National average yield / Acre is 3.35 tons
Insects in Alfalfa Fields

- Over 1000 species of Arthropods have been observed in alfalfa fields.
- Majority are beneficial
- Few are pests but cause substantial damage if present in high numbers
- Reduce yield quantity and/or quality

Seasonal occurrence of Major Insect Pests of Desert-Grown Alfalfa
Caterpillars

• Larval forms of several species of Lepidoptera
  • Butterflies, moths, skippers

• Beet Armyworm, *Spodoptera exigua*

• Western Yellowstriped Armyworm: *Spodoptera praefica*

• Alfalfa Caterpillar: *Colias eurytheme*
Beet Armyworm

Western Yellowstriped Armyworm
Alfalfa Caterpillar

Life cycle

Damage of Caterpillars

“Whitecaps” and “Flagging” caused by 1st & 2nd instar larvae of Armyworm

Skeletonizing leaves by large larvae

Alfalfa caterpillars consume entire leaves
Management of Caterpillars

• Biological control

Management of Caterpillars

• Culture Control
  – Border-Strip Harvesting
  
  – Early harvesting (slight change in cutting cycle)
Management of Caterpillars

• **Monitoring**
  – Start sweeping in early summer
  – Sweep net samples should be conducted in 4 quadrants of the field (5 sweeps / area)
  – determine if caterpillars are parasitized

Management of Caterpillars

• Control measure taken when:
  • Cutting is not practical or not scheduled soon AND the average / sweep is:
  • 10 or more nonparasitized alfalfa caterpillars
  • 15 or more nonparasitized armyworms
  • 10 or more combined nonparasitized alfalfa caterpillars and armyworms
Alfalfa Aphid Complex

• The pea aphid, *Acyrthosiphon pisum*

• The blue alfalfa aphid, *Acyrthosiphon kondoi*

Alfalfa Aphid Complex

• The spotted alfalfa aphid, *Theroaphis maculata*

• The cowpea aphid, *Aphis craccivora*
Alfalfa Aphid Complex

• Damage
  • Sucking plant sap
  • Injecting toxins
  • Secreting honeydew
  • Leaf curling, shortened internodes and yellowing
  • Sooty mold reduces photosynthesis and quality
  • Reducing growth and yield
  • Plant death

Management of Alfalfa Aphid Complex

• Biological Control
Management of Alfalfa Aphid Complex

• Cultural Control
  • Resistant Varieties
  ALMOST LIKE GETTING MARRIED!!
  You’ll have to live with your decision for a long time, so take a little time to investigate the potential performance of your alfalfa varieties.

• Strip Cutting

• Proper irrigation

Monitoring Alfalfa Aphids

– Divide field into 4 quadrants
– Randomly select 5 stems from each quadrant
– Record average stem height from each section
– Shake stem over sweep net or white cloth
– ID aphids and record number of each species
– Take additional 5 sweeps of each section and record number of lady beetle adults and larvae
### Economic Levels for Spotted Aphid

<table>
<thead>
<tr>
<th>Time of occurrence</th>
<th>No. of spotted aphids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring months</td>
<td>40 aphids per stem</td>
</tr>
<tr>
<td>Summer months</td>
<td>20 aphids per stem</td>
</tr>
<tr>
<td>After last cutting in the fall</td>
<td>50 to 70 aphids per stem</td>
</tr>
<tr>
<td>Newly seeded alfalfa in lower desert</td>
<td>20 aphids per stem</td>
</tr>
</tbody>
</table>

### Economic Levels for Spotted Aphid

- During spring and summer, DO NOT treat if ratio of lady beetles to aphids is equal to or exceeds the following:

<table>
<thead>
<tr>
<th>No. of lady beetles per sweep</th>
<th>No. of spotted aphids</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ON STANDING ALFALFA</strong></td>
<td></td>
</tr>
<tr>
<td>1 or more adults</td>
<td>5 to 10 aphids</td>
</tr>
<tr>
<td>3 or more larvae</td>
<td>40 aphids</td>
</tr>
<tr>
<td><strong>ON STUBBLE</strong></td>
<td></td>
</tr>
<tr>
<td>1 or more larvae</td>
<td>50 aphids</td>
</tr>
</tbody>
</table>
Economic Levels for Cowpea Aphid

- Spotty distribution
- Spotty sampling and treatments, especially on the field border
- No economic threshold levels have been established
- Usually using the thresholds for the blue alfalfa aphid:

<table>
<thead>
<tr>
<th>Plant height</th>
<th>Aphids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10 inches</td>
<td>10 to 12 per stem</td>
</tr>
<tr>
<td>10 to 20 inches</td>
<td>40 to 50 per stem</td>
</tr>
<tr>
<td>Over 20 inches</td>
<td>40 to 50 per stem</td>
</tr>
</tbody>
</table>

Three-cornered Alfalfa Hopper

- Buffalo Hopper
- Rarely cause significant damage
- Heat and/or water stressed plant are at greater risk of damage
- Damage caused by feeding and oviposition activity of the adult (girdle stems)
Chemicals used in alfalfa

Non-selective insecticide applied "without justification"

Several generations later
Issues with Management Insect Pests of Desert-Grown Alfalfa

• Outdated or absence of Economic Threshold
• The lack of research on insecticide efficacy and selectivity in the system
• Understanding the roles of natural enemies and incorporating them in Economic Threshold
• Enhance the utilization of culture control

Thanks