Soybean Aphid:
A Comparison of Spray Technologies

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The Challenges of Soybean Aphid:

- Soybean aphids reproduce rapidly.
  - Population all female in summer
  - Females give birth to live young
  - Young mature in ca. 5 days
  - Populations can double in 2-3 days
- Females produce young that will develop wings when faced with crowding, host or seasonal cues.
- Winged aphids readily spread through the landscape.
- Aphids suck soybean sap; affects growth, reduces photosynthetic capacity, lowers yields up to 40%.
- Infested fields show no symptoms when they should be treated.
- Scouting effort intense and prolonged (up to 2 months).
Insecticide Challenges

- Every survivor is female
- High reproductive potential
- Re-colonization may occur
- Sprays remove beneficials
- Products vary in initial efficacy, speed of kill, residual duration
Mgmt. Challenges

- Scouting nightmare: 6-8 wk window, invasive, explosive
- Build up too late for seed trts. or glyphosate tank mixes
- Other pest issues: rust, weed control, spider mites
- Outbreaks can swamp local applicators = delays
Insecticide Timing is Critical:
Tardy Detection or Delay in Application can have Big Impacts

Sprayed | 8/8 | None | 8/13 | 7/31

Yield (bu/A) | 42 | 36 | 42 | 55

Insecticides – Warrior @ 3.2 oz/A (7/31, 8/8),
Lorsban @ 1 pt/A (8/13) in 4 gpa by air
Insecticide Performance Depends on Several Factors

- **Soybean Aphid**
  - Density, canopy distribution, re-colonization

- **Soybean Crop**
  - Canopy development, crop phenology, row-spacing

- **Weather**
  - Rainfall, temperature (reproductive rate, effects on insecticides), wind

- **Application logistics**
  - Air vs ground; carrier volume; nozzle type, pressure and speed; adjuvants.

- **Insecticide Properties**
  - Toxicity, residual protection, repellency, natural enemies
Soybean Aphid Insecticides: Aerial vs. Ground on Full-Canopy Soybean

Noetzel, Holen, Holder & Holen – Fergus Falls, MN

Warrior applied at 3 oz/A in 12 gpa ground and 5 gpa air on July 30, 2003.
Soybean Aphid Insecticides:
Aerial vs. Ground on Soybeans after Peas
Ostlie, Ike, Newberg SkySpray, Broderius – Hector, MN

Warrior applied at 3 oz/A in 15 gpa ground and 5 gpa air on July 30, 2003.
Application Technology & Aphid Control

Ostlie, Price, Ike, Dahlco Seeds, Newberg SkySpray, MN - 2005

Purpose: Evaluate performance of 3 spray technologies (ground, conventional air, electrostatic air) in full-canopy soybean

Soybean Aphid Infestation:

Aug. 10: 1500-5000+ aphids/plant, distributed throughout plant

July 30: 50-350 per plant, >500/plant near farm grove

Soybean Crop: Dahlco 4120RR (1.2 maturity rating), R5 with full canopy (36” high, slightly lodged) on 30” row spacing. Slight to moderate moisture stress.

Insecticide Application (Aug. 10): Warrior T @ 2 oz/acre applied from 5:30 – 7 pm at 67-79°F, 60°F dewpoint, winds 0-3 mph N.

Air (conventional): 4 gpa from Air Tractor AT-502 PT6-15Ag traveling at 145 mph using CP nozzles to apply a 66’ swath.

Air (Electrostatic): 1 gpa from Eagle DW-1 traveling at 105 mph using Spectrum Sprayers system to apply a 66’s swath.

Ground: 20 gpa through 8004 nozzles @ 50-60 psi from a 854 Rogator traveling at 6 mph to apply a 90’ swath.
Soybean Aphid Insecticides: Comparing Technologies on Full-Canopy Soybean

Ostlie, Ike, Newberg SkySpray, Dahlco Seeds – Corvusco, MN

Warrior applied at 2 oz/A in 20 gpa ground, 4 gpa air, 1 gpa electrostatic on Aug. 10, 2005.

Treatment bars with the same letter do not differ (p=0.05).
The electrostatic system provided significantly better control of soybean aphids (99%) than either conventional air (79%) or ground (82.0%) application of Warrior T (2 oz/A).

Conventional air and ground application were equivalent, as seen in two previous studies.

Yields reflected aphid control 7 days after treatment. Yield protection from electrostatic application (+16.1 bu/A), exceeded conventional air (+10.8) or ground (+10.6).

Observations on distribution of surviving aphids indicates that both conventional air and ground applications only partially penetrated the full canopy while the electrostatic application penetrated completely.
Implications of Preliminary Research on Electrostatic System and Soybean Aphid

- Improved control of soybean aphids, particularly in full canopy soybeans, and possibly re-treatments.
- Potential to reduce insecticide application rates.
- Better yield protection.
- Greater efficiency of aerial application (1 gpa vs 3-5 gpa) reduces applicators’ fuel costs.
- Faster application reduces customer backlog and costly application delays during soybean aphid outbreaks.