Control of Winter Grain Mite Infesting Timothy

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Introduction

The winter grain mite (WGM) (*Penthaleus major,* Duges) is a pest of cool-season grass pasture and seed crops throughout the Pacific Northwest. Although predominantly a pest east of the Cascade Mountains, populations of this mite have sporadically damaged fescue and perennial ryegrass seed crops in the Willamette Valley from the Silverton Hills to the south valley floor over the last decade.

Unlike Tetranychidae spider mites that produce multiple generations and copious amounts of webbing on host plants during the hot and dry months of summer and early fall, the WGM becomes active in October, completes two or three generations through the following April, and does not produce webbing on host plants. Cool weather and short day lengths cause the reddish, over-summering eggs located at and below the soil line on host grasses to hatch, and the WGM emerges. The resulting blue-colored mites with bright orange legs feed throughout the fall, winter, and spring months, stunting plants and producing chlorosis of the leaves. Heavy populations surviving through the winter months retard spring regrowth and may kill individual crowns of the more susceptible pasture and seed grasses as well as cereal crops. This mite has the unusual habit of hiding in cracks and crevices of the soil during days of bright sunshine and/or high temperatures and windy conditions. This habit can make initial detection of the mite and symptom diagnosis difficult at times. Cool 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 WGM infestations should be sampled 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 WGM.

This mite does not respond predictably to traditional miticides used to control spider mites. In fact, the organophosphate insecticides dimethoate (e.g., DiGon®, Dimate®) and chlopyrifos (Lorsban®), which do not control spider mites, have generally provided effective control of WGM on those cereal and grass seed crops for which uses are registered.

Methods

In the interest of identifying products with a likelihood of being registered for use on grasses, including both seed and hay crops, should resistance or re-registration difficulties become concerns, we evaluated different materials for the control of this pest. Nine treatments were evaluated in consecutive field trials for control of WGM infesting two different fields of timothy (*Phleum pratense*) managed for hay and pasture near Culver, Jefferson County, Oregon. A randomized complete block design with plots measuring 21

by 21 ft and replicated 4 times was used in both trials as grass was breaking winter dormancy. Products were applied on 24 February (trial 1) and on 12 March (trial 2), 2004. Insecticides were delivered with a CO_2-powered backpack sprayer using a 4-nozzle (8002 flat fan) hand-held boom that covered a 6.5-ft swath. Spray pressure was set at 40 psi and delivered an equivalent volume of 30 gal/acre to the plots. Potassium nitrate fertilizer (10 lb/100 gal) was added to the Vendex® treatment. A silicon surfactant at an equivalent rate of 8 oz/100 gal of spray solution was combined with all treatments except Acaritouch®.

Post-treatment evaluation of plots consisted of coring 3, 2.5-inch-diameter plugs to a depth of 1 inch from randomly selected crowns within the interior of the plots. Samples were taken in the morning and placed in paper bags within plastic Zip-lock® bags for transport to laboratory, where plugs were screened and mites were counted under magnification. Total numbers of live mites were recorded on five different dates from 9 days after treatment (DAT) through 58 DAT for each plot in trial 1; and on two different dates, 13 and 28 DAT in trial 2. Data 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 Table 1.

Results

Mite populations in the untreated control of trial 1 increased initially and then leveled off through 30 DAT. Mite populations had decreased by half at 45 DAT, and by 58 DAT few active mites were observed (Table 1). This is a natural decline as the mites lay aestivating (over-summering) eggs in response to increasing day length and temperatures. In trial 2, mite populations in the check plots held steady through 28 DAT, at which time the experiment was terminated early because the grower worked the field. The low and high rates of the pyrethroid, Mustang MAX™, and the organophosphate, Dimethoate 4E, were comparable in control, providing the best suppression of WGM through the duration of both trials. Mustang MAX™ is a synthetic pyrethroid insecticide scheduled to be labeled by FMC Corp. for use on grass hay and seed crops in 2007 or 2008.

Table 1. Mean number of live winter grain mites (WGM) per 2.5-inch core taken through timothy grass crowns at varying times several days after treatment (DAT).

Treatment[1]	Rate	Trial 1					Trial 2	
		4 Mar 9 DAT	12 Mar 17 DAT	25 Mar 30 DAT	9 Apr 45 DAT	22 Apr 58 DAT	23 Mar 13 DAT	9 Apr 28 DAT
	(product/acre)	(no. per 2.5-inch core)						
Untreated check	--	6.8 ab[2]	21.0 a	22.8 a	11.0 abc	2.0 abc	25.0 abc	29.0 ab
Mustang MAX ™ 0.8 lbs/gal	2 oz	0.3 c	0.8 c	0.3 c	0.0 c	0.8 bc	2.0 de	1.0 c
Mustang MAX ™ 0.8 lbs/gal	4 oz	1.8 bc	1.5 bc	0.0 c	0.0 c	4.8 a	0.5 e	0.3 c
Kumulus®DF Sulfur 80%	20 lb	7.3 ab	19.3 abc	11.0 ab	20.3 ab	0.5 c	50.0 ab	39.5 a
Kumulus®DF Sulfur 80%	30 lb	3.8 bc	25.0 a	22.5 a	10.3 abc	0.8 c	31.8 abc	14.0 abc
Acaritouch®[3]	12 oz	11.8 a	39.3 a	28.5 a	7.8 abc	3.8 abc	14.0 cde	11.8 abc
Acaritouch®	25 oz	6.8 ab	25.3 a	10.0 ab	5.0 abc	2.3 abc	26.0 bcd	18.3 ab
Dimethoate 4E	2/3 pt	0.3 c	1.0 c	1.0 bc	0.3 bc	0.5 c	1.0 e	3.5 bc
Vendex 50 WP + KNO_3 (10 lb./100 gal, H_2O)	2 lb	5.5 ab	25.5 a	15.8 a	17.8 a	2.0 abc	30.8 abc	19.5 ab
Acramite™ 4SC	24 oz	3.0 bc	20.8 ab	13.75a	13.3 ab	3.8 ab	69.0 a	41.5 a

[1]Mustang Max, Acaritouch, Dimethoate, Vendex, and Acramite are not labeled for use in Oregon on grass pasture or hay crops as of this time. Mustang Max is anticipated to have a grass pasture hay and seed crop label in 2007 or 2008. Acramite is anticipated to have a grass pasture hay and seed crop label in 2008 or 2009.

[2]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. Original means presented in table.

[3]Similar to an insecticidal soap.