

RIPM - Interim Progress Report

A. Grant Data

Category: Regional IPM Competitive Grants Program – Northeast Region

Title: Reducing Potato Leafhopper (PLH) Impacts on Alfalfa through PLH-resistant Cultivars intercropped with Perennial Forage Grass

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States Involved: New York and Pennsylvania

Grant Number: NYC-149528

Year Grant Awarded: 2006

Length of Grant: 2 years

Funding Amount: \$79,470

B. Nontechnical Summary

Potato leafhopper (PLH) is the most damaging alfalfa insect pest in the Northeast (NE). Forage grasses in mixture with alfalfa can cause PLH to emigrate and are environmentally beneficial, but may reduce forage quality. Producing high quality forage is a key to profitability in livestock production systems. Some recent alfalfa cultivars have glandular hairs and PLH-resistance, yet are not immune to damage from PLH. Potato leafhopper-resistant alfalfa cultivars intercropped with perennial forage grass could be an IPM strategy that would have environmental, agronomic, and economic benefits to forage producers. The objectives are to compare PLH populations and densities, and forage yield and quality of a conventional alfalfa cultivar and a PLH-resistant cultivar both in monoculture and intercropped with grass, to conduct an economic analysis, and to share results in extension outreach. Trials were established in Pennsylvania and New York. The trial main plots are insecticide-treated and no-insecticide, and the sub-plots are a PLH-resistant alfalfa cultivar and a conventional alfalfa cultivar each clear-seeded, and each seeded with a cultivar of timothy, orchardgrass, or tall fescue.

Intercropping PLH-resistant alfalfa cultivars with grass could minimize risk of PLH damage and eliminate insecticide use for PLH control. All producers of alfalfa would benefit from this research and results would have direct application for producers of alfalfa-grass mixtures. Results of this research would have great potential for direct and immediate adoption by conventional and organic producers of alfalfa and alfalfa-grass mixtures in the NE and other regions.

C. Introduction

Results from this research would have direct application for NE region producers of alfalfa-grass mixed stands. Production of high quality home-grown forage is a critically important component for continued profitability of livestock operations in the NE. Rotations of corn and alfalfa or alfalfa-grass mixtures, both for

production of stored feed in the form of silage, is the major cropping system used for dairies and other livestock production systems in the NE. This research would potentially impact a large portion of the 1.27 million alfalfa and 3.09 million “other hay” acres reported by the National Agricultural Statistics Service for NY, PA, NJ, MD, WV. Potato leafhoppers are considered one of the most significant insect pests of alfalfa in the NE and the USA. Alfalfa and alfalfa-grass mixtures are widely grown and important feed crops supporting livestock production in the NE. Protecting alfalfa from PLH through planting PLH-resistant alfalfa with forage grasses will benefit all of society through reduced use of pesticides that have negative environmental and health risks. Producers will likely benefit economically through reduced costs of pesticides associated with growing alfalfa, or through reduced risk to yield loss and lower plant vigor associated with harvesting alfalfa early to avoid PLH damage.

Even with PLH-resistant alfalfa cultivars, producers at times get the highest forage yield and quality from applying insecticides to alfalfa. This is because PLH-resistant alfalfa still supports a population of PLH, and the PLH continue to feed and cause damage to the alfalfa. This research project aims to quantify the potential for further reduction in PLH damage to PLH-resistant alfalfa and to conventional alfalfa through incorporating forage grass as a non-host species in alfalfa-grass mixtures. Combining the two IPM strategies of PLH-resistant alfalfa with forage grass may eliminate the need for insecticide use as well as gaining other benefits associated with alfalfa-grass mixtures. Combining late-maturing forage grasses with alfalfa will limit the reduction in forage quality associated with adding forage grass to alfalfa cropping systems. These economically important aspects of alfalfa-grass mixtures will be quantified through this research project.

D. Objectives

1. Compare PLH populations, and forage yield and quality in the establishment year and first production year of a conventional, PLH-susceptible alfalfa cultivar and a PLH-resistant alfalfa cultivar, each alone and intercropped with perennial forage grass species timothy, orchardgrass, and tall fescue. The data for achieving this objective has been collected and the data from the establishment year (2006) has been mostly analyzed. All but the last harvest of data have been collected for 2007, but analyses have not been done.
2. Complete partial budget economic analysis of forage production using PLH-resistant alfalfa in alfalfa-grass mixtures. Economic analyses have not been done pending completion of forage quality data analyses.
3. Share results of this study in extension outreach opportunities throughout New York, Pennsylvania, and the NE region. Extension outreach has not taken place because data analyses and research summaries have not been completed.

E. Approach

We propose to test the potential for PLH-resistant alfalfa cultivars to be planted with forage grass as an IPM tactic to eliminate, not just reduce, PLH damage on alfalfa in the Northeast (NE) without the use of insecticides. The approach used was to plant research trials at four locations from the northern most location of

Geneva NY to the southern most location of Landisville PA. For each trial the main plots are an insecticide treatment compared to a no insecticide treatment, and the sub-plots are a PLH-resistant alfalfa cultivar and a conventional alfalfa cultivar each clear-seeded or monoculture, and each seeded with a cultivar of timothy, orchardgrass, or tall fescue. At each trial we monitored the insect populations, and measured alfalfa height and grass height, visually scored the PLH damage to the alfalfa, took samples for determining percent grass and for forage quality analyses, and harvested the plots. From this data set, economic analyses will be used to value the various management options, mainly a PLH-resistant alfalfa variety vs. a conventional alfalfa variety and planting monoculture alfalfa vs. planting with a grass companion crop.

F. Progress

In the establishment year (2006), all data was analyzed with the exception of the forage quality data. The economic analyses will be completed when the forage quality data is available. The level of PLH damage and percent grass varied by location, thus data were not combined over locations. Damage from PLH to conventional alfalfa when planted with a grass was lower than in monoculture, and this difference was statistically significant at two locations. For PLH-resistant alfalfa, PLH damage levels were similar when planted in monoculture and with a grass. Potato leafhopper damage to alfalfa was less for the PLH-resistant cultivar (average 2.1) than for the conventional cultivar planted with a grass (average 3.3). The alfalfa-grass mixtures shifted toward more grass in the mixture when the alfalfa was not protected from PLH damage by insecticide treatment or genetic resistance.

In the first production year (2007), a severe drought and low PLH population affected the trial at Geneva NY. At Geneva NY, Ithaca NY, Rocksprings PA, and Landisville PA, all the plot data have been collected for each harvest except for the upcoming harvest. The data has not been analyzed. The samples for forage quality remain to be processed.

