INTERACTIONS BETWEEN POTATO LEAFHOPPERS, GLANDULAR-HAIRED ALFALFA AND INSECTICIDE TIMING

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Introduction

The potato leafhopper (PLH) is the most serious insect pest of alfalfa in Wisconsin and the Upper Midwest. PLH injury to alfalfa can result in leaf yellowing ("hopperburn"), plant stunting, loss of yield and forage quality, and reduced alfalfa stand persistence. Leafhopper populations are a perennial problem in new alfalfa seedings, and they frequently increase to damaging levels on the second and subsequent crops in established alfalfa stands. Until recently, crop scouting and insecticide application when warranted was the only effective means of PLH management. However, development and eventual release of glandular haired (GH) alfalfa varieties in 1997 is changing the way we manage this pest and may ultimately alter its pest status in alfalfa. On the other hand, the success of GH varieties for stand-alone PLH control has thus far been inconsistent, and therefore scouting is still necessary for effective PLH management.

The purpose of this study was to investigate the extent to which treatment thresholds currently recommended in Wisconsin for PLH management in alfalfa may need to be adjusted for glandular haired alfalfa cultivars with resistance to PLH. A further aim of this study was to assess the effectiveness of resistance of GH alfalfa to the potato leafhopper and to look at the implications for using GH alfalfa in PLH control.

Materials and Methods

This study was conducted during the summer of 2002 at the UW Arlington Agricultural Research Station. The experiment included two factors: three PLH treatment thresholds - the conventional threshold (1X) recommended by UW Extension (which increases with crop height), twice the conventional threshold (2X), and an untreated control (100X); and three alfalfa varieties - Pioneer 5454 (no PLH resistance), DK131HG (53% resistant plants), and Evergreen (79% resistant plants). The experimental design was a split plot with 6 replications, and individual plots were 18' by 18'. Plots were direct seeded on May 27, 2002. The 1X and 2X plots were sprayed on July 1 and July 5, respectively. The plots were cut on July 30 and yields were subsequently recorded. During this study, data recorded included weekly or biweekly PLH counts and crop heights, hopperburn ratings as warranted, and dry matter yields.

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Results and Discussion

Overall, we saw statistically significant differences in all measured responses among treatment thresholds and alfalfa varieties. The first sampling date on July 25 showed very little difference among thresholds and varieties, but this was most likely due to the lack of establishment of the PLH in the field at that time. Following the application of Warrior insecticide to the 1X plots on July 1, we began to see differences in PLH numbers among the alfalfa varieties in both the unsprayed and control plots. This trend continued throughout the growing season until harvest time. As expected, the greatest differences in PLH numbers occurred in the untreated control plots, with plots of Pioneer 5454 containing far more PLH than either of the GH varieties of DK131HG or Evergreen. Moreover, Pioneer 5454 also had the greatest amount of hopperburn in comparison to the GH varieties. Evergreen and DK131HG also had a better stand height than Pioneer 5454, with Evergreen being the greatest. In terms of yield, Evergreen out-yielded both DK131HG and Pioneer 5454 in all treatments, while Pioneer 5454 yielded the least among the alfalfa varieties. Evidence from the 2002 study suggests that using a 2X threshold for the GH varieties is just as effective as using the recommended 1X threshold. However, when no threshold was used (i.e., untreated control plots), all varieties showed a loss in yield. These results from 2002 indicate that GH varieties do exhibit added resistance to the PLH, but that they do not provide adequate plant resistance for stand-alone PLH control.

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