Notes on and Control of the Clover Mite, *Bryobia praetiosa* Koch, Infesting Orchardgrass in Central Oregon

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Introduction

Localized infestations of clover mite (CLM) (*Bryobia praetiosa* Koch), typically a concern as a transient pest of dwellings, have injured orchardgrass pastures in Deschutes, Jefferson, and Crook counties since the late 2000. These mites are brownish and only about half the size of the winter grain mite (WGM) (*Penthaleus major,* Duges), which is an established pest of cool-season grass pasture and seed crops throughout the Pacific Northwest. A key diagnostic feature of the CLM is the front pair of legs. They are two to three times the length of the second, third, and fourth pairs of legs, which are all short and similar in length.

The CLM is similar to the WGM in seasonality, behavior, and damage they cause to grass. Populations of CLM increase on grass pasture during late winter and spring, and cause stunting and yellowing of spring regrowth. Occasionally entire crowns die out. Populations of CLM usually persist through May before declining naturally. Those of WGM usually decline sometime in April.

Like WGM, CLM hides in cracks and crevices of the soil during days of bright sunshine and/or high temperatures and windy conditions. This makes detection of mites and symptom diagnosis difficult. Cool, calm days and low light conditions bring the mites up to the foliage where they feed with piercing mouthparts, disrupting epidermal cells and drying leaves. Grasses suspected of CLM infestations should be sampled beginning in March. (Contrast this with WGM when populations are monitored beginning in October). If symptoms are seen but the mites are not, dig some crowns and shake them briskly over a white enamel pan or paper. Use a 10-power hand lens to confirm that the moving specks you see are CLM.

It is important to re-emphasize that this damage is nearly synchronous with and resembles that of WGM. The beginning of a severe CLM infestion can look like a fertilizer burn in the field. Populations of CLM seem to appear slightly later in the winter than those of WGM, and persist slightly longer into the spring than those of WGM.

Unfortunately, our knowledge and understanding of the biology of CLM in central Oregon is incomplete at best. In other areas of the United States, CLM is thought to over-winter as eggs in grass or as mites on trees or shrubs adjacent the pastures. These over-wintering mites move into grasses throughout the winter and early spring. Although the CLM is not yet reported in grass seed crops in central Oregon, its damage potential and proximity to bluegrasses is cause for concern.

Methods

In the interest of identifying effective products for CLM control with a likelihood of being labeled or registered for use on grasses, including both seed and hay crops, we evaluated different products in the spring of 2006. Eight products were evaluated for control of CLM infesting a 4-year-old orchardgrass (*Dactylis glomerata*) pasture near Tumalo, Deschutes County, Oregon. The field trial was designed as a randomized complete block with plots measuring 21 by 21 ft and replicated 4 times. Grass was breaking dormancy, and regrowth on crowns from the previous fall was from 2 to 4 inches at the time treatments were applied on 27 April. Insecticides were delivered with a CO_2-powered backpack sprayer using a 5-nozzle (8002 flat fan) hand-held boom that covered a 6.5-ft swath. Spray pressure was set at 30 psi, and delivered an equivalent of 30 gal/acre.

Post-treatment evaluation of plots consisted of extracting 3, 2.5-inch-diameter plugs to a depth of 1 inch from randomly selected orchardgrass crowns. Samples were placed in paper bags for transport to our laboratory in Corvallis where Berlese funnels equipped with 25W bulbs extracted all arthropods from the plugs into 70 percent ethanol by treatment. All stages of CLM were counted and recorded for all plots on 2 May (5 days after treatment [DAT]), 8 May (11 DAT), 16 May (19 DAT), and 22 May (25 DAT). In addition, numerically defined visual assessments of CLM damage in all plots were made on the last three sample dates. These were averaged to provide a subjective evaluation of treatment effectiveness based on grass "vigor". The assessment was based on relative grass height and color and employed a scale of 1 to 4 (1 representing least regrowth and most chlorosis; 4 representing greatest regrowth and least chlorosis).

Data collected were subjected to analysis of variance (ANOVA) and means were separated using the Tukey's Studentized Multiple Range (HSD) Test at $P = 0.05$. All values were transformed using square root transformation to equalize variance. Original means are presented in Tables 1 and 2.

Results

The Dimethoate treatment had significantly fewer mites than the untreated control (UTC) at all four sampling dates post-treatment (Table 1). Acramite® had significantly fewer mites than the other treatments at 5 and 11 DAT. Populations of CLM declined dramatically in all plots beginning 19 DAT. Only one treatment, dimethoate, had a mean visual damage assessment score significantly greater than the UTC (Table 2).

Dimethoate is currently registered for use *only* on grass seed crops and with "no feeding of any part of the crop to livestock" restrictions. Acramite and bifenthrin (Discipline®, Capture®) are being processed through the federal IR-4 program for product registration on grass pasture and seed crops with provisions for feeding treated grass to livestock. Mustang MAX™ and Warrior® are anticipated to have Federal labels for grass pastures and seed crops in 2007 or 2008. Baythroid® is currently labeled for use on grasses. Methyl parathion is labeled for use on grass pastures, but its toxicity to mammals has generally precluded its use in Oregon. Oberon 2 SC® does not carry a label for use on grasses.

Table 1. Number of clover mites per 2.5-inch core taken through orchardgrass crowns at several days after treatment (DAT).

Treatment	Product rate	No. of clover mites per 3, 2-inch grass crown cores: May 2 5 DAT	May 8 11 DAT	May 16 19 DAT	May 22 25 DAT
	(oz/A)	(no. per 2.5-inch core)			
Untreated	--	447.0 abc[1]	412.0 a	151.5 ab	89.1 ab
Mustang MAX	4	607.5 ab	430.5 a	261.5 a	114.7 a
Warrior W/Z	3.84	648.0 ab	598.8 a	211.0 ab	52.0 ab
Baythroid 2	1.9	589.3 ab	327.5 ab	318.8 a	118.0 a
Discipline 2	6.4	801.0 a	272.3 abc	126.3 ab	8.3 b
Methyl Parathion 4	8	724.5 a	68.5 d	93.3 ab	33.8 ab
Oberon 2 SC	16	334.0 abc	433.8 a	132.0 ab	53.6 ab
Acramite 4F	16	220.0 bc	109.0 bcd	150.0 ab	48.7 ab
Dimethoate 4E	10.6	160.5 c	68.5 cd	20.8 b	5.0 b

[1]Means followed by the same letter within a column do not differ significantly at $P \leq 0.05$ (Tukey's HSD multiple comparisons). Mean values were square-root transformed to equalize variance.

Table 2. A damage value was assessed by visually rating treated plots for mite damage on a scale of 1 (most damage) to 4 (least damage) and averaged over three different evaluations.

Product	Product	Visual assessment of clover mite damage
	(oz/acre)	(1 to 4)
UTC	--	2.00 b[1]
Mustang MAX	4	2.25 b
Warrior W/Z	3.84	2.36 a
Baythroid 2	1.9	2.42 ab
Discipline 2	6.4	3.38 ab
Methyl Parathion 4	8	2.17 b
Oberon 2SC	16	2.08 b
Acramite 4F	16	2.75 ab
Dimethoate 4E	10.6	3.83 a

[1]Means followed by the same letter within a column do not differ significantly at $P \leq 0.05$ (Tukey's HSD multiple comparisons). Mean values were square-root transformed to equalize variance.