Integrated Pest Management for Tehama County Prunes and Walnuts

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- Orchard Crop Production – R. Buchner
- Water Resources – A. Fulton
- Youth Development – J. George & T. Golonka
- Livestock/Natural Resources – M. Horney
- Dairy, Olives & Agronomic – Glenn County

Orchard Production is More Than Just Integrated Pest Management

COSTS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley 2002

CULTURAL COSTS

Cash and Labor Costs per acre:

	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
Pruning – Alternate Years (50% cost)	3.50	51	26	0	0	77
Pruning – Brush Disposal – Alternate Years	0.37	12	3	0	0	15
Irrigate	1.00	9	0	141	0	150
Fertilizer – Nitrogen 2X	0.00	0	0	58	0	58
Fertilizer – Leaf Analysis – N, K, Zn	0.04	0	0	0	1	1
Pest – PCA Service	0.00	0	0	0	22	22
Weed Control – In-season Strip Spray	0.25	4	2	3	0	9
Weed Control – Dormant Strip Spray	.25	1	2	10	0	16
Weed Control – Mow Middles 5X	1.25	18	10	0	0	28
Insect Control – Codling Moth 2X	0.50	7	5	39	0	51
Insect Control – Misc. Insects	0.25	4	3	30	0	36
Disease Control – Walnut Blight 3X	0.75	11	8	86	0	104
Vertebrate Control – Gophers	0.50	5	0	6	0	11
Growth Regulator (50% acres)	.13	2	1	14	0	17
ATV Use	2.85	41	4	0	0	45
Miscellaneous Labor	3.00	28	0	0	0	28
TOTAL CULTURAL COSTS	**14.63**	**195**	**64**	**386**	**23**	**668**

COSTS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley 2002

HARVEST COSTS

Cash and Labor Costs per acre:

	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
Shake, Pick, Hull	0.00	0	0	0	145	145
Rake Walnuts	1.50	14	0	0	0	14
Hull, Dry	0.00	0	0	0	324	324
CWC Assessment Fee	0.00	0	0	54	0	54
TOTAL HARVEST COSTS	**1.50**	**14**	**0**	**54**	**469**	**538**

COSTS PER ACRE TO PRODUCE WALNUTS

Sacramento Valley 2002

CASH OVERHEAD

Cash and Labor Costs per acre:

	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
Office						50
Liability Insurance						5
Sanitation Service						11
Fuel/Lube Pickup						17
Property Taxes						88
Property Insurance						29
Investment Repairs						51
Interest on operating capital @ 7.40%						25
TOTAL CASH OVERHEAD COSTS						**275**

OPERATING COSTS/ACRE

Cash and Labor Costs per acre:

	Operation Time (Hrs/A)	Labor Cost	Fuel, Lube & Repairs	Material Cost	Custom/ Rent	Total Cost
TOTAL CULTURAL COSTS		**195**	**64**	**386**	**23**	**668**
TOTAL HARVEST COSTS		**14**	**0**	**54**	**469**	**538**
TOTAL CASH OVERHEAD COSTS						**275**
TOTAL OPERATING COSTS/ACRE		**209**	**64**	**440**	**492**	**1,480**

IPM

Integrated pest management is an ecosystem-based strategy focusing on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties (Flint, 2001).

http://www.ipm.ucdavis.edu

Integrated Prune Farming Practices (IPFP)

aka

Environmentally Sound Prune Systems (ESPS)

The Team

- Bill Olson
- Rick Buchner
- Mark Freeman
- Brent Holtz
- Bill Krueger
- Themis Michailides
- Nick Mills
- Gary Obenauf
- Carolyn Pickel
- Wilbur Reil
- Ken Shackel
- Jed Walton
- Steve Sibbett
- Steve Southwick
- Fred Thomas

Problem

Without a dormant spray, aphids can be a problem

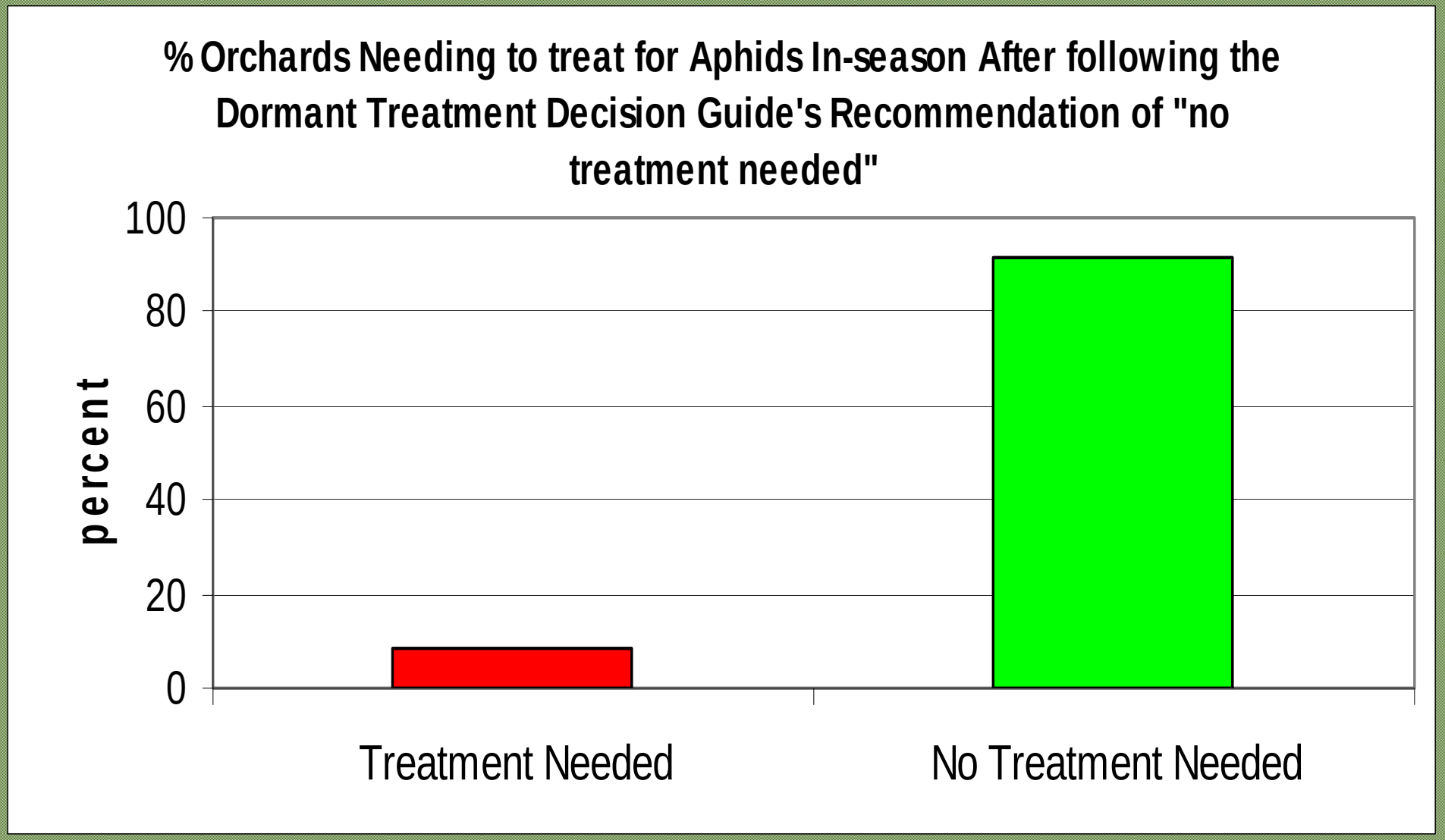
Dormant Treatment Guide For Orchards That Have been Receiving Dormant Insecticide Sprays in The Past

Aphids present using methods 1 or 2 (Y,N)	Scale above Threshold	Reduced Risk Treatment Reccomendation	Conventional Treatment Recommendation
N	N	Nothing	Nothing
N	Y	Dormant Oil	Dormant Insecticide + Oil
Y	N	Oil at Green Tip or Growing season Insecticide or Growing season Oil*	Dormant Insecticide + Oil
Y	Y		Dormant Insecticide + Oil

* Oil alone is not effective for Leaf Curl Plum Aphid once the leaves are curled.

1) Orchard history indicates at least one tree had aphids last season.

2) One or more aphid eggs are found in the dormant spur samples.


% Orchards Needing to treat for Aphids In-season After following the Dormant Treatment Decision Guide's Recommendation of "no treatment needed"
percent
100
80
60
40
20
0
Treatment Needed
No Treatment Needed


Buchnera


11 06 2001

Controlling Prune Aphids Using 20lbs of ZnSO4/100 Gallons of water in an air blast spray application applied 10-15-01 to Defoliate Trees				
Evaluated 5-7-02				
% of Trees With MPA		Low-Med-High**	% of Trees With LCPA	
Defoliated	25	21-0-3	Defoliated	7.3
Non-Defoliated	99	19-19-57	Non-Defoliated	12.5

**Total number of trees with MPA
Low = Less than 25% of the tree with aphids
Med = Less than 50 % of the tree with aphids
High = More than 50 % of the tree with aphids

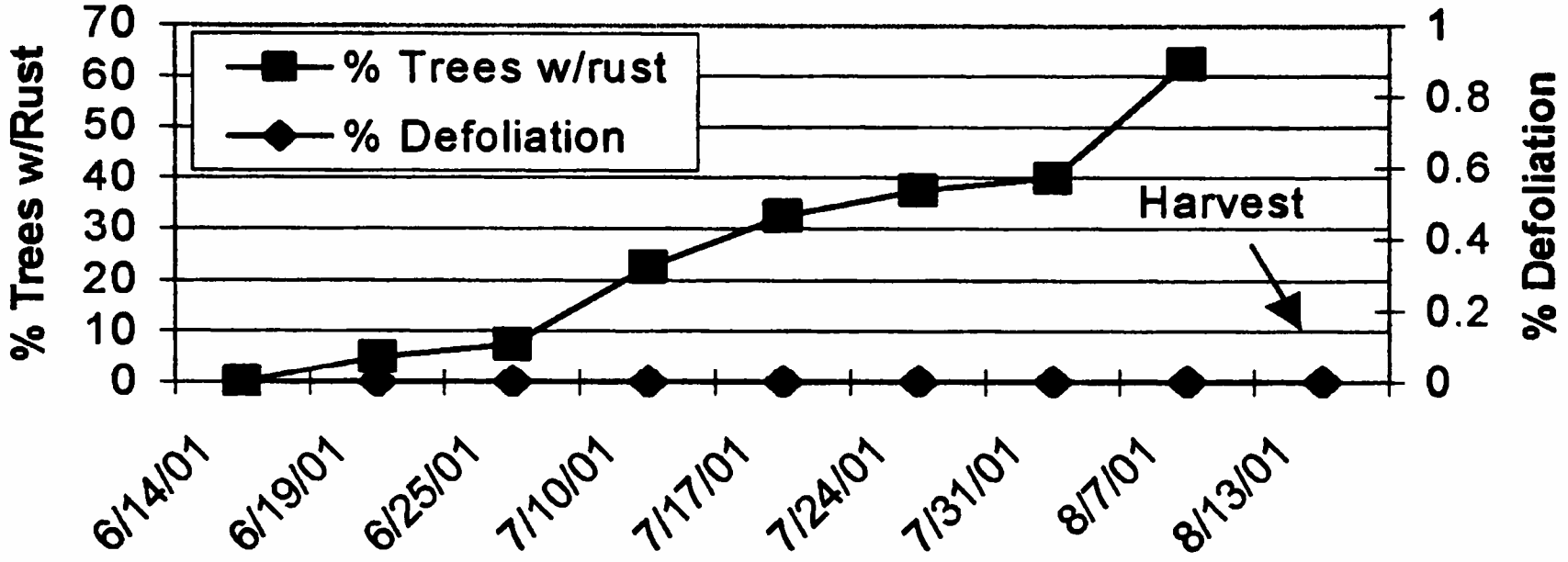
Problem:

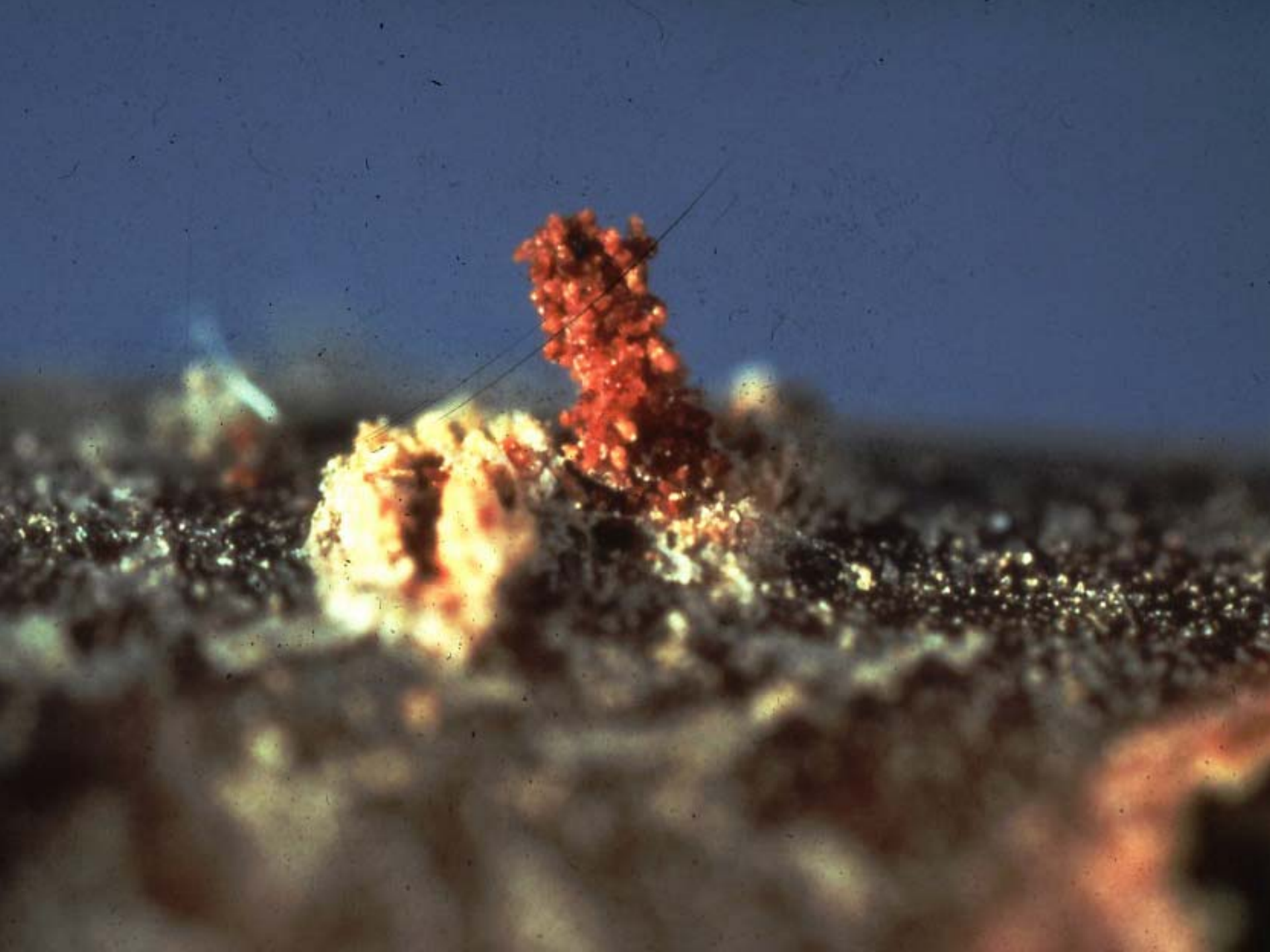
No way of knowing if Prune Rust will be a problem. Consequently, rust treatments are the most common growing season treatment

Solution:

Create a rust monitoring technique

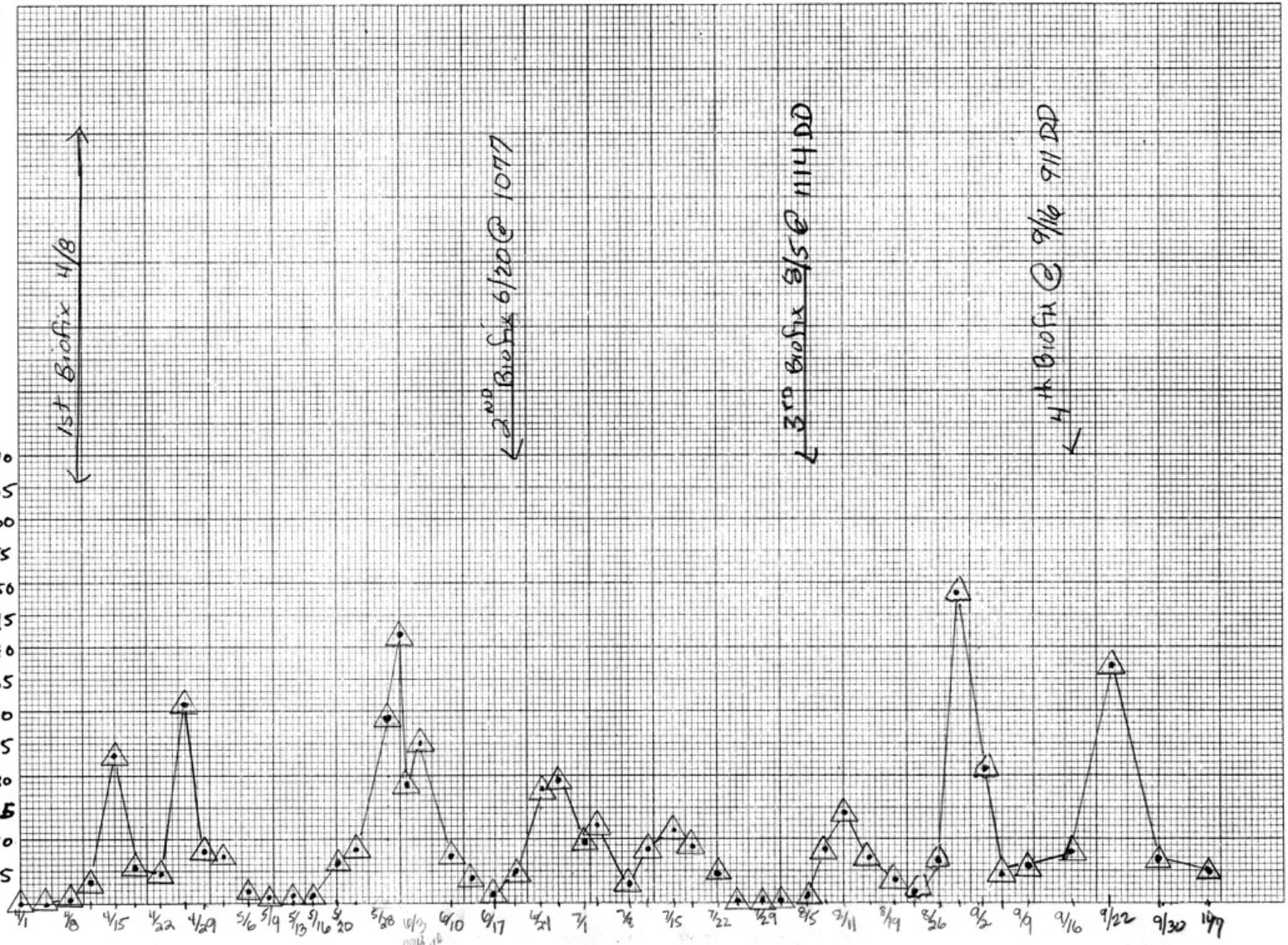
Development of Rust and Defoliation in an Orchard with the Longest Interval Between Onset and Harvest

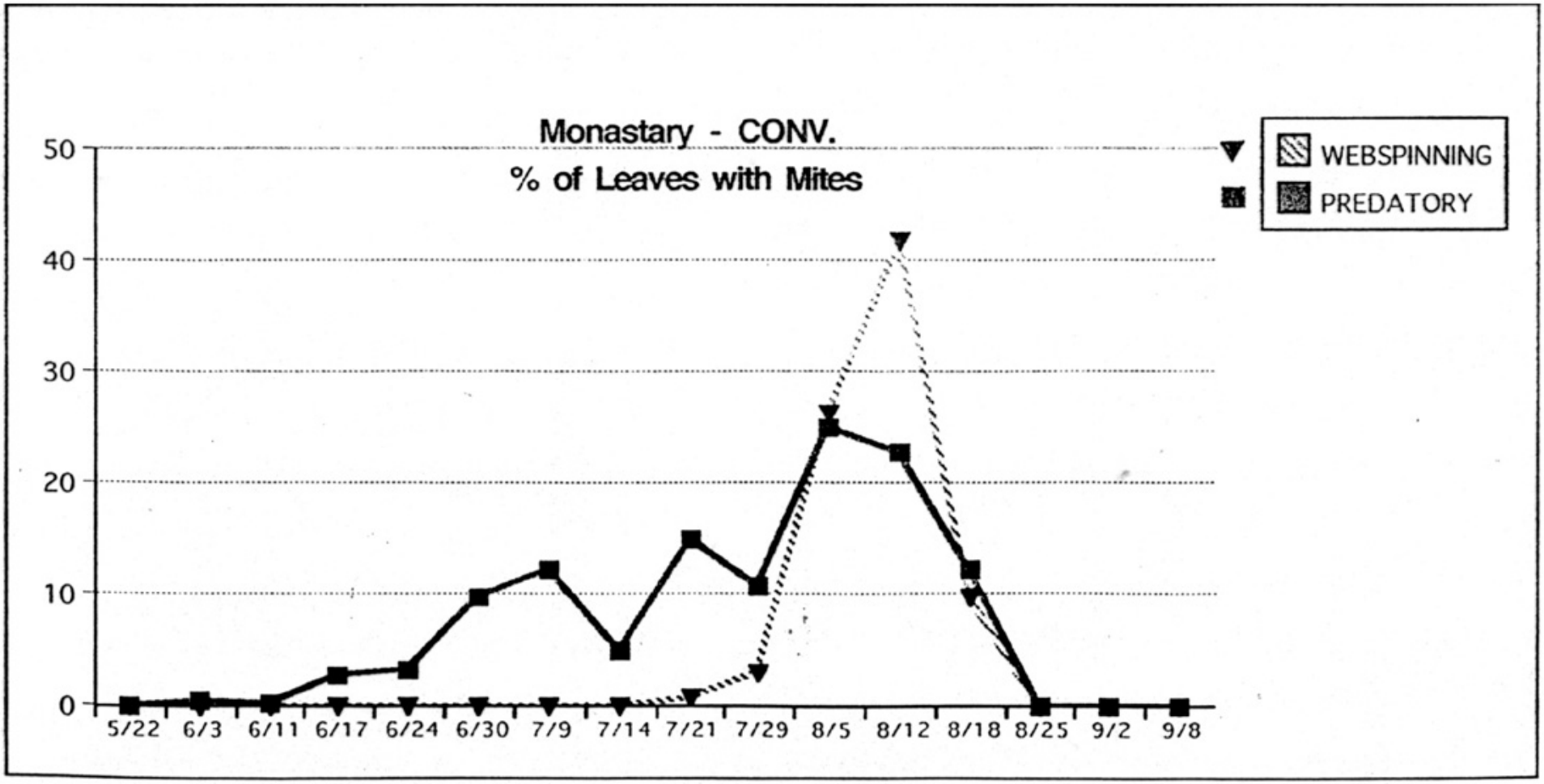





1C Trap

2002 - WRAY ALMONDS - PTB

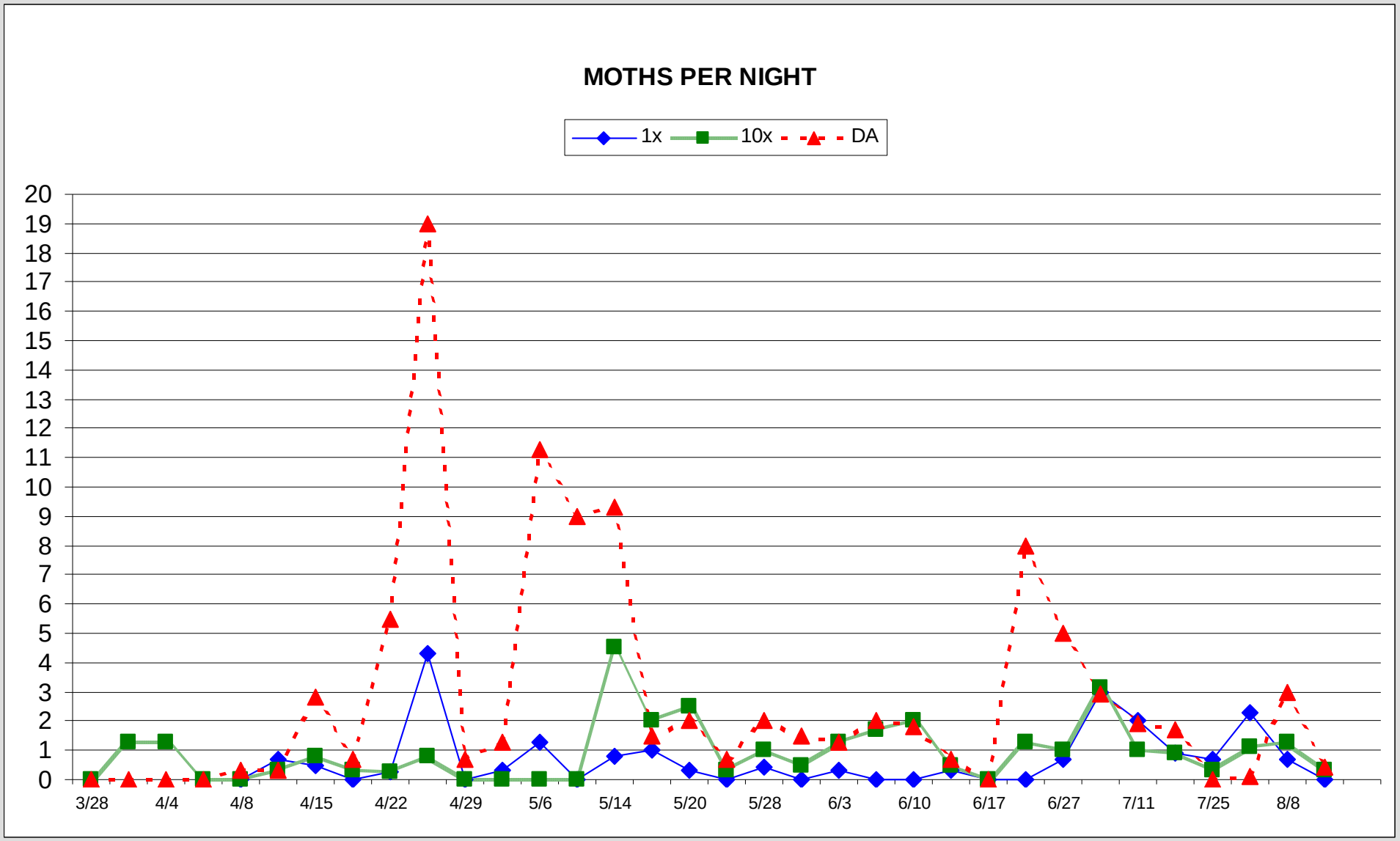



Monastary - CONV.
% of Leaves with Mites
WEBSPINNING
PREDATORY
50
40
30
20
10
0
5/22
6/3
6/11
6/17
6/24
6/30
7/9
7/14
7/21
7/29
8/5
8/12
8/18
8/25
9/2
9/8

IPM
Techniques for Walnuts

Codling moth *C. pomonella*

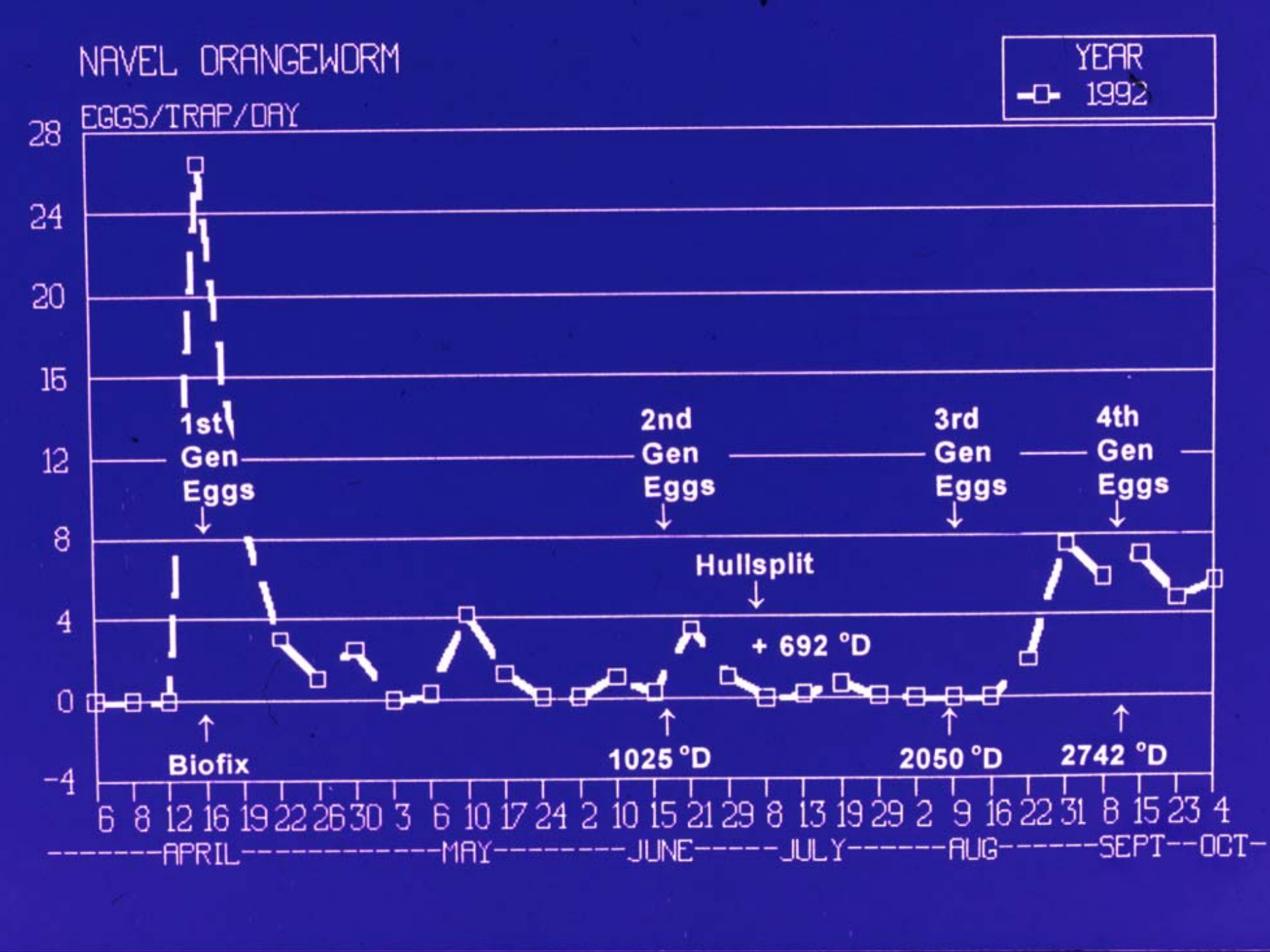
- **IPM – Pheromone traps / degree days**
- **Parasitism – *Trichogramma platneri***
- **Mating disruption / pheromone confusion**
- **Insect growth regulators**

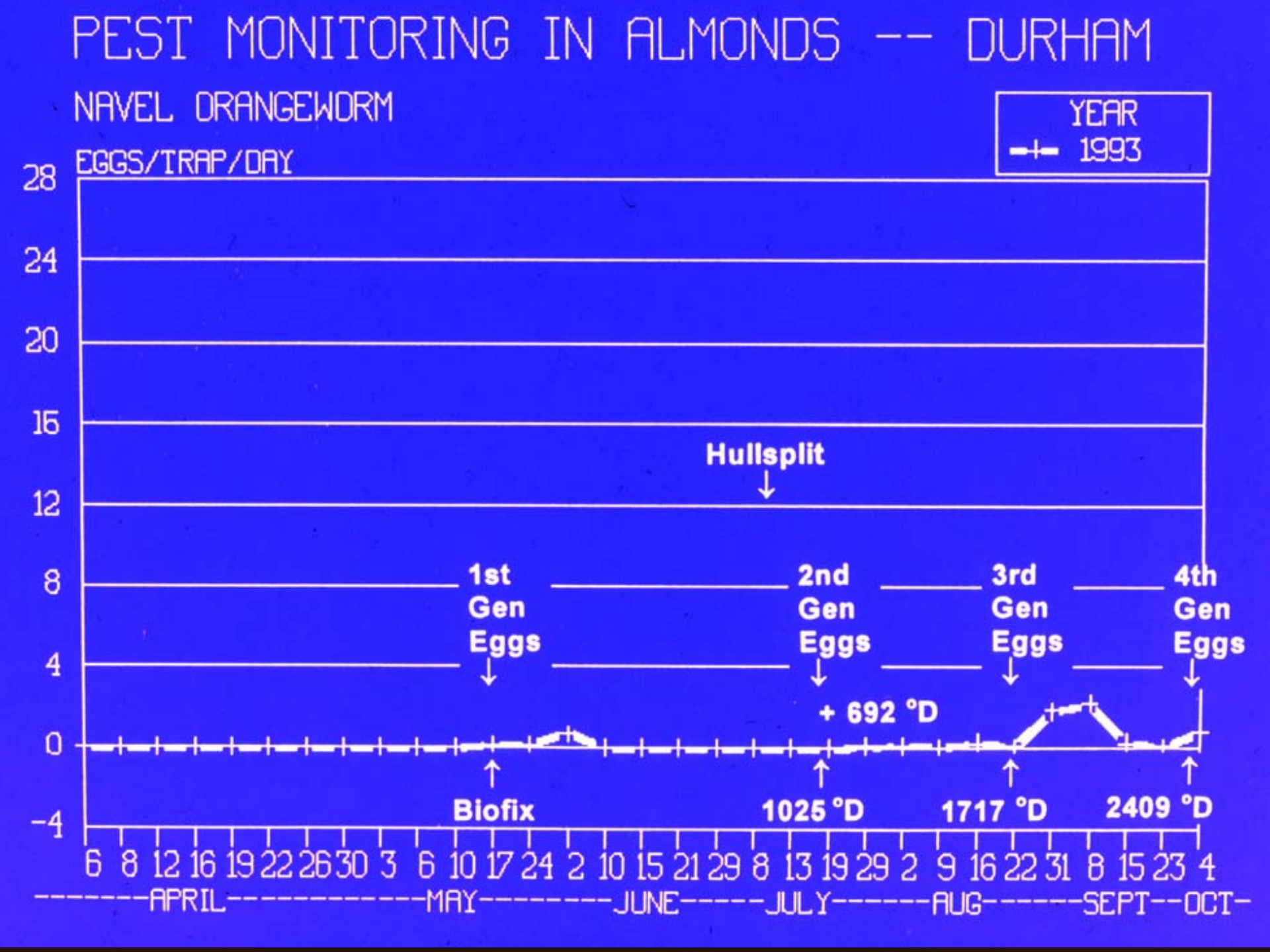

MOTHS PER NIGHT
1x
10x
DA
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
3/28
4/4
4/8
4/15
4/22
4/29
5/6
5/14
5/20
5/28
6/3
6/10
6/17
6/27
7/11
7/25
8/8

1997 HUSK FLY

Tehama Co. - Hartley

Date	Trap #1		Trap #2		Trap #3		Trap #4	
	Total	Fm/egg	Total	Fm/egg	Total	Fm/egg	Total	Fm/egg
6/28	4	1	36	19	48	20	41	25
6/29	S	S	S	S	S	S	S	S
6/30	3	1	25	13	63	26	54	23
7/01	0	0	0	0	1	0	0	0
7/07	2	0	11	0	4	0	4	0
7/10	0	0	13	0	9	0	7	0
7/22	0	0	0	0	1	0	1	0
7/28	0	0	3	0	1	1	0	0
7/31	0	0	2	0	4	0	1	0
8/04	0	0	0	0	0	0	2	0
8/11	0	0	0	0	0	0	0	0
8/14	0	0	1	1	0	0	1	0
8/17	S	S	S	S	S	S	S	S
8/18	0	0	0	0	0	0	0	0
8/21	0	0	0	0	2	0	0	0
8/25	0	0	3	0	1	0	1	0
8/29	0	0	0	0	2	1	8	2
9/01	0	0	3	1	7	1	3	2
9/02	S	S	S	S	S	S	S	S
9/04	0	0	0	0	1	1	0	0
9/08	0	0	1	0	4	0	5	1
9/11	0	0	1	0	0	0	4	3
9/15	0	0	0	0	0	0	3	2
9/18	0	0	0	0	0	0	2	1
9/29	0	0	0	0	0	0	11	3


NAVEL ORANGEWORM
EGGS/TRAP/DAY
YEAR
1992
28
24
20
16
12
8
4
0
-4
1st Gen Eggs
2nd Gen Eggs
3rd Gen Eggs
4th Gen Eggs
Hullsplit
+ 692 °D
Biofix
1025 °D
2050 °D
2742 °D
6 8 12 16 19 22 26 30 3 6 10 17 24 2 10 15 21 29 8 13 19 29 2 9 16 22 31 8 15 23 4
APRIL
MAY
JUNE
JULY
AUG
SEPT
OCT


PEST MONITORING IN ALMONDS -- DURHAM
NAVEL ORANGEWORM
EGGS/TRAP/DAY
YEAR
1993
28
24
20
16
12
8
4
0
-4
Hullsplit
1st Gen Eggs
2nd Gen Eggs
3rd Gen Eggs
4th Gen Eggs
+ 692 °D
Biofix
1025 °D
1717 °D
2409 °D
6 8 12 16 19 22 26 30 3 6 10 17 24 2 10 15 21 29 8 13 19 29 2 9 16 22 31 8 15 23 4
APRIL
MAY
JUNE
JULY
AUG
SEPT
OCT

University of California ESPS, IPM, and WPMA Pest Update
Tehama County 10/7/02

ESPS = Environmentally Sound Prune Systems
IPM = Integrated Pest Management
WPMA = Walnut Pest Management Alliance

INSECT	FIRST BIOFIX	SECOND BIOFIX	THIRD BIOFIX	FOURTH BIOFIX	ACTIVITY MOTHS/DAY	AVG. DEG. DAYS/DAY	DAY DEGREES FROM BIOFIX
CODLING MOTH	4/1	6/20	8/1		0	16.4	1369
ORIENTAL FRUIT MOTH	3/4	5/20	6/24	7/29	0	21.4	1811
PEACH TWIG BORROR	4/8	6/20	8/5	9/16	4.9	16.4	375
NAVEL ORANGE WORM	5/16 est	7/7 est	8/5		0 eggs	11.5	1167
SAN JOSE SCALE	4/2					15.4	3403

- Monitoring Insect Activity
- Temperate Phenology Models