

Project Report for the Oregon Clover Commission

Title: Assail Red Clover Trials – 2005

Objective:

- 1) To determine the efficacy of Assail for the control of clover aphid, *Nearctaphis bakeri*, and pea aphid, *Acyrtosipho pisum*, in red clover.
- 2) To determine the potential for bee aversion to Assail treatments.
- 3) To determine the effect on seed yield as a result of potential change in bee pollination activity.

Summary:

Although aphids were found in clover bloom from all treatments, results of this trial indicate that both incidence and severity of aphid infestation in red clover was less for all rates of Assail than they were in the Untreated Check. Results also indicate no aversion by honey bees to red clover treated with Assail 30G at rates from 1.5 to 4 oz/ac. This was determined by both sweep net counts and seed yield. Sweep net counts in Assail treated plots yielded as many or more honey bees as the Untreated Check. All mature blooms randomly selected from each Assail treatment (20/plot) contained seed. The total weight of seed collected from each Assail treatment was greater than the weight of seed collected from the Untreated Check. Bee counts and seed yield greater in the Assail treated plots than in the Untreated Check plots where bee activity is deemed necessary for complete pollination and maximum seed set, suggest essentially no bee aversion to Assail treated red clover.

Western Biochemical Consulting, Inc.

P.O. Box 344
Hubbard, OR 97032

Dave Anderson, Ph 503-982-2712, E-mail danderson@qwest.net, Fax 503-982-0092

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- 2) To determine the potential for bee aversion to Assail treatments.
- 3) To determine the effect on seed yield as a result of potential change in bee pollination activity.

Procedure:

A trial site was established in a commercial field of red clover near Gaston, OR. One half of the trial site was treated on 7/15/05, while clover was at approximately 10% bloom. The same set of treatments was applied on 7/20/05 to the other half of the trial site when clover was at approximately 45% bloom. Plot size was 13.5 ft by 42 ft. All treatments were replicated four times. All treatments were applied using a CO₂ pressurized plot sprayer with a 5 ft boom in a total of 20 gallons of spray mix per acre. On 8/4, when red clover was in full bloom, both early and late applications were evaluated for bee aversion by making ten, 180 degree sweeps with an insect net in each plot and recording the total number of honey bees and bumble bees. The number of ladybird beetles was recorded per plot also. Ladybird beetles are a significant insect predator of aphids and served as indicator of the presence or absence of aphids in clover bloom. Ten blooms were randomly collected from each plot on 8/4, taken to Western Biochemical's laboratory facility and examined for both incidence and severity of aphid infestation. On 9/12, twenty mature blooms were randomly harvested from each plot for seed. These mature blooms were hand threshed to obtain seed yield which serve as another indicator of bee activity. As bees are necessary for pollination, lower yield would suggest less pollination and bee activity. The treatments were as follows;

- Table 1. Treatments

- 1) Untreated Check
 - 2) Assail 30 SG @ 1.5 oz/ac
 - 3) Assail 30 SG @ 2.5 oz/ac
 - 4) Assail 30 SG @ 4.0 oz/ac
 - 5) Standard (Lorsban @ 2 pts/ac)
- * All treatments included the non-ionic surfactant R-11 @ 0.25% v/v.

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Results: Aphid counts on 8/4/05 @ 20 days after treatment (DAT) from the early treated site.

- Table 2. Incidence of aphids. Ten blooms per plot examined.

Treatment	Blooms with one or more aphids					Ave. /plot
	R1	R2	R3	R4	Total	
1) Untreated Check	8	8	7	8	31	7.8
2) Assail 30 SG @ 1.5 oz/ac	7	9	8	5	29	7.3
3) Assail 30 SG @ 2.5 oz/ac	8	7	6	0	21	5.3
4) Assail 30 SG @ 4.0 oz/ac	4	7	5	6	22	5.5
5) Standard (Lorsban @ 2 pts/ac)	4	0	3	1	8	2

Results: Aphid counts on 8/4/05 @ 20 DAT from the early treated site.

- Table 3. Severity of aphids. Ten blooms per plot examined.

Treatment	Average number of aphids/bloom/plot					Ave. aphids/bloom
	R1	R2	R3	R4	Total	
1) Untreated Check	8	11	11	10	40	10
2) Assail 30 SG @ 1.5 oz/ac	4	9	10	7	30	7.5
3) Assail 30 SG @ 2.5 oz/ac	6	7	7	0	20	5
4) Assail 30 SG @ 4.0 oz/ac	3	5	6	9	23	5.7
5) Standard (Lorsban @ 2 pts/ac)	6	0	3	4	13	3.3

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Results: Aphid counts on 8/4/05 @ 15 DAT from the late treated site.

- Table 4. Incidence of aphids. Ten blooms per plot examined.

Treatment	Blooms with one or more aphids					Ave. /plot
	R1	R2	R3	R4	Total	
1) Untreated Check	x	9	10	8	27	9
2) Assail 30 SG @ 1.5 oz/ac	4	6	6	6	22	5.5
3) Assail 30 SG @ 2.5 oz/ac	8	8	7	5	28	7
4) Assail 30 SG @ 4.0 oz/ac	7	3	6	5	21	5.3
5) Standard (Lorsban @ 2 pts/ac)	6	1	0	0	7	1.8

Results: Aphid counts on 8/4/05 @ 15 DAT from the late treated site.

- Table 5. Severity of aphids. Ten blooms per plot examined.

Treatment	Average number of aphids/bloom/plot					Ave. aphids/bloom
	R1	R2	R3	R4	Total	
1) Untreated Check	x	12	10	12	34	11.4
2) Assail 30 SG @ 1.5 oz/ac	7	5	5	6	23	5.7
3) Assail 30 SG @ 2.5 oz/ac	3	8	6	4	21	5.3
4) Assail 30 SG @ 4.0 oz/ac	3	6	4	5	18	4.5
5) Standard (Lorsban @ 2 pts/ac)	2	5	0	0	7	1.8

X = Part of one of the replicates of the Untreated Check was subjected to drift from commercial Lorsban application.

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Results: Bee and ladybird beetle counts on 8/4/05 from early treated site @ 20 (DAT) where HB honey bee, BB = bumble bee, and LB = ladybird beetle.

- Table 6. Bee Counts

Treatment	Bees/ladybird beetles per 10 X 180 degree sweeps per replicate (plot).					
	R1	R2	R3	R4	Total	Average/plot
1) Untreated Check						
HB	2	4	3	2	11	2.8
BB	-	1	-	-	1	0.3
LB	10	16	22	22	70	17.5
2) Assail 30 SG @ 1.5 oz/ac						
HB	-	2	5	4	11	2.8
BB	-	-	-	1	1	0.3
LB	4	6	17	12	39	9.8
3) Assail 30 SG @ 2.5 oz/ac						
HB	-	3	3	3	9	2.3
BB	-	-	-	-	0	0
LB	6	2	2	1	11	2.8
4) Assail 30 SG @ 4.0 oz/ac						
HB	-	1	4	2	7	1.8
BB	-	-	-	-	0	0
LB	4	3	12	8	27	6.8
5) Standard (Lorsban @ 2 pts/ac)						
HB	2	2	3	3	10	2.5
BB	-	-	-	-	0	0
LB	0	0	1	0	1	0.3

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Results: Bee and ladybird beetle counts on 8/4/05 from late treated site @ 15 (DAT) where HB honey bee, BB = bumble bee, and LB = ladybird beetle.

- Table 7. Bee Counts

Treatment	Bees/ladybird beetles per 10 X 180 degree sweeps per replicate (plot).					
	R1	R2	R3	R4	Total	Average/plot
1) Untreated Check						
HB	x	1	6	5	12	4
BB	x	0	0	0	0	0
LB	x	7	16	9	32	10.7
2) Assail 30 SG @ 1.5 oz/ac						
HB	5	3	4	7	19	4.8
BB	-	-	1	0	1	0.3
LB	13	4	7	8	32	10.7
3) Assail 30 SG @ 2.5 oz/ac						
HB	3	7	5	3	18	4.5
BB	-	-	-	-	0	0
LB	2	10	5	6	23	5.8
4) Assail 30 SG @ 4.0 oz/ac						
HB	7	4	4	0	15	3.8
BB	-	-	-	-	0	0
LB	1	2	8	1	12	3
5) Standard (Lorsban @ 2 pts/ac)						
HB	2	5	2	5	14	3.5
BB	1	-	-	1	2	0.5
LB	0	0	1	2	3	0.8

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Results: Weight of seed (in grams) per 20 heads per plot from early treated site. All seed heads contained seed.

- Table 8. Seed Weight

Treatment	Grams of seed per 20 heads per plot					Ave. /plot
	R1	R2	R3	R4	Total	
1) Untreated Check	2.7	2.6	3.7	3.6	12.6	3.2
2) Assail 30 SG @ 1.5 oz/ac	3.4	3.1	3.8	3.4	13.7	3.4
3) Assail 30 SG @ 2.5 oz/ac	3.6	3.9	3.5	3.5	14.5	3.6
4) Assail 30 SG @ 4.0 oz/ac	3.5	3.6	3.6	4.0	14.6	3.7
5) Standard (Lorsban @ 2 pts/ac)	3.5	3.5	3.8	3.3	14.1	3.5

Results: Weight of seed (in grams) per 20 heads per plot from late treated site. All seed heads contained seed.

- Table 9. Seed Weight

Treatment	Grams of seed per 20 heads per plot					Ave. /plot
	R1	R2	R3	R4	Total	
1) Untreated Check	3.6	3.1	3.6	3.1	12.6	3.2
2) Assail 30 SG @ 1.5 oz/ac	4.0	4.0	3.6	4.0	15.1	3.8
3) Assail 30 SG @ 2.5 oz/ac	3.6	3.4	4.0	3.6	14.1	3.5
4) Assail 30 SG @ 4.0 oz/ac	3.7	3.9	3.4	3.8	14.8	3.7
5) Standard (Lorsban @ 2 pts/ac)	3.1	3.1	3.6	3.6	13.7	3.4

Discussion:

It is difficult to explain the presence of aphids on 8/4, in clover bloom in all treatments from both the early and late application sites. Possibly aphids were already in early developing blooms at the time of application. It would be interesting to evaluate Assail treatments applied a week to 10 days before any bloom was visible. Ladybird beetles were fewer in number in the Lorsban treated plots than in the Untreated Check and all of the Assail treated plots. It is unclear whether this was due to lack of food supply (ladybird beetles are predators of aphids), i.e. fewer aphids in the Lorsban plots or actual control of ladybird beetle by the Lorsban.

Essentially no bumble bees were in the treatment area. Honey bees however, were found on 8/4, in all early and late treated plots. On 9/12, all mature seed heads contained seed. The average seed yield of each Assail treatment was greater than the Untreated Check and except for Treatment # 2, Table 8, yield from the Assail treatments were slightly greater than the average yield for the Lorsban treatments. However, the statistical significance of these differences has not been determined.

Dave Anderson, Ph 503-982-2712, E-mail danderson@qwest.net, Fax 503-982-0092

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Conclusion:

Results of this trial indicate that both incidence and severity of aphid infestation in red clover was less for all rates of Assail than the Untreated Check. Results also indicate no aversion by honey bees to red clover treated with Assail 30G at rates from 1.5 to 4 oz/ac, as determined by both sweep net counts and seed yield where bee activity is deemed necessary for complete pollination and maximum seed set.