Part 2 of 3

ORDP Report No. 2:
In-Season Management of Perennial Sow Thistle with Stinger

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Cornell Cooperative Extension Vegetable Program

Empire Produce Expo, Syracuse, NY: January 21, 2014
In-Season Management of Perennial Sow Thistle (Main)
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
<th>Crop Stage</th>
<th>Weed Stage</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Untreated Weedy Check</td>
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<tr>
<td>2. Hand weeded Check</td>
<td></td>
<td>4-leaf</td>
<td>NE to EB</td>
<td>Jun-18</td>
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<tr>
<td>3B. Loop + Kill Plot:</td>
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<tr>
<td>Stinger</td>
<td>4 fl oz</td>
<td>Loop</td>
<td>NE to ER</td>
<td>May-9</td>
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<tr>
<td>Stinger</td>
<td>8 fl oz</td>
<td>2.5-leaf</td>
<td>NE to LR</td>
<td>Jun-7</td>
</tr>
<tr>
<td>Stinger</td>
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<td>NE to MB</td>
<td>Jun-20</td>
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<td>EB to MB</td>
<td>Jul-5</td>
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<tr>
<td>Stinger</td>
<td>4 fl oz</td>
<td>6-leaf</td>
<td>NE to Ebud</td>
<td>Jun-27</td>
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<td>Stinger</td>
<td>4 fl oz</td>
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<td><strong>10. 16 fl oz x 1:</strong></td>
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<tr>
<td>Stinger</td>
<td>16 fl oz</td>
<td>4-leaf</td>
<td>NE to EB</td>
<td>Jun-20</td>
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<tr>
<td><strong>11: High-Low + 4:</strong></td>
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<td><strong>15. Standard:</strong></td>
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In-Season Management of Perennial Sow Thistle: Weed Biomass (Aug-13)

- **Untreated**
  - Weed Biomass: 1700 g/0.5m²

- **Hand weeded**
  - Weed Biomass: 710 g/0.5m²

- **Kill plot**
  - Weed Biomass: 20 g/0.5m²

- **Max 16**
  - Weed Biomass: 80 g/0.5m²

- **Max 16 8 x 2**
  - Weed Biomass: 280 g/0.5m²

- **Max 16 16 x 1 @ 4L**
  - Weed Biomass: 160 g/0.5m²

- **Max 16 Hi-Low + 4**
  - Weed Biomass: 130 g/0.5m²

- **Standard**
  - Weed Biomass: 460 g/0.5m²

Comparisons:
- Untreated vs. Hand weeded: a
- Hand weeded vs. Kill plot: b
- Kill plot vs. Max 16: c
- Max 16 vs. Max 16 8 x 2: bc
- Max 16 8 x 2 vs. Max 16 16 x 1 @ 4L: c
- Max 16 16 x 1 @ 4L vs. Max 16 Hi-Low + 4: c
- Max 16 Hi-Low + 4 vs. Standard: bc

In-Season Management of Perennial Sow Thistle: Weed Biomass (Main)
Ground Cover Measured by: No. live plants every foot per 2 transects per plot
In-Season Management of Perennial Sow Thistle:

% Weed Control (Jul-30 & Aug-13)

- **1.** Kill plot: 98.7 98.8
- **2.** Max 16 - Hi-Low + 4: 92.2 99.4
- **3.** Max 16 - Low-Hi + 4: 92.3
- **4.** Standard: 4 @ 4L
- **5.** Max 16 - 4 x 4: 87 Max 16 - 8 x 2
- **6.** Max 16 - Hi-Low + 4: 92.2 99.4
- **7.** Hand weeded: 64.9 58.2
- **8.** Standard: 4 @ 6L
- **9.** Max 16 - 8 x 2
- **10.** Max 16 - 16 x 1 @ 4L
- **11.** Max 16 - Hi-Low + 4
- **12.** Max 16 - Low-Hi + 4
- **13.** Max 16 - 16 x 1
- **14.** Max 16 - 16 x 1

- **15.** Standard: 4 @ 4L

Legend:
- **% weed control (ground cover) Jul-30**
- **% control (fresh weight) Aug-13**
In-Season Management of Perennial Sow Thistle (Main)

• The **most susceptible stage** of perennial sow thistle to kill with Stinger pre-solstice is the **mid-rosette stage**.
  – 5-9 leaves
  – 4-7 inches in diameter

• Weed is self-sufficient, not depending on parent rhizome for nourishment
In-Season Management of Perennial Sow Thistle (Main)

- Late-rosette and early-bolt stages of perennial sow thistle most difficult to control pre-solstice.
- Energy flow is generally upward

**Early Bolt** plants are those with any sign of a vertical shoot up to about 6” tall.

**Large rosette** plants have many expanded leaves, are >7 inches across, and have not yet started to grow a flower stalk.
In-Season Management of Perennial Sow Thistle (Main)

1. Untreated

Jun-27-3013  Jul-30-3013
In-Season Management of Perennial Sow Thistle (Main)

15. Standard: Stinger 4 fl oz at 4-leaf & 6-leaf
In-Season Management of Perennial Sow Thistle (Main)

8. 4 fl oz x 4: Stinger 4 fl oz at 2.5-leaf, 4-leaf, 6-leaf & 7-8-leaf

Killed 90% of rosettes

Early and mid-bolt escapes with injury

June 27, 2013

Jul-30: rhizomes not healthy
In-Season Management of Perennial Sow Thistle (Main)

9. 8 fl oz x 2: Stinger 8 fl oz at 2.5-leaf & 4-leaf

90% kill overall, including rosettes and early-bolt

June 27, 2013
In-Season Management of Perennial Sow Thistle (Main)

12. Low+High + 4: Stinger 4 fl oz (2.5-leaf) + 8 fl oz (4-leaf) + 4 fl oz (6-leaf)

60% kill overall, including rosettes and some early-bolt.

Early-bolt that escaped first app were not killed by the second app.

New emergence.

June 27, 2013
11. High-Low + 4: Stinger 8 fl oz (2.5-leaf) + 4 fl oz (4-leaf) + 4 fl oz (6-leaf)

70% kill overall: Rosettes & some early-bolt killed, minor new emergence, early-bolt struggling to survive.

June 27, 2013

plants that are dead above-ground also have dead rhizomes

some root pruning
In-Season Management of Perennial Sow Thistle (Main)

June 27, 2013
In-Season Management of Perennial Sow Thistle (Main)

10. 16 fl oz x 1: Stinger 16 fl oz at 4-leaf

Best control of large weeds pre-solstice (LB)

Excellent below-ground kill

NE continued to grow untreated
In-Season Management of Perennial Sow Thistle (Main)

10. 16 fl oz x 1: Stinger 16 fl oz at 4-leaf

Aug-7, 2013
In-Season Management of Perennial Sow Thistle (Main)

3B. Kill Plot: Stinger 4 fl oz at loop + 8 fl oz (2.5-leaf, 4-leaf & 7-8-leaf)

Stinger 8 fl oz eventually killed most of escapes from loop stage app. No NE. Best treatment overall!

Jul-30-3013
In-Season Management of Perennial Sow Thistle (Main)

2. Hand weeded at 4-leaf (Jun-18)

Hand weeded when onions at 4-leaf on Jun-18

Jun-27-3013
In-Season Management of Perennial Sow Thistle (Main)

Hand weeding stimulates bud-break on rhizomes
In-Season Management of Perennial Sow Thistle (Main)

2. Hand weeded at 4-leaf

Compared to untreated, weeds in hand weeded plots were delayed, parent rhizomes had fewer adventitious roots and buds.
In-Season Management of Perennial Sow Thistle

Future Research Plans:

• Investigate 6 fl oz and 12 fl oz

• Trial Starane and Garlon for feasibility of controlling perennial sow thistle in onions including efficacy and crop tolerance

• Investigate strategies to align susceptible weed stage with crop tolerance of growth regulator herbicides.