Population dynamics studies of the Western Corn Rootworm - experiments in isolation cages

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Abstract/Summary
These studies resulted in beetles hatching when maize after maize was grown. Two years after a defined number of female and male beetles have been inserted into closed cages larval damages (root eating and gooseneck symptoms) occurred. Although the experiments were carried out at a site near Graz/Austria at an altitude of 450 m above seal level with delayed vegetation reasonable results could be achieved.

Objective
1. Study the population dynamics of Diabrotica virgifera virgifera over 4 years in closed cages
2. Record the propagation rates under different strength of infestations
3. Specify the threshold of relevant economic damages

Material and Methods - Experimental work with isolation cages to specify host and non host plants

- In special designed well isolated cages each sized 2 m² and 2,5 m high maize was planted with 20 plants/cage
- Defined numbers of female and mail beetles have been set free in 2009 into those cages
- Descendant affiliated generations i.e. hatching of beetles have been regularly recorded
- Damages have been examined: Root eating, Goose neck symptoms, leaf mining and yields
- Adults have been trapped cage by cage in yellow traps+ baits by the end of the testing series – see pictures below

Results 2010 to 2012
- Populations steadily declined over the years
- numberwise a return on inserted beetles from 2009 could not be achieved during consequent years

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<table>
<thead>
<tr>
<th>Totals per variants</th>
<th>Recorded numbers of hatched</th>
<th>Average number of beetles per plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>1</td>
<td>72</td>
<td>117</td>
</tr>
<tr>
<td>3</td>
<td>331</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>172</td>
<td>44</td>
</tr>
</tbody>
</table>

Root pruning/eating IOWA 1-6 in 2012 after inserts beetles/plant in 2009 vs. hatched beetles/plant 2012

Goose neck 2012: % of plants affected - listed due to inserted beetles/plant in 2009 (x-axle) vs. hatched beetles/plant in 2012

Conclusions from the host plant studies in isolation
1. root pruning by larvae due to IOWA-Scale 1-6 showed damages which were roughly in line with population densities set free in 2009
2. gooseneck symptoms: measurable differences in test year 2011 and particular in 2012
4. Yield effects 2010 and 2011: not significant, no regular differences in between population densities
5. thresholds of plant damages must be \(\geq 5\) beetles/plant under semi-moist conditions in Styria