Section VI
Pests of Turf and Ornamentals

CLOVER AND WINTER GRAIN MITES IN ORCHARDGRASS

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Clover mite (CLM; *Bryobia praetiosa* Koch), and **winter grain mite** (WGM; *Penthaleus major* Duges) continue to be pests of pastures in Deschutes, Jefferson and Crook counties in central OR. Populations of CLM can occur in combination with WGM and are most active during cooler periods of the year (mid-fall to late spring) with peak populations and corresponding damage occurring in late winter and early spring months. Mite injury during spring re-growth results in stunted and chlorotic leaves. Portions of and occasionally entire orchardgrass crowns are killed. The objective of this trial was to evaluate potential products for the control of these two mites.

Materials and Methods

Three products were evaluated for control of CLM infesting a 4 year old orchardgrass (*Dactylis glomerata* L.) pasture near the Lower Bridge area, Deschutes County, Oregon. The field trial was designed as a randomized complete block with plots measuring 20 × 20 ft and replicated 4 times. At the time treatments were applied on April 4, 2009, the orchardgrass was breaking dormancy and new leaves were 1 to 3 inches long. Insecticides were delivered with a CO^2 powered backpack sprayer using a 6 nozzle (AM 11002 flat fan) hand held boom that covered a 10 ft swath. Spray pressure was set at 40 psi, and delivered an equivalent of 20 GPA.

Pre- and post-treatment evaluation of plots consisted of extracting three, 2.5 inch diameter grass cores to a depth of 2 inches from randomly selected orchardgrass crowns. Samples were placed in Berlese funnels equipped with 25W bulbs extracted mites and other arthropods from the

treated crowns into 70% EOH. All stages of CLM and WGM were counted and recorded for all plots on 9 sampling dates: April 2 (pre-), April 10 (6 DAT), April 13 (13 DAT), April 20 (20 DAT), May 1 (27 DAT), May 8 (34 DAT), May 15 (41 DAT), May 29 (55 DAT), and June 5 (62 DAT). In addition, a visual assessment of mite damage in all plots was made on four sample dates on May 1, 8, 15, and 29. The assessment was based on relative grass height, color, vigor, affected plants, and employed a scale of 1 to 5 (1 representing least regrowth and serious chlorosis; 5 representing greatest regrowth and least chlorosis). Data were subjected to analysis of variance (ANOVA) and means were separated using Fishers LS Means (LSD) test at p-value =.05. All values were transformed using square root transformation to equalize variance. Each plot was harvested on June 23, 2009. A 34-inch swath was cut from the interior of each plot from east to west borders. Excessive growth resulting from horse urine and manure were avoided. Samples were oven dried at 120°F until there were no changes in weights. Dry weights were converted to per acre yields, plot means are presented below.

Results and Discussion

Cobalt® at 26 ounces per acre of product gave excellent control of both CLM and WGM through the duration of the trial, resulted in the least amount of visual damage from these mites, and produced the second greatest yield of dry matter weight (Table 1, 2, 3). None of the other treatments resulted in reduction of CLM significantly different from the untreated control. Populations of WGM collapsed on May 1 (27 DAT). Brigade and Brigade plus Exponent® reduced WGM populations below those of the untreated control at 6, 13 and 20 DAT, with reductions in numbers being statistically significant only at 20 DAT. The addition of Exponent® to Brigade did not improve control over Brigade alone. Oberon did not control either mite at the rates evaluated in this trial. Numbers of mites remained statistically similar to those in the untreated control for the duration of the trial. Paradoxically, Brigade-treated plots produced the greatest dry matter forage weight of all plots (statistically similar to Cobalt) and along with plots treated with Cobalt produced the best visual rating scores for least amount of visible damage; although mite control was substantially and significantly less than that produced by Cobalt for most sampling dates. The addition of Exponent® to Brigade reduced CLM control, increased damage symptoms and reduced dry matter forage weight over brigade alone.

Table 1. Mean number of clover mites per 2.5 inch diameter core through orchardgrass crowns to a depth of 2 inches by treatment & date.

		Mean. no. of **clover mites** per 2.5-inch grass core[3,4]								
	Rate	4/2/09	4/10/09	4/13/09	4/20/09	5/01/09	5/8/09	5/15/09	5/29/09	6/5/09
Treatment[1,2]	**fl oz/a**	Pre-	6 DAT	13 DAT	20 DAT	27 DAT	34 DAT	41 DAT	55 DAT	62 DAT
Untreated Check	-	247.3 ±59.5	118.1 a ±28.9	84.4 a ±22.9	174.6 a ±67.3	99.2 a ±20.1	46.8 a ±4.8	80.8 a ±24.1	20.8 b ±4.9	0 b
Oberon 2SC Low	8	321.0 ±57.6	173.4 a ±39.0	94.7 a ±23.9	126.8 a ±38.8	64.1 a ±12.6	36.1 a ±19.1	67.4 a ±23.1	0 c	0 b
Oberon 2SC High	12	337.8 ±23.2	112.2 a ±26.5	61.9 a ±18.9	58.8 a ±13.9	35.0 a ±8.3	20.6 a ±3.9	20.9 a ±5.5	0 c	0 b
Brigade 2EC	6.4	298.0 ±97.3	127.5 a ±24.2	95.6 a ±24.7	92.8 a ±19.4	60.3 a ±33.5	34.5 a ±4.2	32.8 a ±14.5	0 c	0 b
Brigade 2EC + Exponent 8L	6.4	292.3 ±81.0	145.0 a ±33.6	185.9 a ±23.7	145.0 a ±11.9	52.1 a ±12.6	37.6 a ±11.6	66.3 a ±20.0	62.5 a ±18.5	2.0 a ± 0
Cobalt	26	250.0 ±54.6	13.8 b ±3.3	5.3 b ±1.9	2.8 b ±0.60	1.5 b ±0.3	0.5 b ±0.1	1.5 b ±1.2	0 c	0 b
F		0.33	15.98	17.94	39.04	23.21	36.78	1.48	19.48	Infty
P-Value		NS	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

[1] Treatments were applied on April 4, 2009.
[2] SuperSpread 7000L was added to all product tank mixes at an equivalent rate of 2 pt /100gal.
[3] Means followed by the same letter are not significantly different ($P = 0.05$; Fishers LS Means Test).
[4] Data were transformed using (Log (x + 0.01)) to reduce variation. Original means are presented in table.

Table 2. Equivalent per acre dry matter yield of orchardgrass hay and visual ratings of clover mite damage by treatment and date, Deschutes Co., OR 2009.

	Harvest Yield[1,2,3] lb/A	Clover mite damage rating [1,2,3] (0 – 5; 1 = damage, 5 = no damage)			
Treatment	6/23/09	5/1/09	5/8/09	5/15/09	5/29/09
Untreated Check	893.1 b ±94.4	1.60 c ±0.20	1.88 c ±0.18	1.95 b ±0.18	1.95 b ±0.19
Oberon 2SC Low	1066.3 ab ±39.1	1.53 c ±0.31	1.78 c ±0.21	2.03 b ±0.20	2.03 b ±0.18
Oberon 2SC High	1030.2 ab ±68.1	1.48 c ±0.19	1.90 c ±0.24	1.70 b ±0.18	1.88 b ±0.18
Brigade 2EC	1183.8 a ±82.9	2.83 a ±0.18	3.10 a ±0.17	3.35 a ±0.37	3.28 a ±0.34
Brigade 2EC + Exponent 8L	1049.9 ab ±81.6	1.75 bc ±0.32	1.93 bc ±0.29	2.23 b ±0.34	1.95 b ±0.26
Cobalt	1139.9 a ±57.3	2.43 ab ±0.35	2.63 ab ±0.31	3.33 a ±0.47	3.18 a ±0.46
P-Value	NS	< 0.0087	< 0.0066	< 0.0034	< 0.0037

[1]Means followed by the same letter are not significantly different ($P = 0.05$; Fisher's LSD Mean).
[2]Data were transformed using (Log (x + 0.01)). Original means are presented in table.
[3] A rating of 1(least regrowth, serious chlorosis) to 5 (most regrowth least chlorosis) scale was used to quantify orchardgrass damage.

Table 3. Mean number of live winter grain mites per 2.5 inch diameter core through orchardgrass crowns to a depth of 2 inches by treatment and date, Deschutes Co., OR 2009.

		Mean no. of **winter grain mites** per 2.5-inch grass core[1,2]						
	Rate	4/2/09	4/10/09	4/13/09	4/20/09	5/01/09	5/8/09	5/15/09
Treatment	fl oz/a	Pre-	6 DAT	13 DAT	20 DAT	27 DAT	34 DAT	41 DAT
Untreated Check	-	11.3 ±3.0	11.6 a ±3.1	8.8 ab ±3.1	10.6 a ±2.8	0.3 a ±0.3	0.1 ±0.1	0.6 ±0.4
Oberon 2SC Low	8	22.0 ±3.8	12.2 a ±2.8	13.8 a ±2.4	9.1 a ±1.6	1.3 a ±0.9	0.9 ±0.3	0.1 ±0.1
Oberon 2SC High	12	19.5 ±6.2	6.5 a ±2.5	7.5 abc ±3.7	7.2 a ±2.6	0.8 a ±0.1	0.5 ±0.4	0.3 ±0.3
Brigade 2EC	6.4	9.5 ±2.2	2.2 ab ±1.4	1.3 bc ±1.3	0 b	0 b	0.1 ±0.1	0
Brigade 2EC + Exponent 8L	6.4	10.8 ±3.3	0.94 ab ±0.31	1.3 bc ±0.9	0 b	0 b	0	0
Cobalt	26	13.8 ±4.6	0.31 b ±0.31	0 c	0 b	0 b	0	0
P-Value		NS	<0.0033	0.0021	0.0059	0.0059	NS	NS

[1] Means followed by the same letter are not significantly different ($P = 0.05$; Fishers LS Means).
[2] Data were transformed using (Log (x + 0.01)). Original means are presented in table.