

Western Regional IPM Grants Research/Extension Accomplishments Report

INSTRUCTIONS: PLEASE PROVIDE ONLY THE ESSENTIAL COMPONENTS OF ACCOMPLISHMENT WHICH ARE:

1. A CLEAR IDENTIFICATION OF THE PROBLEM/ISSUE ADDRESSED BY THE RESEARCH/EXTENSION.
2. A CONCISE EXPLANATION OF HOW THE RESEARCH/EXTENSION ACHIEVEMENT CONTRIBUTED TO THE SOLUTION OF THE PROBLEM/ISSUE BEING RESEARCHED.
3. THE IDENTIFICATION OF OTHER BENEFITS RESULTING FROM THE RESEARCH/EXTENSION, EVEN IF UNPLANNED.
4. PLEASE ATTACH A SUMMARY OF THE PAST YEARS PROGRESS, ONE PAGE MINIMUM.

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PROJECT NUMBER: _____

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PROJECT TITLE: Development of an IPM Program for Arthropod Pests of Cool-Season Grass Hay Crops

PRINCIPAL INVESTIGATOR: Larry Godfrey and Doug Walsh

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CO-PIs: Larry Godfrey and Doug Walsh

OTHER TEAM MEMBERS: Holly Ferguson, Dan Marcum, William Riggs, Jay Davison, and Dominic Reisig

THE PROBLEM, ISSUE, OR REASON FOR CONDUCTING THE RESEARCH/EXTENSION:

Hay from cool-season grasses is an important crop in several western states; this grass hay is highly valued as feed for horses and is in demand domestically and for export. Appearance and "aesthetics" of the hay is of utmost importance as cool-season hay is valued based largely on these factors. In recent years, thrips (western flower and grass) and mites (several species of Tetranychid mites) have caused severe damage to cool-season grass crops. Pest management studies in cool-season grasses are very limited. As the crop acreage, the market demands, and importance to the local agricultural economies all increase, the needs for and scrutiny of sound integrated pest management practices have also increased in the crop. Sampling protocols, decision thresholds, influence of cultural practices on pest populations, and incidence of biological control are just a few of the areas that are largely unexplored. Through this research, we are in the process of investigating these specific areas in sites in California, Washington, and Nevada and to develop the data needed to design a baseline IPM program for major arthropod pests of cool-season grass crops.

THE SINGLE MOST IMPORTANT ACCOMPLISHMENT OR BENEFIT RESULTING FROM THIS RESEARCH/EXTENSION:

At the initiation of this research, thrips were recognized as the most important pest of timothy in CA and NV. Indeed thrips are an important detriment to hay quality and we have made progress on designing IPM strategies for thrips. However, the results on mites may be the most important findings from this research. In CA timothy, mites were not generally thought to be a concern; however, one application of a pyrethroid insecticide (now registered for thrips control) flared mite populations to levels causing severe damage. At all three locations/states, an eriophyiid mite has been identified and, especially in WA, may be causing significant damage. This mite was first (to my knowledge) found from samples in 2006. A greenhouse experiment was initiated in WA to determine the effects of this eriophyiid mite on timothy plants. In addition, the effects of insecticide applications, targeted for thrips (CA) and for Banks grass mite (NV), on populations of this eriophyiid mite species, were recorded.

ADDITIONAL BENEFITS, SUCH AS:

SOCIAL BENEFITS -

ECONOMIC BENEFITS -

Sampling methods, such as counting thrips by direct observation, collecting tillers for counting thrips in the lab, beating timothy into a cup, sticky cards, and sweep netting, were explored for documenting thrips population dynamics in 2006 and 2007. These results will help field practitioners to quickly assess thrips population levels and to reduce the incidence of unneeded insecticide applications.

ENVIRONMENTAL BENEFITS -

The registration process of bifenazate to control spider mites on cool-season grasses is nearly complete. This material has been researched in several of the studies for this project. Bifenazate is easier on beneficial predator mite populations, and once it is available, we will provide extension education to the timothy growers on its proper use. Its use will replace, in part, that of broad-spectrum organophosphate pesticide, methidathion.

OTHER -

PLEASE SUBMIT A HIGH RESOLUTION DIGITAL IMAGE REPRESENTATIVE OF YOUR RESEARCH/EXTENSION PROJECT THAT WE CAN USE TO HIGHLIGHT YOUR PROJECT!

When you have completed this form, return to both:

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THIS FORM WAS COMPLETED BY:

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Development of an IPM Program for Arthropod Pests of Cool-Season Grass Hay Crops

Co-Principal Investigators: Larry Godfrey and Doug Walsh

Other Key Personnel: Holly Ferguson, Dan Marcum, William Riggs, Jay Davison, and Dominic Reisig

Institutions Involved: Univ. of California-Davis, Washington State Univ., Univ. of California Cooperative Extension, and Univ. of Nevada Reno Cooperative Extension

Studies in 2006-7 continued in Nevada, northern California and Washington. The goal is to design a management program for insect and mite pests of cool-season forage grass crops. Timothy is the primary grass species targeted in these studies and is an important hay crop that is marketed domestically, primarily for horse forage, and exported to Asia. Two species of thrips (grass thrips and western flower thrips) and four to five species of mites (banks grass mite, two-spotted spider mites, another tetranychid mite species, and at least one species of eriophyiid mite) are problematic in timothy. Populations of these pests, and of key natural enemies, were quantified every 10 to 14 days in untreated timothy fields so as to better understand population build-up and to develop some ability to predict outbreaks. Data are still being summarized.

The highlights from each state are as follows: In **Nevada**, the effects of registered and experimental, reduced risk, insecticides on populations of thrips and mites were quantified.

Plots were established in two fields in a replicated design and applications were made on 1 June; 11 treatments were compared and these included both mite-active and thrips-active materials. Following application, populations of thrips and mites were monitored weekly. Hay yields were evaluated from each plot about 5 week after treatment. These data will be used to investigate the yield response to differing infestation levels. Sticky trap sampling and population monitoring in the non-irrigated field corners (planted with crested wheatgrass) were also done as a means to develop some predictive ability for the pest infestation. In **California**, thrips were found to be active from February through October. Two species of thrips were documented in timothy, present in different ratios depending on field location. In addition, grass thrips are present in a fully winged form and a brachypterous form. Sampling methods, such as counting thrips by direct observation, collecting tillers for counting thrips in the lab, beating timothy into a cup, sticky cards, and sweep netting, were explored for documenting thrips population dynamics in 2006 and 2007. In 2006, as populations increased in the fall and host plant quality decreased, there were more winged adults in relation to brachypterous adults. Data have not been processed completely from 2007. In addition, threshold population levels for treatment and treatment timing are being explored. Thrips levels, yield, and visual damage are being recorded using chemicals to manipulate thrips population levels. Treatments with lower thrips numbers had significantly less damage, although thrips did not significantly affect yield. Finally, a preliminary burn study was done in March 2007. Thrips numbers were lower two weeks after burning, but burning may damage shallow timothy corms and affect yield and a larger study is planned for winter 2007. In **Washington**, timothy growers had access to the full complement of irrigation water in 2007 unlike the previous few years. Reports were received of grass turning brown or isolated brown patches but the cause was difficult to discern. The browned grass may have been due to a spider mite infestation, but

few spider mites found on tiller samples. The grass may have browned as a result of an eriophyiid mite infestation and studies were focused on the small, white, cigar-shaped, eriophyiid mites found inside the ribs of the leaves, sometimes in large numbers. A greenhouse experiment was designed and begun to determine the effects of eriophyiid mites on timothy plants. No results are available at this time as this experiment is ongoing. Extension education was provided to growers, fieldman, and our project technicians on mite identification, preserving beneficial arthropods, and the detrimental effects of broad-spectrum pesticide applications (e.g. methidathion) on the timothy agro-ecosystem. The registration process of bifenazate to control spider mites on cool-season grasses was nearly complete.



Figure 1. Brown patches in timothy field, July 2007, Kittitas County, Washington.



Figure 2. Overview of Nevada field site at the time of application, 2007.