporulation, leaf twisting and necrosis.

**Numbers followed by the same letter within columns are not significantly different at P = 0.01 according to Duncan's Multiple Range Test.

I. Deciduous Orchard Diseases

Leaf Curl - Peach (Improved Elberta)

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Oregon State University, Corvallis, OR

Ziram 76 WP 8 and 12 lbs per acre applied by Bean airblast sprayer in 300 gallons water per acre on Dec 29, 1982 and Jan 10, 1983, provided good control of leaf curl. Poor control was provided by Kocide 101 12 lbs plus 1 quart superior oil, tribasic copper sulfate 12 lbs plus 1 quart superior oil, Bordeaux 8-8-100 and Quintar 5F 51.2 fl oz per acre.

S E C T I O N II

ORCHARD MITES

Section Leader -- Bob Zwick

II. Orchard Mites

Two Spotted Mite - Almonds

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Kearney Agricultural Center
University of California

The standard miticides Omite, Vendex, Kelthane, Plictran and superior spray oil all gave excellent control in summer sprays. The addition of the surfactant Surfix to Omite and the spray enhancer Penetrator to Vendex could not improve on the performance. Neither additive was of value when added to Kelthane in these trials.

MK-936 and NC-21314 performed very well. FMC 54800 looked very good initially but did not hold after one week. XE-936 did not look as good as it has in past mite tests. UC-81341 gave good to fair control.

European Red Mite - Almonds

J. E. Dibble & S. M. Haire
Kearney Agricultural Center
University of California

All materials, standard and experimental, as listed under two spotted mite gave good to fair control. Those materials in the fair category were XE-938, UC-81341 and FMC-54800.

WEB-SPINNING MITES - ALMONDS

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A method utilizing a presence/absence sampling technique to quantify web-spinning mite populations in almonds is being developed. Tentative treatment thresholds have also been proposed. Limited field validation in 1983 indicates this sampling method is simple rapid and provides a good estimate of mite populations at the time of sampling. Predictive capabilities also appear to be feasible.

McDanielli Mite-apples

Russ Gleason
Son Light Consultants
R.2 Box 443
Yakima, Wa. 98908

Two pounds Omite per acre gave good control of McDanielli mite with no apparent disruption of typhlodromus. Zetzalia were severely reduced by this treatment.

II. Orchard Mites

European Red mite-apples

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R.2 Box 443
Yakima, Wa. 98908

One-fourth pound Plictran per acre was more effective in red mite control than two-fifths, one-half, or one pound. As doseage increased, disruption of predator mites (typhlodromus) also increased, with much more problem of mites resurging in damaging numbers.

Where overwintering red mite eggs were present in very high numbers, 2# Morestan per acre at pink was extremely effective in providing control with no apparent disruption of predator mites (typhlodromus).

Spider Mites - Pome Fruit

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Hood River, OR 97031

The mite growth regulator NC 21314 and petroleum oils produced excellent control of overwintering red mite eggs in delayed dormant applications. NC 21314 and SLJ 0312 also gave good control of spider mites in later sprays. The pyrethroids Mavrik FL and FMC 54800 suppressed spider mites seasonally in 4-cover applications on apple. The IGR's CME-13406, BAY SIR 8514, and diflubenzuron permitted Typhlodromus resurgence in seasonal cover sprays.

Tetranychus urticae - Pear, Strawberry

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Populations of T. urticae from strawberry and pear in the western United States show high to moderate levels of developed resistance to formetanate (117-fold) and cyhexatin (17-fold) at the LC_{50} and 117-fold and 171-fold at the LC_{95}, respectively. Inheritance of formetanate resistance in T. urticae may be intermediate to recessive in dominance. The mono- or polygenic nature of cyhexatin resistance can not yet be determined since the levels of resistance are still too low for discriminatory analysis using standard backcrossing tests. The implications of these features of inheritance of acaricide resistance to management of field populations of T. urticae will be discussed.

II. Orchard Mites

Two-spotted and Yellow mite - Pear

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Because of documented resistance to the conventionally used organotin compound cyhexatin in Southern Oregon pear orchards and a lack of registered alternatives, several combinations of cyhexatin and other registered miticides were evaluated in 3 Southern Oregon pear orchards.

In two of the orchards the combinations cyhexatin (Plictran) (0.5 lb. a.i./A) + formetenate hydrochloride (Carzol) (1.15 lb. a.i./A) and fenbutatin oxide (Vendex) (0.5 lb. a.i./A) + Carzol (1.15. a.i./A) were compared to Plictran (1 lb. a.i./A) and Vendex (0.75 lb. a.i./A + 1% superior-type oil). In the 3rd orchard oxamyl (Vydate) (1.5 lb. a.i./A) alone, Carzol (2.3 lbs. a.i./A) alone, Plictran (0.5 lb. a.i./A) + Vydate (1 lb. a.i./A) and Vendex (0.5 lb. a.i./A) + Vydate (1.0 lb. a.i./A) were also compared to the previously mentioned combinations.

The cyhexatin plus Carbamate combinations were the most effective; much more effective than Plictran alone where resistance has been documented. The Plictran and Carbamate combinations also gave more effective long term control than did the Carbamates alone at higher rates.

Tetranychus urticae - peaches
Phytoseiidae - peaches

R.E. Rice & R.A. Jones
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The experimental pyrethroid FMC 54800 was evaluated as a miticide and compared to Plictran and Pydrin on mature cling peaches at Parlier. Materials were applied by hand gun at 400 gpa on 25 July 1983. Post-treatment counts showed rapid knock-down and good control of 2-spotted mites with Plictran through 90 days, with relatively good recovery and long-term survival of Phytoseiid (Metaseiulus occidentalis) predator mites. FMC 54800 also gave good initial knock-down and control of 2-spotted mites up to 7-14 days, but population resurgence was severe from 21 through 98 days. There was no recovery of Phytoseiids in 54800 treatments through 98 days post-treatment. Six-spotted thrips were able to re-invade FMC 54800 treatments at low levels, but apparently could not build strong populations even in the presence of high prey populations.

I. Orchard Mites

PACIFIC AND EUROPEAN RED MITES - WALNUTS

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Avermectin + oil provided season long control of both Pacific and European Red Mites. FMC 54800 provided good control of Pacific mites for over 5 weeks. Mavrik 2F at .2lb/acre appeared to out perform the 2E and the .1lb/acre rate of 2F. None of the pythroids appeared to control European Red mites. Phoslone caused a flareup of Pacific mites and the European Red mites were significantly higher in the Supracide treatment. Both Guthion and Lorsban appeared to supress mites in this trial. However, extremely high aphid populations with a correspondingly heary honeydew deposit could have been responsible for the reduction in mites.

Mass-rearing pesticide resistant predaceous mites

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A project was initiated this year to develop technology for the mass production and release of carbamate and pyrethroid resistant predaceous mites in order to improve the existing integrated mite control program.

An organo-phosphate-carbamate-sulphur resistant strain of Typhlodromus occidentalis (Phytoseiidae) was imported from California and released into a greenhouse containing pinto beans infested with twospotted mites to act as prey. The pinto beans and their associated mites were then placed into a portion of a 0.5 ha plot of soybeans where the mite populations continued to multiply. The soybeans and their mites were then placed into European red mite infested apple trees. The pinto beans released into the soybeans contained approximately 7500 predators while the soybeans placed into the apple orchard contained some 21,000 predators. Though the final release occurred too late in the season to measure the effect of the predators on the red mites a study is under way to determine the overwintering ability of the imported predator.

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S E C T I O N III

OTHER INSECT PESTS

Section Leader -- Bob Fye

III. Other Insect Pests

APPLE APHIDS IN THE DOO-DOO ORCHARD - YEAR 1

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A new planting of Red-Chief spur Red Delicious apples is being used to evaluate the influence of effluent irrigation and various levels of nitrogen fertilization on insect and mite populations associated with apple trees. The orchard was planted as a 6 x 6 latin square and each tree can receive either fresh or effluent irrigation through drip emitters. An apple aphid infestation occurred this year but there was no significant difference in aphid numbers between fresh and effluent irrigated trees. None of the insecticides tested gave outstanding control.

Apple Maggot - Apple

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During 1983 a cooperative trapping program for the western cherry fruit fly (Rhagoletis indifferens Curran) was conducted in 100 sites in five Utah counties (Cache, Box Elder, Weber, Davis, and Utah) using Pherocon AM traps. As a result of this program, specimens of the apple maggot (Rhagoletis pomonella (Walsh)) were detected in Cache (4 flies), Davis (6 flies), and Utah (200+ flies) counties.

Utah County catches were confined to an area of abandoned orchards on the Mapleton bench. Traps in this area were increased from an initial 5 traps/square mile to 10 and eventually 25 traps/square mile. The first catch was on July 6 and peak activity occurred between July 25 and Aug. 10. The end of the flight period was not recorded.

No larval finds were made in any of the counties, although fruit with typical apple maggot injury symptoms was recovered from the Mapleton area. The trapping program will be expanded in apple production areas in 1984.

III Other Insect Pests

APPLE MAGGOT (Rhagoletis pomonella Walsh) - Apple

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THE APPLE MAGGOT PROBLEM IN CALIFORNIA

The Apple Maggot Fruit Fly (Rhagoletis pomonella Walsh) has been studied by entomologists for 100 years. During that time it has spread from northeastern United States and Canada to other eastern and central states. It was first discovered in the Portland, Oregon area in 1979, and at the Cascade Locks, Oregon and Vancouver to White Salman, Washington in 1981. Another distinct population occurs in Spokane, Washington in 1983. By 1982, Apple Maggot spread south of Portland, Oregon through most of the Willamette Valley and established outlying populations to the California border. On August 24, 1983 the Apple Maggot was first found near Smith River, Humboldt County, California. The present known infestations in California extends from Yreka, Siskiyou County, south into Scott's Valley, and west along the Klamath River to the Trinity River - Klamath River, interchange. Larvae in apples and howthornes were also found in Mt. Shasta, Shasta County.

Rhagoletis pomonella Walsh has the potential of being a serious pest of not only apples but pears, plums, cherries and apricots.

Discussion on Apple Maggot will be on a complete computer and library search. Current feelings toward quarantine, eradication, containment, and survey. Education, basic and applied research - trapping, control methods, development of a IPM program, biology and ecology in both field and laboratory.

III. Other Pests

Apple Maggot - Apples

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Hardness of fruit from 40 abandoned apple trees was measured with a pentrometer throughout the 1983 season and correlated with larval infestation of the apple maggot. Heavy infestations were recorded in early ripening "soft" fruit while late maturing "hard" fruit were virtually maggot free. Large numbers of apple maggot adults were trapped from all of the trees.

Apple maggot infestation in hawthorns, Crataegus spp., was also studied. As in 1982, adults were trapped in and larvae were reared from both the native and imported hawthorn species. There seems to be no distinct preference for either.

CROSS BREEDING OF RHAGOLETIS POMONELLA AND R. ZEPHYRIA

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Dept. of Entomology, Oregon State University

Laboratory experiments showed that successful matings occurred between R. pomonella and R. zephyria. A number of crosses were attempted and most of them found to be successful. Pupae from these crosses are undergoing diapause development at present.

OPIINAE PARASITES OF RHAGOLETIS POMONELLA AND R. ZEPHYRIA IN THE WILLAMETTE VALLEY, OREGON

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Two parasites belonging to the family Braconidae (Hymenoptera) were found to parasitize the apple maggot, Rhagoletis pomonella and the Snowberry maggot, R. zephyria. About equal numbers of Opius downesi and Opius lectoides were found to parasitize the Snowberry maggots, while about 92% of the parasites on apple maggots were O. downesi and 8% were lectoides.

III. Other Insect Pests

Orange Tortrix - Apples and Raspberries

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Pheromone traps are used by growers and researchers to monitor adult orange tortrix in caneberry, grape, and apple crops in western North America. Preliminary data suggests that competition from calling female orange tortrix may significantly decrease the number of male moths caught in pheromone traps. Experiments were conducted in the field and in a closed environment to measure competition between calling females and pheromone traps.

Female orange tortrix, caged in sticky traps, were uniformly placed in a raspberry field containing pheromone baited traps. Trapped males were collected daily. It was established that between 3 and 5 males were caught in a pheromone trap for every one male caught by a female baited trap.

In a related experiment male orange tortrix, marked with a fluorescent powder, were released in an 800 m^2 courtyard, containing 2 pheromone traps. Approximately 35% of the released males were captured in the pheromone traps. Caged females in sticky traps, were introduced into the system and pheromone trap catch was evaluated. It was established that at a ratio of one virgin female for every five males, pheromone trap catch was reduced by 10%. Studies will be continued to establish a pheromone trap/female competition coefficient that can be used under varying conditions of trap, male and female densities and other factors influencing both trap catches and moth responses. These data will be useful in constructing an orange tortrix pheromone trap response model.

III. Other Insect Pests

San Jose Scale Parasites - Apples

Donald W. Davis
Utah State University

A life history and degree day study of Aphytis nr. vandenboschi, was completed by Manas Titayavan. This was the only species of San Jose scale parasite found in northern Utah apple orchards. According to DeBach, it is probably an undescribed species. All parasites were females. The minimum developmental temperature was near 11°C and the maximum near 31°C, with an optimum about 25°C. The degree days above 11°C per generation was very close to 300. The number of generations per year, based on season and location, varied from 3 to 5.

Adult parasites were weak flyers. By late season, about 25% of adult female scales on twigs, and 75% on leaves, were parasitized. Adult female scales were the major hosts, but some prepupal males and instar II females were parasitized.

A predatory mite, Pyemotes herfsi, was a serious enemy of the parasite in both field and laboratory populations.

MONITORING SAN JOSE SCALE MALES WITH PHEROMONES AND STICKY BARRIER TRAPS

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It would be useful to be able to detect the emergence period of San Jose Scale males in order to accurately time and optimize a pesticide application for mating disruption. A computerized, day-degree driven timing model is being developed but requires detection of the first emerging male to act as a biofix. Sticky barrier traps were compared with pheromone-baited tent traps for their ability to capture emerging SJS males during the spring flight. Both types of traps were set out on May 1, 1983. The tape traps detected a first male on May 5, an emergence peak on May 17 and the last male on June 20. The pheromone traps captured a first male on May 17 with an emergence peak on May 25 and the last male on June 10. It appears likely that cold, windy weather conditions during the spring flight period cause the males to walk rather than fly to calling females, hence the tape traps are a more accurate, but also more difficult to use measure of male activity than the pheromone traps.

III. Other Insect Pests

Pear Psylla - Pears

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Two different programs for pear psylla management using Acco Plant and Tree Wash for cover sprays, produced relatively little honeydew russeting at harvest. Two pre-bloom oil sprays suppressed psylla early. An oxythioquinox pink spray on one block further hindered psylla buildup so only one soap cover spray was needed. The block without the oxythioquinox spray required 5 covers of the soap spray. Some spray damage was noted in both blocks. Beneficial insects including D. brevis, Chrysopa sp., spiders were present throughout most of the season.

Pear Psylla - Pears

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Hood River, OR 97031

Pear psylla collected from the field starting in December for the past four years have laid eggs on twigs in the laboratory at temperatures ranging from 39° to 68°F. The photoperiods ranged from 10 to 16 hours of light.

Summed daily degree days with a base of 43°F starting from December 1 through first observed pear psylla egg were calculated for the past 18 years. The mean is 76.34°D. Pear psylla egg laying in the Hood River Valley has occurred as early as January 8, in 1981, and as late as March 12, in 1969.

Pear psylla (Psylla pyricola)

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Levels of resistance in psylla populations from 12 Oregon orchards were determined using a modified slide-dip technique. Orchards were selected from the Hood River, Willamette and Rogue River Valleys and represented the range of ecological and management diversity within these distinct pear growing regions. The slide-dip method appears to be a reliable and fairly precise method to evaluate resistance in the field. Levels of resistance to four compounds--endosulfan, azinphosmethyl, fenvalerate and Perthane--were measured during the 1982 and 1983 seasons.

Psylla from all orchards showed some degree of resistance when compared to the susceptible OSU entomology farm population. Resistance to endosulfan ranged from 2- to 12-fold and resistance to azinphosmethyl ranged from 10- to 41-fold. Resistance levels for these two compounds did not appear to be correlated with an orchard's previous management history, but resistance did vary among pear growing regions. Perthane susceptibility seems to reflect regional use patterns. Orchard populations varied in their degree of susceptibility to fenvalerate.

I. Other Insect Pests

Pear Psylla

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Monitoring of 4 orchards using hard pesticide programs, 5 orchards with light pesticide programs and 4 orchards with oil only programs indicated: (1) Pydrin® was not as effective as in previous years; (2) predator populations were low and not as effective as in previous years; (3) overhead sprinklers minimize fruit damage; (4) oil programs are adequate in low psylla populations but fail in large build ups; (5) psylla populations are lower in Bosc pears and slightly higher in D'Anjou pears in mixed orchards with Bartletts.

Stands of antelope bitterbrush, Purshia tridentata, planted adjacent to orchards supported large populations of Psylla coryli and Arytaina pubescens, two psylla attacking only the genus Purshia. The psylla were attacked by small numbers of Deraeocoris brevis equal to those found in native bitterbrush in 1983. Anthocoris spp., major predators of pear psylla, and Trechnites insidiosus were also present on the bitterbrush.

Five hundred sixty Anthocoris nemorum, received from France were released in 1983. In addition 170 Chrysopa carnea from Greece and 220 Menochilus quadriplagiatus (Hong Kong), a lady beetle, were released. Forty Prionomitus mitratus, a parasitic wasp from France, were released at Husum and 94 at Yakima. None of the species previously released were detected during evaluation sampling.

Developmental studies of pear psylla, Chrysopa nigricornis, Hemerobius ovalis, and Anthocoris melanocerus were completed. Consumption of pear psylla by Deraeocoris brevis, Chrysopa carnea, C. nigricornis, snakeflies, Stethorus picipes adults, and A. melanocerus, was studied.

III. Other Insect Pests

Cherry Fruit Fly - Cherries

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Two foliar sprays of Cygon (dimethoate) 4.8 EC applied at 1.1 kg ai/ha according to current control recommendations against the Western cherry fruit fly on sour or sweet cherries caused residue levels much above the permissible 1 ppm tolerance. These levels also were much above those reported following use of Rogor (dimethoate) 4 EC from 1970 to 1973, when the formulation was registered for this purpose. It is no longer available. Samples of cherries from three commercial and one experimental block were collected at regular intervals from each site after the first and second sprays. These were divided and analyzed at three laboratories. Results were reasonably similar. In a mixed planting of sour and sweet cherries, the total residue levels at harvest, 15 days after the second spray, were 2.41 and 2.23 ppm, respectively. The half-life of Cygon 4.8 EC was 11 days compared to five days as previously reported for Rogor 4 EC.

The Western Cherry Fruit Fly - Cherries

Donald W. Davis
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The western cherry fruit fly is now present in most northern Utah fruit growing areas. Unsprayed backyard sour cherry trees sometimes approach 100% infested fruit at harvest. Sweet cherries have usually escaped major damage.

The research studies were centered on validation of the Oregon model under northern Utah conditions. Degree days were based on 5°C after March 1. Nine trapping sites in 4 sour cherry orchards were used. A field weather station was placed in one of the orchards.

The first fly catch in the study area was between June 13 and 17. The traps were checked twice weekly. On June 17, the accumulated degree days was 490. There was no clear-cut peak flight date, but heavy catches occurred from July 4 (727 dd) to July 24 (1070 dd). With the exception of one fly caught September 12, the flight was over by August 21 (1561 dd). In the trapping area, sweet cherry harvest was completed by July 15 and sour cherry harvest by August 4.

The information from 3 years trapping data is similar to that reported from Oregon, but tends to be more variable. The variability is probably due to the 3-4 day sampling intervals and to the fact that our traps were in small orchards or backyards, often near buildings.

III. Other Insect Pests

San Jose Scale, Quadraspidiotus perniciosus - stonefruits

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Chemical treatments were applied to peaches at Parlier to determine the optimum timing for control of first generation SJS crawlers. Diazinon 50W was sprayed by handgun at 2.0 lbs. a.i. in 400 gpa at pre-selected D° intervals following 1st male scale collections in pheromone traps on March 16, 1983. Greatest reductions in crawler populations were achieved from treatments applied at 600-700 D° after 1st male flight, or at 200-300 D° after 1st crawler emergence.

Field studies on commercial SJS pheromone cap longevity showed that caps should be replaced at 4-wk. intervals.

Myzus persicae - Green Peach Aphid - Peach/Nectarine

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The green peach aphid annually attacks peach and nectarine crops in the lower Yakima valley. The impact of this insect on peach set, fruit size and fruit quality are examined. Overwintering populations in 1982 and 1983 are compared in attempts to determine levels and sampling procedures required to estimate potentially threatening conditions. The impact of OFM and GPA sprays on green peach aphid natural enemy activity are discussed.

Grape mealybug - Pear

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Parathion, diazinon, carbosulfan and methidathion controlled grape mealybug, Pseudococcus maritimus (Ehrl.), on pear. Handgun sprays were more effective than airblast applications. Growers' control problems are caused by poor timing and spray coverage. Most effective times to spray are cluster bud and petal fall stages. Two sprays at these timings are necessary to control dense populations.

III. Other Insect Pests

Pear psylla - Pear

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Flucythrinate and cypermethrin were as effective as fenvalerate but MK 936 (avermectin B) was less effective, as dormant sprays against overwintered adult pear psylla, Psylla pyricola Foerster. Compounds effective as foliage sprays against this pest included MK 936, SN 72129, CME 13406, fluvalinate and XE 938. SN 72129, used in 4 sprays during the growing season, controlled pear psylla yet allowed survival of Anthocoris nemoralis (Fabr.) and Deraeocoris brevis Knight, predators of psyllids and aphids.

Paclobutrazol applied as a soil drench around trees (20 g/tree; 5.4 Kg/ha) in 1980 suppressed shoot growth during 1983. Suppressed shoot growth did not affect pear psylla density, but fruit on treated trees had more psylla honeydew damage than that on untreated trees. Psylla nymphs were restricted to foliage closer to fruit where shoot growth was reduced. Densities of twospotted spider mite, Tetranychus urticae Koch and pear rust mite, Epitrimerus pyri Nalepa, were lower on paclobutrazol-treated trees. At rates between 15 g/tree (30.6 Kg/ha) and 680 g/tree (184 Kg/ha) there was a positive correlation between rate of nitrogen fertilization and density of pear psylla and pear rust mite but a negative correlation with twospotted spider mite.

Walnut Scale - Phenology and Control

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Walnut scale adult males and crawlers were monitored in an untreated orchard by the double-sided sticky tape method. The tapes successfully trapped both males and crawlers and resulted in good biofix points from which estimations of degree-days per generation were made. A threshold of 50°F and upper limit of 90°F gave the best fit with a mean generation time of approximately 2060°D. Treatments of methidathion applied at crawler emergence gave somewhat better control than at the dormant period or male emergence but resulted in some disruption of biological control of other pests.

S E C T I O N IV

LEPIDOPTEROUS PESTS

Section Leader -- Jay Brunner

IV. Lepidopterous Insects

Codling Moth - Asian pears and plums

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Chemical treatments to determine optimum spray timing for first generation codling moth larvae were applied at 100 D° intervals (50°-88°F thresholds) to Asian pears and to plums. Results of these tests, using Diazinon 50W @ 2.0 lbs. a.i./acre, showed best control at 200-400 D° after 1st moth flight in April.

Codling moth - Pear

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Alsystin in a single spray timed for beginning of second brood controlled codling moth, Cydia pomonella L. Fruit in adjoining check plots was heavily damaged.

Codling Moth - Apples and Pears

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BUGOFF is a family of temperature-driven computer models of the codling moth developed under the direction of Dr. Falcon at UC Berkeley since 1973.

The BUGOFF 1 and BUGOFF 2 phenology models are currently used to time codling moth sprays. BUGOFF 3, under development, is a population model linked to a simple tree fruit model. In the models the rate of insect development is proportional to the degree-days accumulated between a 52F lower threshold and a 92F upper threshold. Oviposition is allowed when twilight temperatures exceed 60F.

BUGOFF 1, rewritten and renamed BUGOUT, is available on-line to California farm advisors through the statewide IMPACT computer system. It predicts beginning and ending points of phenological events but not the peak.

BUGOFF 2 tracks percentages of insects in each life stage on each day. It provides a more precise estimate of codling moth activity, especially for the second and third generations. It has been used successfully to time the application of codling moth granulosis virus, a short-residual material.

BUGOFF 3 can track sub-populations of codling moth in orchard microclimates, allowing a check of the assumption that ambient temperatures are a good measure of development. It will let us determine the effects of natural and pesticide-induced mortality on the shape of phenological curves. Through its linkage to a simple fruit yield model, BUGOFF 3 will enable us to estimate the economic outcome of control strategies.

IV. Lepidopterous Pests

EVALUATION OF PETE MODEL FOR CODLING MOTH EMERGENCE UNDER WILLAMETTE VALLEY CONDITIONS

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The Predictive Extension Time Estimate (PETE) model developed at Michigan State University was validated under Willamette Valley conditions using pheromone trap data. Initial model predictions were inadequate; however, the model was later modified by changing overwintering larval development characteristics and the modified model predictions of field emergence of adults were fairly accurate.

Codling Moth - Apple

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Forecasting - Observations on codling moth development (adult emergence, initial egg hatch and larval instar) and population density, and on air temperature, were made at five sites in the Okanagan Valley. Heat accumulation was correlated with insect development at each site. These parameters were not uniform from site to site, but the correlations were close to that of a model previously tested in nearby Washington State. This suggests that heat unit accumulation is a suitable basis for predicting codling moth development and hence appropriate spray schedules.

Chemical Control - Two insect growth regulators, diflubenzuron and BAY SIR 8514, and the codling moth granulosis virus were sprayed on apple trees that were heavily infested with the codling moth. These materials gave only moderate control of the pest, and unacceptable levels of damage still occurred. The standard treated check, azinphos-methyl, provided good control. None of the treatments reduced populations of the dominant predaceous mite, Typhlodromus caudiglans Schuster.

Fumigation and Cold Storage - About 50% of adult moths died after 10 days in cold storage. Codling moth eggs on apples died in cold storage (1°C) in about 3 weeks, and only 10 days cold storage resulted in complete egg mortality if the infested apples had been fumigated with methyl bromide (36 g/m^3 for 2 h at 10°C). Late-instar larvae in immature apples were killed if kept in cold storage for up to 12 weeks, but only one month cold storage was needed to kill the larvae if the infested apples had been fumigated (13 g/m^3 for 2 h at 10°C). Cold storage of codling moth larvae in cocoons eliminated nondiapausing larvae in 16 weeks, but not diapausing larvae. Diapausing larvae in cocoons were the most difficult of all stages to kill, but exposure to 48 g/m^3 methyl bromide for 4 h at 10°C killed all of them.

Lepidopterous Insects

Cydia pomonella - Codling moth - Apple

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Results of trapping codling moth in sex pheromone traps at three locations in Washington are reviewed. The use of the sex pheromone trap as a tool for determining need to spray is reviewed. The proposed threshold of two moths per trap on two consecutive weeks appears a reasonable level, at least for the first generation. Trap density of one trap/ha may be more than necessary after the initial survey within an area. Border trapping appears very sensitive to external population pressure.

Quality control of pheromones and pheromone traps from Zoecon are discussed. Indications from preliminary tests are that the Zoecon CM cap purchased from retail outlets gave extremely varied results when compared with a known standard. How can research scientists respond to such a problem. Without reliable quality the use of sex pheromones for monitoring populations of insects is questionable and recommendations for use as decision-making tools in agriculture are impossible.

Male Annihilation for Codling Moth Control in Apple Orchards

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During 1983, two additional synthetic pyrethroids, Pydrin and Ambush, were tested to determine if they had rapid knockdown properties. Neither had the necessary rapid action needed for male annihilation. Wet formulations were often better than dry deposits. Wet formulations were prepared in superior spray oil, propylene glycol, diethylene glycol, glycerin, and corn oil; using the insecticides Batamin P&O, Pyrenonen, Pydrin, Ambush, and Baygon. Each of these products stayed wet for several weeks and provided the longevity needed. Bio-assays were done to determine the toxicity of each. Superior oil with Baygon was best. In field trials codling moth males were repelled by the liquid bases, and the moths would not come closer then ca. 5 cm. Tests showed it was the liquid not the insecticide that was the repellent. The only formulation found that was not repellent was microencapsulated Baygon; males were not repelled by Baygon platforms in field trials.

IV. Lepidopterous Pests

Temperature Driven Timers for Determining the Timing of Sprays for Codling Moth Control

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Better codling moth control is obtained with fewer sprays if the applications are precisely timmed. When we consider that the effective residual life of a spray application is 8-10 days, a 3 to 5 day error, especially if it is early, is serious and may mean the difference between 1, 2 or 3 applications to control the 1st flight of codling moths.

Modeling codling moth development, using heat received as the fuel for development (degree days or hours), beginning January 1, has not been consistent and too large an error results; as much as 14 days. However, precise timing is possible by measuring heat received following 1st emergence of each flight. A simple microprocessor is used, on site, to measure heat input.

Slope, air drainage, tree density all influence the amount of heat the codling moth receives. Two orchards in the same area may have different dates for 1st emergence, e.g. 2122°h at Green's compared to 2678°h at Leache's in 1983, or April 20 vs. May 3, a 13 day difference. Slope and tree spacing was the only obvious difference between the two orchards.

Codling Moth - Apple

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Codlemone was used at two release rates, 80 µg/day and 30 µg/day to control codling moth by male mating disruption. In the 80 µg/day plot (0.4 ha, 1500 dispensers) disruption as measured by male response to pheromone baited traps was 80%. In the 30 µg/day plot (0.4 ha, 5000 dispensers) disruption was 98%. At the end of first brood activity, there was no difference in codling moth infestation between the disruption plots and the untreated control.

Fruittree Leafroller - Apple

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Methidathion and methomyl, applied prior to overwintering egg hatch, gave excellent control of a leafroller strain tolerant to organophosphates. Bacillus thuringiensis applied at the pink stage was less effective, but provided commercial control. Kryocide and trichlorfon were ineffective as pink sprays. With Bacillus thuringiensis, rates below 2 lbs/acre gave relatively poor control.

IV. Lepidopterous Pests

Pandemis pyrusana - Pandemis leafroller - Apple/cherry

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The use of sex pheromone traps as a monitoring tool for the Pandemis leafroller appears to be very limited. Trappaing over large areas indicates centers of activity but not the exact location of populations. Weekly trap counts during peak activity period of less than 20 indicate no resident population within an orchard based on a trap density of one per ha. The life history of the Pandemis leafroller on apple and cherry are discussed. Laboratory rearing of eggs, larvae and pupae at constant temperatures was conducted and threshold estimates for development will be discussed. An artificial diet used to rear pink boll-worm was used to successfully rear field-collected larvae. Larval development on the diet was slower than on apple or cherry foliage suggesting it was inadequate for sustained normal development. Host range of the Pandemis leafroller is discussed.

Threelined and Obliquebanded Leafroller - Apple

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Pheromone traps, although attractive to male leafrollers, are not reliable to monitor populations in apple orchards because of the wide host range of these species. Traps in non-infested orchards captured similar numbers to those in orchards with known infestations. Terpinyl acetate bait pans captured females in areas with infestations but not in clean orchards. Pheromone traps in both cultivated and noncultivated areas indicated the male activity of obliquebanded and threelined leafrollers began in late May and continued to late September. In southern districts, peak activity of both species was in late July and August. In northern districts, peak activity of obliquebanded leafroller was in July and threelined leafroller in August, a month later.

Orange Tortrix - Apple

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Pheromone traps have not proven adequate in timing sprays for orange tortrix in apples. In order to develop a presence-absence sample plan it is necessary to find out the distribution of orange tortrix in the tree. Ten mature newtown pippins on MM106 were examined twice a month starting in mid-June using the orange tortrix day-degree model. The tree was divided into 10 quadrants representing, N, E, W, S both up and down and inside and out. The first sample included damage caused during bloom from fruit tree leafroller, apple pandemis, green fruit worm, and oblique banded leafroller. A multiway analysis of variance showed no difference between quadrants. This means we can sample for damage occuring during bloom anywhere on the tree.

For new damage occuring during growing season there was substantial difference between quadrants. This means we will need to sample parts of the tree differently and damage changes through the season. Damage was 50% higher in the top of the trees.

IV. Lepidopterous Insects

Argyrotaenia citrana - apple, caneberries

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A model of *A. citrana* phenology on caneberries in the Willamette Valley is being fine-tuned and validated through larval sampling and pheromone trap catches. Sampling during 1983 of both overwintering and first generation larvae indicated peak oviposition occurred near 900 heat units (based from January 1st, $K_1 = 41^{o}F$). Pheromone trap catches also peaked at 900 heat units, however, a second peak occurred at 1400-1600 heat units. Results from larval sampling demonstrated that appreciable oviposition did not occur during this period. Instead, our interpretation of this second peak suggests it represents an artificial response of male moths to traps. Factors which can create temporal asynchrony between pheromone trap peak catch and female peak oviposition and its relevance to pest management will be discussed.

Minor Lepidopterous Pests

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Despite extremely high flight peaks of spotted tentiform leafminer, infestation in three Hood River apple orchards was almost nonexistent by harvest time. In The Dalles, a small apple block showed 3 to 5 mines/leaf by late July with less than 1 mine/leaf in an adjacent sweet cherry block.

An early petalfall parathion application (every other center) to Newtown apple gave only slight reduction of *Pandemis limitata* damage compared with an adjacent unsprayed block.

The Tentiform Leafminer - Apples

Donald W. Davis
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Infestations of the tentiform leafminer (*Phyllonorycter elmaella*) were generally low in Utah during 1983. One series of treatments was applied in control tests in the orchard with the heaviest infestation we were able to locate. The average mines per leaf was about 3.5 in the area away from the plots during mid August. This compares to about 20 mines per leaf during some years.

The sprays were applied too late, well after the second flight. Only Vydate (oxamyl) at 8 oz AI/100 gallons and the pyrethroid FMC 54800 at 0.5 oz showed significant reductions in mine numbers. Treatments of Pydrin, Ammo, and Bay Sir 8514 did not reduce the mines significantly.

I. Lepidopterous Pests

Spotted Tentiform Leafminer - Pome Fruits

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Agricultural Research Service, USDA

Yakima, WA 98902

Pheromone traps baited with (E)-10-dodecnyl acetate placed in orchards in Kennewick captured leafminer males currently identified as Phyllonorycter elamaella Dog. and Mut. from March 15 to November 10, 1983. Many leafminer larvae were infected and died from what we suspect is a virus disease. A hymenoptera, identified as Pnigalio maculipes (Crawford) was the principal leafminer parasite found in orchards in Kennewick, Roosevelt, and Wapato, Wa.

TENTIFORM LEAFMINER IN IDAHO APPLES

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The tentiform leafminer was found in Idaho in 1981 in unsprayed apple orchards. Phermome trapping during 1982, 1983 showed the insect spreading to most commercial apple areas in the State including Emmett, Payette, and Fruitland, but not in the Caldwell-Sunny Slope area. Although trap counts were very high, economic damage to leaves has not been apparent in most cases.

In 1983, the first moths were trapped on 21 March; the first eggs were noted on 25 April. Early sap feeding larvae were seen on 10 May and the first tissue feeding larvae were present on 28 May. Pupation occurred in early June and 2nd generation moths were trapped on 14 June.

In 1983, several heavily infested orchards were sprayed at Pink Stage with Vydate 2L (.5 lb AI) with excellent control in all cases. Post bloom sprays were not required.

IV. Lepidopterous Pests

Spotted Tentiform Leafminer

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Several insecticides and two application dates of each insecticide were evaluated for control of spotted tentiform leafminer and effect on mite populations. Testing was done in two commercial orchards using plots which ranged from 0.5 to 2.0 acres in size. Insecticides were applied at pink and/or mid-June and leaves were examined for leafminers and mites weekly or biweekly. In addition an ongoing systemic nematocide trial was sampled to evaluate tentiform control.

Although populations did not approach levels considered to be economically injurious, some materials did appear to provide significantly better control than others. Early season control was best with Vydate, Ammo, and Dimilin in one orchard. In the other orchard Vydate, Thiodan at pink with a malathion-methoxychlor mix mid-June, and Pydrin controlled leafminers best. In neither case did mites reach damaging levels.

Results of nematocide trials sampled at mid and late season showed good control by Temik, Mocap plus Temik, and Vydate.

Peach Twig Borer - Peaches

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One Summer spray of WL85871 10 EC at 25 g or deltamethrin 2.5 EC at 10 g ai/ha timed by sex pheromone traps against first summer brood peach twig borer moths effectively controlled feeding injury in terminal twigs and fruit on Redhaven and Valiant peach trees caused by first brood and the earliest of the second summer brood larvae. Both treatments were equivalent to a timed spray of the current control recommendation, azinphosmethyl 50 WP at 1.4 kg ai and and superior to pirimicarb 50 WP at 500 g ai/ha. Sprays were applied to replicated 0.1 ha plots by hand gun sprayer in 3370 L/ha 10 days after catches of first brood moths in the pheromone traps exceeded the weekly level of 2 male moths/trap. The traps were deployed at a density of 10/ha. At harvest, larval feeding injury in fruit from the above treatments and the checks averaged 1.3, 0.5, 1.3, 15.8, and 22.8%, respectively. Additional sprays were not applied although the economic threshold level of 5 male moths/trap for second brood moths was exceeded. Traps indicated peak emergence of a high population of this brood began immediately prior to harvest.

IV. Lepidopterous Insects

Peach Twig Borer - Peaches

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A comparison of commercially available Zoecon 1981 and 1983 peach twig borer pheromone caps in peach blocks indicated significant variability in attraction. Except at one site where one cap was used, 2 of each kind were tested in Pherocon IC traps deployed at densities of 2 to 10/ha in 5 mature peach blocks. The position of each trap was rotated weekly and trapped moths removed. The pheromone caps and traps were replaced at 6-week intervals. During a 16-week period, the 1981 pheromone caps attracted 2.0 to 5.7 times as many first and second summer brood male moths as the 1983 caps. This difference in attractiveness could result in economic damage if threshold levels for these broods were being monitored.

Peachtree Borer - Peaches

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In monitoring trials against the peachtree borer in peach plantings, 1983 Zoecon GPTB caps were more attractive to male moths of this species than caps made in the laboratory with synthetic pheromone from two commercial sources. The laboratory caps contained 1 mg of pheromone concentrate. Two caps of each kind were tested in Pherocon IC traps deployed at densities of 2.5 to 10/ha in a nursery and two commercial peach blocks. The position of each trap was rotated weekly and trapped moths removed. Pheromone caps and traps were replaced at 6-week intervals. During the season, traps baited with Zoecon caps attracted 4.5 to 4.9 times more moths than caps made from 1976 Farchan concentrate and 14.7 to 22.1 times more moths than caps made from 1983 Essex concentrate. In two other commercial peach blocks, caps made from the Farchan concentrate also were superior to those made from the Essex concentrate.

Oriental Fruitmoth - peaches/nectarines

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Diazinon was applied at specific D° intervals to 3rd leaf peaches and nectarines at 2.0 lbs. a.i./ac. for control of OFM larvae during the 2nd (May) flight. Best control was obtained from sprays applied at 600 D° after the biofix (1st moth collections) on May 15, 1983. The experimental pyrethroid FMC 54800 also provided good control of OFM when applied at 600 D° at rates of .04, .06, and .08 lbs/a.i. per acre.

IV. Lepidopterous Insects

Tortricid Moth Pheromones - mixed hosts

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Synthetic pheromones of eight Torticid species were placed into stonefruit orchard and uncultivated areas in four locations in Fresno and Tulare counties. The pheromones were for fruittree leafroller, filbert leafroller, fruittree tortrix, obliquebanded leafroller, orange tortrix, three-lined leafroller, tufted apple budmoth, and redbanded leafroller. Of these 8 target species, only the fruittree leafroller and obliquebanded leafroller were collected.

The fruittree leafroller (FTLR) was attracted by several pheromones, including its own pheromone (171 total moths), filbert leafroller (105 FTLR), obliquebanded leafroller (85 FTLR) and redbanded leafroller pheromone (142 FTLR). Minor responses of FTLR were also shown to the pheromones of fruittree tortrix (4 FTLR) and three-lined leafroller (7 FTLR).

Obliquebanded leafroller (OBLR) moths were collected in traps containing pheromones of orange tortrix (273 OBLR), its own pheromone (157 moths), filbert leafroller (26 OBLR) and redbanded leafroller (3 OBLR).

Oriental fruitmoth showed significant response to pheromones of orange tortrix (87 OFM) and three-lined leafroller (62 OFM). The garden tortrix, Clepsis peritana, responded in high numbers to pheromones of filbert leafroller (1053 GT) and OBLR (1362 GT). This species also responds to the pheromone of omnivorous leafroller, Platynota stultana.

Other non-target species responding to the pheromones were Commophila umbrabsana (Tortricidae) in tufted apple budmoth traps (231 moths) and Macrotheca sp. (Pyralidae) in FTLR traps (364 moths) and fruittree tortrix traps (638 moths).

Peach Twig Borer, Anarsia lineatella - stonefruits
Oriental Fruit Moth, Grapholitha molesta - stonefruits
Omnivorous Leafroller, Platynota stultana - stonefruits
Codling Moth, Cydia pomonella - plums

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Optimum attractancies (cap longevity) of commercial pheromone dispensers were measured for peach twig borer, oriental fruit moth, omnivorous leafroller, and codling moth. Cool weather and hot weather tests were conducted for each species. Based on the data from these tests in 1983, recommendations for pheromone cap replacement for each species is as follows: peach twig borer - 2 wks; oriental fruit moth - 6 wks; omnivorous leafroller - 4 wks; codling moth - 2 wks.

IV. Lepidopterous Insects

Peach Twig Borer - stonefruits

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Chemical treatments with Diazinon to determine the optimum post-bloom spray timing for control of peach twig borer continued to show the best timing to be 400-500 D° after 1st moth collections in pheromone traps in April. This confirms similar observations made in 1981 and 1982.

Navel Orangeworm - Almonds

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Field studies on the thermal summation of the navel orangeworm on almonds revealed that an average of ca. 766 degree-days is required for development from egg to adult on new-crop almonds, while ca. 1125 degree-days are required for complete development on mummy almonds. The use of an upper developmental threshold temperature of 94°F with a vertical cutoff is necessary in calculating degree-days for this species.

Navel Orangeworm - Almonds

J. E. Dibble & S. M. Haire
Kearney Agricultural Center
University of California

July hullsplit sprays gave slightly better worm control than those applied in May. However, due to an extremely high mummy nut population on the ground (knocked but not destroyed) none of the materials gave economic control. The standard materials used were Guthion, Imidan, Pounce and Zolone. Lorsban, XE-938 and FMC-54800 have looked better in the past when NOW population pressure has been less.

Navel Orangeworm - Almonds

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and
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Navel orangeworm egg trap improvement was investigated by modifying trap color, trap texture, and bait formulation. By changing the color of the trap to a less reflective color such as black, egg deposition was increased 180-350%. By changing the texture of the trap so that the roughened surface extended the full length of the trap, egg deposition was increased 13%. By changing the bait formulation from almond press cake to almond press cake plus 10% crude almond oil, egg deposition was increased 160%. The biological activity of the almond press cake plus 10% crude almond oil formulation was not significantly different after 8 weeks of trapping than fresh bait formulation. It was also found that as the amount of bait formulation placed in the trap increased, so did egg deposition.

IV. Lepidopterous Insects

Obliquebanded Leafroller - pistachios

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The obliquebanded leafroller, Choristoneura rosaceana (Harris), was found feeding on foliage and maturing nuts of pistachio, Pistacia vera, in a commercial orchard in Merced County, California. Feeding on nuts was observed from mid-July until harvest in late September. Collections of moths in pheromone traps in another location showed two distinct flight periods between mid-May and October, 1983. This is the first know record of OBLR feeding on a Pistacia host.

Monitoring and Control of Filbertworm Melissopus latiferreanus (Walsingham) (Lepidoptera, Olethreutidae) on Corylus avellana

Jim Calkin, G.C. Fisher, M.T. AliNiazee
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Oregon State University initiated an integrated pest management program on filberts in 1982. One key pest monitored is filbertworm. The larvae of which feed on the kernel. Its host range includes the nuts and fruits of Corylus, Quercus, Prunus and Juglans. It has one generation per year. The larva overwinters in cracks and crevices of various shelters, debris on the ground and in the soil.

The adult flight activity is monitored with pheromone traps (4 traps per 10 acres and 1 trap for each additional 4 - 5 acres). Traps are located in the upper one-third of the canopy. An action threshold of 3 moths per trap per week was used in 1982 and a more conservative threshold of 5 moths per trap accumulative was used this season (1983).

A comparison of insecticide usage by growers participating in the IPM program in 1982 and 1983 to their use of insecticides in 1981 is shown in the table below:

Annual Insecticide Usage by IPM Growers

Pest	# of Blocks Treated		
	1981	1982[a]	1982[b]
Filbertworm	14	7[c]	13[d]

[a] Fifteen blocks monitored.

[b] Twenty one blocks monitored.

[c] Three treated twice; two treated three times.

[d] Four treated twice.

None of the growers in the 1982 program were assessed a sorting charge because of filbertworm. One grower in the 1983 program was assessed a sorting charge for filbertworm infested nuts. This infestation appears to be one of two this past season occurring in the Willamette Valley where seasonal pheromone trap catches were incongruent with subsequent filbertworm infestation.

IV. Lepidopterous Pests

Monitoring and Control of the Filbertworm Two Orchard Anomalies

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Excellent control of the filbertworm was achieved in individual IPM orchards in 1982 using the action threshold of 3 moths/trap/week. However using what in general is a more conservative threshold of 5 moths/trap cumulative in 1983, filbertworm infestations of harvested nuts exceeded the allowable tolerance of 1% and a sorting charge was assessed in at least one orchard.

In general, filbertworm infestations were up for most all IPM growers in 1983. Possible explanations are (1) the light crop year increased the probability of detecting infested nuts (2) inclement weather diminished the efficacy of cover sprays.

However, there were two orchards (A monitored by OSU, B monitored by a processor fieldman) in which a moderate trap count (A; total moths captured = 10 for 5 traps), followed by an insecticide application and an extremely low trap count (B; total moths capture = 3 for 2 traps) followed by 2 cover sprays produced FW infestations of 3.3% and 24.8% respectively. Both orchards were also heavily infested in 1982, 7% and about 25% respectively.

Whereas the pheromone traps have been very good indicators of FW activity and quite helpful in timing sprays for most all filbert orchards, we're at a loss to explain the failure of the traps to predict the large infestations in these two orchards.

CODLING MOTH WALNUTS

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Nine materials were applied to mature Payne walnuts on May 3 and June 27. First generation codling moth control was evaluated by counting dropped nuts. Second generation control was evaluated by picking 150 nuts at random from each of four trees and checking for damage. All materials were significantly better than the check on the first generation. MK936 was significantly poorer than the other tested materials except Lorsban for second generation control.

S E C T I O N V

CONCENTRATE SPRAYING, RESIDUES, PHYTOTOXICITY, AND PESTICIDE DEVELOPMENT

Section Leader -- Kurt Volker

V. Concentrate Spraying, Residues, Phytotoxicity, and Pesticide Development

FMC 54800 - A New Pyrethroid

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FMC 54800 is a new broad spectrum foliar insecticide/miticide being developed for use on a wide variety of crops. One of its unique properties as a pyrethroid is its high degree of acaricidal activity. The effective rate, depending upon the target species, falls within the range of 0.02 to 0.10 lb ai/acre. The toxicology and metabolism of this chemical are similar to many of the new pyrethroids.

Phytotoxicity - Pears

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A dilute application (270 gpa) of dicofol 4 FL plus azinphosmethyl 50 WP at the rate of 2.0 lb and 0.5 lb a.i./acre, respectively, on June 7 caused marking on fruit and foliage of d'Anjou pears. No damage was noted on Red and Golden Delicious apples.

Dilute applications (300 and 400 gpa) of Acco Plant and Tree Wash at 2 and 4 gal/acre caused typical EC ringing on d'Anjou pears throughout the growing season.

CHEMICAL CONTROL OF PRUNE DISEASES IN CALIFORNIA

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California has 66,000 bearing acres of French prune and the major diseases controlled by fungicides are: 1) brown rot blossom blight caused by M. laxa and M. fructicola. 2) leaf rust caused by Tranzchelia discolor, and 3) russet scab on fruit, cause unknown. The unusual wet spring weather in 1983 resulted in severe brown rot blossom blight and fruit rot as well as russet scab of fruit. Leaf rust did not develop until just prior to harvest time but the disease was so severe that almost all the leaves were infected.

Because of the widespread occurrence of benomyl-resistant M. fructicola in prune orchards, the consequences of using benomyl or thiophanate methyl must be considered. Although benomyl-resistant M. laxa has not been detected in prunes, it has been detected in apricot and almond orchards. Alternatives to benomyl or thiophanate methyl would be iprodione and captafol. Iprodione was more effective when used in combination with oil. Captafol has an advantage because it is less expensive and also controls russet scab. Although the cause of russet scab has not yet been definitely established, it is controlled by captan and its analogs. For effective control of brown rot blossom blight and russet scab on fruit, two sprays are necessary. The first application between green bud and white bud and the second at nearly full bloom.

Leaf rust was in epidemic proportions in late fall after fruit harvest, yet mancozeb sprays applied before or after the initial stages of infection provided effective disease control. Registration of mancozeb for control of leaf rust has been requested.

V. Concentrate Spraying, Residues, Phytotoxicity, and Pesticide Development

Electrostatic Applications - Almonds

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Dye coverage tests did not show consistent differences between two identical spray runs - one with charged particles and the other with no charge. Although target cards and poles did not provide a ground for the negatively charged droplets, it was felt that the grounded tree would attract a greater cloud of charged droplets and thereby increase card deposit in contrast to the non-charged droplets.

On almonds at 25 gpa there was no difference in coverage between 1.8 and 2.5 mph. At 50 gpa and 1.8 mph slightly better coverage was obtained than either run at 25 gpa. 50 gpa at 2.5 mph was the poorest.

Tests in peaches and plums showed generally better results when particles were electrostatically charged. This difference was consistent except for one test run. GPA and mph made little difference in total coverage.

Filbert Aphid Control on Filberts

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Four insecticides were screened for efficacy against filbert aphid on filberts. Treatments were applied in a randomized complete block design with five single tree replications. Tree age was eight years and spacing as 20 ft. x 20 ft. The predominant variety was barcelona interplanted with Daviana pollinizers. To minimize drift, trees in alternate rows were used for treatment. No adjuvants were used. Treatments were applied via an Amerind McKissick sprayer by handgun using 2 gallons of water per tree (ca. 218 gallons per acre) on March, 1983. The total numbers of aphids on 5 randomly selected 3-leaf terminal shoots per tree were recorded.

Sevimol caused a resurgence of filbert aphid populations greater than check after 14 days. Initial control by Pounce and Orthene was comparable to Metasystox-R, the standard. After thirty-five days, there was no statistical separation among the aphid populations in the Metasystox-R, Orthene, and check trees.

Treatment and lb ai/acre	Mean No. Aphids Per 3-Leaf Terminal*						
	Pre	Days Post-Spray +2	+7	+14	+21	+29	+35
Metasystox-R 0.5	2.6 a	0 a	0.2 a	0.8 a	2.0 a	2.0 a	2.2 a
Orthene 75S 0.5	2.2 a	0 a	0.6 a	0.8 a	3.6 ab	5.4 a	8.0 ab
Orthene 75S 1.0	3.6 a	0.2 a	0.4 a	1.0 a	3.6 ab	4.2 a	5.4 ab
Pounce 3.2EC 0.2	3.4 a	0.4 a	1.6 a	4.4 a	9.2 bc	19.2 a	18.8 bc
Pounce 3.2EC 0.4	2.8 a	0 a	1.0 a	3.2 a	7.0 c	9.0 b	12.2 c
Sevimol 4 3.0	4.2 a	0.4 a	6.6 b	21.4 c	21.2 e	32.6 c	42.8 d
Untreated	4.6 a	2.2 b	5.0 b	12.4 b	15.2 d	10.8 ab	7.4 a

*Numbers followed by the same letter are not significantly different at the 0.05 level (DMRT).

V. Concentrate Spraying, Residues, Phytotoxicity and Pesticide Development

Filbertworm Control on Filberts

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Oregon State University
Corvallis, OR 97331

Three insecticides were screened for efficacy against filbertworm on filberts. The experimental design was a randomized complete block design consisting of four single tree replications. Tree spacing was 20 x 20 feet with tree age being 40 years. The main variety was Barcelona with Daviana pollinizers. All insecticides were applied to Barcelona trees. Adjuvants were not included. Treatments were applied with an Amerind McKissick sprayer by handgun using 2 gallons of water per tree (ca. 218 gallons per acre). Pretreatment monitoring of filbert nut development, weather, and adult flight activity of filbertworm were used to time insecticide applications. Pheromone traps were monitored twice a week until the third week of September. Large moth catches were recorded in all traps. Pheromone caps were changed twice during the monitoring period.

An insecticide application was made on July 11, 1983. Rain (0.9 inches) a week later and continuous trap catches required the trial to be resprayed on July 22, 1983. A third application was made on August 12, 1983 due to large pheromone trap catches and length of time prior to harvest. Samples consisting of 80 nuts per tree were collected on October 4, 1983. Nuts from both untreated and treated trees contained economically damaging infestations of filbertworms. Commercial filbert processors would reject the nuts from the untreated and Orthene 75S treated trees. The nuts from trees to which Pydrin and Pounce were applied would be accepted, but a sorting charge to remove worm infested nuts would be levied. An extremely low crop yield and an unusually high moth population not normally found in commercial orchards was experienced during this trial.

Treatment and lb ai/acre	% Infestation
Pydrin 2.4EC 0.2	4.7 a*
Pydrin 2.4EC 0.4	2.2 a
Pounce 3.2EC 0.2	2.5 a
Pounce 3.2EC 0.4	2.5 a
Orthene 75S 0.5	33.8 b
Orthene 75S 1.0	29.7 b
Untreated	40.9 b

*Numbers followed by the same letter are not significantly different (P = .05) DMRT.

S E C T I O N VI

TOPICS NOT COVERED UNDER ONE OF THE ABOVE

Section Leader -- Gary Fields

VI. Topics not covered under one of the above

Orchard Scouting - Pears

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and
Dr. Peter Westigard
OSU, Southern Oregon Experiment Station
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An orchard scouting program was initiated in 1982 by 3 large pear growers with the help of the Southern Oregon Experiment Station and the Jackson County Extension Service. In 1982, the scout, hired by the growers, sampled just over 1,000 acres. In 1983, in spite of the withdrawal of one of the original participants, the program was expanded to slightly over 1600 acres. In 1982 the cost was $8.00 per acre and in 1983 the costs were $10.00 per acre.

Yellow, 2- spotted and McDaniel mites and pear psylla were the primary pests monitored in the sampling program, although in some orchards pheromone trapping was done for codling moth and San Jose scale. San Jose scale crawlers and pear rust mite populations were reported when observed as a result of leaf bushing. Approximately 0.5 embryonic plus post-embryonic mites per leaf is the treatment threshold that was used. Populations of all species of mites found were summed to compare to the treatment threshold. Through the first codling moth generation, 0.4 psylla nymphs per leaf is the treatment threshold used, after that period the threshold was raised to 0.6 nymphs per leaf.

At the end of the 1983 season, insecticide costs were compared between a grower participating in the scouting program and a non-participating orchardist of similar acreage. The participating grower saved $37.35 per acre based on the average insecticide costs in 5 of his orchards of mixed variety. The costs established for the non-participating grower were based on 3 of his orchards also of mixed varieties. The participating grower saved spray costs by making each application on a variety specific basis.

VI. Topics Not Covered Under One of the Above

Pollination of Apples

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We investigated 33 varieties of flowering crabapples in the Wenatchee area last spring. Young America, Turesi, NY 50-4 and possibly Simpson 10-35 are being discarded because they don't possess the sort of strong, upright growth which can be trained as a pole pollinizer. NY 50-4, NY 58-22, Donald Wyman, PK-14, David, and Geneva are being discarded because of too few flowers and/or poor pollen release. Blooming periods started 1-14 days earlier than in 1982. Gibbs Golden Gage, Young America and Henry DuPont were deemed too late to use as pollinizers; while Rosedale, Pink Beauty, and Strathmore were too early. Dolga was also too early for Red Delicious, but might be suitable for McIntosh. Three early-blooming varieties which are promising are Chestnut, Manchurian and Red Flesh. Four mid-season blooming varieties are Golden Hornet, Vietch, Pear Leaf and Snodrift; however, each has other characteristics which may limit their usefulness as pollinizers. Varieties which are being discarded because of susceptibility to virus diseases, fire blight and/or mildew are Donald Wyman, Profusion, Cranberry, Pioneer Scarlett, Sparkler, Red Jacket, Arrow, PK-14, David, Geneva, Radiant, Flame and Strathmore. Bees flew almost up to certain red, lavender or pink-flowered varieties and then shied away, usually continuing past to the next Red Delicious tree in the row. Ten of the 14 "off-color" varieties sampled had low nectar volume and 8 had weak ultraviolet reflectance. Bees exhibited the shying away habit with 13 of the 14.

VI. Topics Not Covered

Status of ARS Research Programs at Yakima

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Yakima, WA 98902

In February 1983 the Agricultural Research Service (ARS) announced new directions for its research with emphasis on critical national needs. An ARS Program Plan was subsequently developed on how to meet these needs most effectively and efficiently. Our resources are being redirected in line with Secretary of Agriculture Block's policy to focus research on national goals. Over the next 6 years the agency projects that $75 million will be redirected.

At Yakima there will be an increase in emphasis on development of treatments needed to permit export of commodities where quarantine barriers exist. This includes development of new and improved chemical, physical and biological treatments to reduce or eliminate pest populations in commodities for export.

There also will be a redirection of research to emphasize studies on ecology, biology and control of codling moth and pear psylla on fruit and green peach aphid and Colorado potato beetle on potatoes and other crops. Research on some other pests will gradually be phased out, while other areas will be continued at a reduced level. Emphasis will be on basic, long range, high-tech' research affecting national concerns.

BIOLOGICAL CONTROL OF THE WINTER MOTH - FILBERTS

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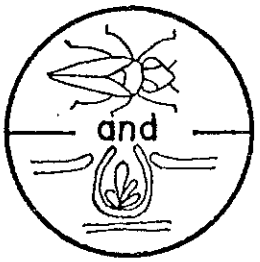
The parasitoid, Cyzenis albicans (Tachinidae), has been introduced into Oregon for control of the winter moth, Operophtera brumata. Seven sites were selected for determining success in establishment. Late instar larval collections in 1982 resulted in verification of establishment at one site. Trapping techniques in 1983 resulted in the recovery of C. albicans at three sites. Additional introductions of the parasitoid will be made in 1984 to augment the releases made at these sites. Phenology of winter moth larvae based on a degree-day model will be used to optimally time the introductions.

Western Orchard Pest

Chairman - Jack Eves
Chairman Elect - Ron Covey
Sec/Tres - Gary Fields



Disease Management Conference

MINUTES OF THE 58th ANNUAL MEETING
IMPERIAL HOTEL, PORTLAND, OREGON, JANUARY 11, 12, 13, 1984

The 58th Annual Meeting was called to order at 0902, 11 January 1984 by Chairman Jack Eves.

Introductions were made around the room with 89 members in attendance. Clancy Davis returned to the conference and introduced himself as "CITIZEN".

A moment of silence was held for the late George Tamaki, USDA who passed away during this past year.

The minutes were approved as mailed. Committee assignments were announced by Chairman Jack Eves. The special interests session was moved to Thursday at 3 PM due to a room conflict. There was no old business.

Under new business, discussion was held on setting a schedule for the order of papers to be given. The Sections will be rotated annually; section III first this year, section IV first next year and so on. The order will appear in the meeting notice.

The business meeting was adjourned at 0915 until Friday morning. It was re-convened at 0935, 13 January 1984. The Treasurer's report was read showing a begining balance at $163.99, this included $3.26 interest earned on the WOP&DMC savings account. Expenditures were $108.04 (postage and receipt books) giving an ending balance of $56.95. 1984 registration receipts were $103.00, bringing the new balance to $159.95. The checking account was dropped in 1983 due to bank charges of $3.00 per month. The Conference now operates on a savings account and a petty cash fund. The report was accepted without change.

The Nominations committee read the slate of officers for 1985 as follows:

Chairman - Ron Covey
Chairman Elect - Bill Barnett
Sec/Tres - Gary Fields

The slate of names received no additions and the nominees were elected.

Under new business discussion was held to clarify the rules on Industry partisipation. The 1978 decision was read from the minutes. It was noted that the 1979 meeting opened the business meeting to industry reps. Discussion continued with the following results:

(1) Industry as well as private consultant companies would be limited to one rep at the meetings.

(2) More than one industry or consultant rep is welcome if Geography, Major Field or R&D cover two or more persons from one company over the above areas.

(3) Any member, Research, Extension, Industry or Consultant will have full voting rights at the business meetings.

(4) Any preson attending is expected to present data whether or not an abstract was submitted.

Also discussed under new business was the time used to give papers. Agreement was reached not to limit discussion after a paper but to shorten presentation of data. Basic life histories, types of damage from common pests, long detailed explanations of minor details are to be excluded from presentations in the future. Any visual aid worth bringing to the meeting will be self-explan tory. We do not need a line-by-line explanation of 7 or 8 tables - a brief summary will su fice. Thirty minutes to present data is too long for the purpose of this conference. We may see a timer on the front table if presentation can not be limited to 10-12 minutes voluntarily.

The resolution committee chairman Don Davis (appointed by default of Carl Johansen and Art Retan) read the following resolutions:

Be it resolved that:

1. We express our sincere appreciation to the management and staff of the Imperial Hotel for the excellent accommodations and courteous service during the 58th Annual Meeting of the WOP&DMC.

2. We express our appreciation to Chairman Jack Eves, Sec/Tres Gary Fields, and all the section chairmen for their effective service in organizing and conducting this conference in a successful manner.

3. We extend our thanks to Jim Calkin and Glen Fisher for publication of the abstracts and providing and operati g the visual aids equipment which is so important to the success of the conference.

4. We ask the Sec/Tres to send a letter of condolence to Millie Tamaki expressing our heart-felt loss caused by the untimely passing of George Tamaki, a talented and faithful friend and participant at these conferences.

5. We instruct the section chairmen of future conferences to expedite the presentations of certain topics, thus allowing consideration of subsequent material more completely. We also discourage the use of poor visual aids materials such as overheads. If these points are not observed, we may suggest the reinstatement of the chicken (or turkey) award.

The resolutions were approved by those in attendance.

The meeting was turned over to Chairman Elect Ron Covey who announced the 1985 meeting dates as the 16, 17, & 18 of January (the 2nd full week of the month).

The meeting was adjourned at 0950, January 13, 1984.

Respectfully submitted,

Gary J. Fields
Secretary/Treasurer