Potato Flea Beetle Control with Systemic, Foliar Insecticides and Biopesticides on Potatoes Grown in Northwestern Washington

L. K. Tanigoshi, G. Hollis Spitler, B. S. Gerdeman and *D. W. McMoran
WSU Mount Vernon
Northwestern Research & Extension Center
*WSU Skagit County Extension
Northwest Washington Potato Production
Objectives:

- Evaluate efficacy of newer neonicotinoid compounds and new class pesticides compared with some standard potato insecticides.
- Study life history of the TFB and association of beating tray counts with timing of potato tubers injury.
- Evaluate efficacy of bio-rational pesticides for control of larval and adult TFB with *(Metarhizium anisopliae,* and the botanical azadirachtin (neem).
Tuber Flea Beetle Life History

- Overwinter as adults.
- Late March-April, feed on weed hosts.
- Late May-July, lay eggs.
- Larvae present June-August.
- Adults emerge in Late July-September.
- Unclear from literature if TFB possesses 2 generations a year.
- 2nd generation larvae present in August-September.
- Adults merge in October.
Bio-warfare on life stages! Bacterial, fungal, or botanical.
TFB is easily controlled by various insecticides of standard, new class and even biorational pesticides.
Field Sites

Field 1

Field 2

Field 3

Field 4
Sampling at 2008 Field Sites
Foliar Damage by TFB
TFB Foliar Damage    Loc#1    2008

Foliar sprays!
TFB Counts

Loc#1  2008

Both sexes very close!!!

2nd Foliar Spray

3rd Foliar Spray
Insect Damage Rating

<table>
<thead>
<tr>
<th>Rating</th>
<th>Holes in Tuber</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1 to 5</td>
</tr>
<tr>
<td>2</td>
<td>6 to 10</td>
</tr>
<tr>
<td>3</td>
<td>11 to 15</td>
</tr>
<tr>
<td>4</td>
<td>16 to 20</td>
</tr>
<tr>
<td>5</td>
<td>21 to 30</td>
</tr>
</tbody>
</table>

Insect damage Index (idi) = vl X 1 + l X 3.5 + m X 5 + h X 6 + s X 7
                         c + vl + l + m + h + s
Damage on tuber not reaching a high rate until 12th Aug samples.
Foliar damage – Adult Counts – Tuber Damage

Graph showing foliar damage, adult counts, and tuber damage across different time points.

- 'Leverage'
- 'Cruiser Maxx'
- 'Untreated Check'

Time points:
- 28-Jul 49 DAP
- 4-Aug 66 DAP
- 12-Aug 74 DAP
- 22-Aug 84 DAP
- 8-Sep 89 DAP
Relationship between the Number of insects and types of damage?

Data as of now make it hard to analyze or to make any valid conclusions.
Field summary of TFB abundance in Skagit County Research Sites, 2008

- Foliar damage does not seem to indicate the damage in the tubers.
- Tuber damage can start as soon as tuber development starts.
- Seed and in furrow treatments may not protect tubers after a curtain amount of time after planting has passed or insect pressure is too great.
- The establishment of insect populations is not fully understood for our field conditions or climate in this area.
- The tuber damage done by TFB can make a critical impact on a sellable crop.
Objectives for 2009

- Compare multiple management programs for their field efficacy and impacts on economic yields.
- Determine generational cycle(s) of the TFB as mitigated by degree-day heat accumulations and abundance of foliage and tubers in cage universes.
- Investigate impact of solanaceous weeds and volunteers on TFB’s propensity to colonize emerging potato.
- Continue investigating softer insecticides and bioinsecticides for sustainable IRM and urbanization affects farming practices in northwestern Washington.
Western Washington Potato Growth Stages

TUBER FLEA BEETLE LIFE CYCLE

Jan – May Overwintering Adults

May – eggs – July

Aug – Dec 2nd Adults

July – Pupae – Oct

July – Larvae – Aug

07-08 Adult Counts

Figure 3. Growth stages of the potato plant. I Sprout Development: Sprouts develop from eyes on seed tuber and grow upward to emerge; roots begin to develop. II Vegetative Growth: Branch stems and first 8 to 12 leaves develop from aboveground nodes along emerged sprouts; roots and stolons develop from belowground nodes. III Tuber Initiation: Tubers begin to form at tips of stolons; foliage continues to develop. IV Tuber Growth: Most of plant production supports tuber enlargement. V Maturation: Tuber periderm (skin) thickens, and dry matter content reaches a maximum; vines begin to senesce.

Research Summary, 2008

- New Mode of Action (MoA) insecticides, Groups 22 & 28 will control adult flea beetle.
- There are questions about the identification of the flea beetles and their respective life cycles (number of generations) in the Skagit valley.
- Larval feeding damage to tubers may extend from July - August but in some cases late August - September. This suggests an extended larval period for the TFB or a second generation which has been uneconomic with early season field practices.
Acknowledgments

Washington State Potato Commission
Washington State Commission for Pesticide Registration
BASF
Bayer CropScience
DuPont
Syngenta
Novozymes
Dr. Lerry Lacey
Josh Flores
Lily Hidler
Clinton Meckstroth
Kevin Wilson
NWREC Potato Trials