Development of an Integrated Cereal Leaf Beetle (Oulema melanopus) Management Program (ICLBMP) in Oregon.

D.L. Walenta¹, S. Rao¹, B.B. Bai², R.A. Worth², K.J.R. Johnson², H.W. Rogg², and G. W. Brown³

(1) OSU Extension Service, 10507 North McAlister Road, LaGrande, OR, 97850, 541-963-1010, darrin.walenta@oregonstate.edu
(2) Oregon Department of Agriculture   (3) USDA-APHIS-PPQ

Introduction

The cereal leaf beetle (Oulema melanopus) is a new pest of economic importance to small grains and other grass-host crop species in Oregon and the Pacific Northwest region. Cereal leaf beetle (CLB) continues to expand its range and population levels in Oregon in the absence of natural predators. Currently, insecticide application provides the only effective means of control but CLB and insecticide use has increased significantly since CLB introduction in 1999 (Figure 1). The PNW region lacks quantitative information on crop yield impact, economic threshold levels, monitoring tactics, and host-crop preference of CLB.

Objectives

In response to the CLB threat, a series of research, extension, and biological control projects are being conducted to develop an integrated CLB management program (ICLBMP) for implementation in CLB-infested areas of Oregon and the PNNW. Projects are designed to generate IPM knowledge for the region:

- Host-crop range of CLB (cereals and grasses grown for seed).
- CLB impact on winter and spring wheat grain yield.
- Economic threshold levels for CLB infestations.
- CLB population monitoring tactics.
- CLB biology, phenology, and management educational programs.
- Biological control program for CLB management with parasitoid wasp species Tetrastichus julis (larvae parasite) and Anaphes flavipes (egg parasite).

Yield Impact and Threshold Assessment

Table 2. CLB population and impact on commercial winter and spring soft white wheat yield – Union County, Oregon 2004.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Larvae per Tiller</th>
<th>Flag Leaf</th>
<th>Flag Leaf Damage</th>
<th>Grain Yield</th>
<th>Test Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Wheat</td>
<td>No Insecticide</td>
<td>0.7</td>
<td>0.4</td>
<td>22</td>
<td>105.3</td>
</tr>
<tr>
<td>Insecticide</td>
<td>0.1</td>
<td>0</td>
<td>6</td>
<td>108.4</td>
<td>54.4</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Spring Wheat</td>
<td>No Insecticide</td>
<td>0.7</td>
<td>0.6</td>
<td>25</td>
<td>78.4</td>
</tr>
<tr>
<td>Insecticide</td>
<td>0.1</td>
<td>0.1</td>
<td>1</td>
<td>90.2</td>
<td>58.9</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>8.8</td>
<td>ns</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Soft white spring wheat tends to be more susceptible to CLB injury than winter wheat (Table 2). Spring wheat grain yield was significantly reduced (13% loss) when control actions were not taken in 2004. CLB impact on winter wheat grain yield was variable and dependent upon overall crop vigor in relation to CLB population. In this study, winter wheat yield loss ranged from 3% to 18%.

In 2005, soft white spring wheat grain yield losses averaged 21% when CLB populations ranged from 0.5 to 1.9 larvae/flag leaf (data not shown). CLB larvae collections from the study sites were found to have 62% and 91% parasitism rates by Tetrastichus julis (larvae parasitoid wasp).

Current economic threshold levels, adapted from other CLB-infested regions, recommend control measures when population levels reach an average of 3 eggs and/or larvae per tiller (until cereals reach boot stage of growth) or 1 larva/flag leaf. Results from this study suggest flag leaf threshold levels may actually be lower than 1 larva/flag leaf for spring wheat and adequate for winter wheat. Attainable spring wheat yield potential is much lower than winter wheat, therefore, allowing less tolerance for additional economic damage caused by CLB.

Expected Outcomes and Impacts

- Damage potential to susceptible host-grass seed and cereal grain crops.
- Economic threshold levels for cereal crops.
- CLB management guidelines for improved IPM decision-making in OR & PNNW.
- CLB population monitoring system.
- Improve insecticide-use efficiency and grower economics.
- Establish a successful biological control program in OR & PNNW.