Innovations in Citrus Weed Control

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Potential Orchard Floor Management Strategies

- Mechanical weed control only (mowing, disking, Perfecta cultivator)
- Post-emergence herbicides only (broadcast or spot treatment)
  - Broadcast herbicide applications waste chemical by spraying bare ground
  - High cost of manual spot spraying
  - Sensor controlled sprayers – reduce labor costs and avoid spraying bare ground
- Pre-emergence herbicides only
- Pre-emergence herbicides followed by post-emergence herbicides
  - Problem of broadcast sprays at low weed densities – use of sensor controlled sprayers
Weed Seeker Sensor Controlled Spray Nozzle
Weed Seeker Spray Unit

1: PhD600
Weed Seeker Boom Configuration
Weed Seeker Tree-Project Goals

The main objectives are:

1) to evaluate the potential for reduced herbicide use in Arizona tree crops with the Weed Seeker sprayer;

2) evaluate the utility of the Weed Seeker used with and without preemergence herbicides, and

3) collect tree yields and field operational data in order to develop crop budgets and determine the economics of using the sensor controlled sprayer technology.
Patchen Sprayer Project

- Constructed a prototype tractor-mounted sprayer using the Patchen WeedSeeker spray units
Patchen Sprayer Project

- Tractor mounted sprayer
Patchen Sprayer Project

- Tractor mounted sprayer
Patchen Sprayer Project

- Constructed a second WeedSeeker sprayer on a Kawasaki 4WD 3010 Mule
Patchen Sprayer Project

- Sprayer on Kawasaki 3010 4WD Mule
Patchen Sprayer Project

- Sprayer on Kawasaki 3010 4WD Mule
Patchen/Kawasaki Mule Sprayer
Patchen/Kawasaki Mule Sprayer
Patchen/Kawasaki Mule Sprayer
Digital Image Analyzed For Percent Weed Ground Cover
Digital Image Analyzed For Percent Weed Ground Cover

Spray Volume (gal/plot)

1st Roundup Application

Plots were 0.38 acres
H1 - Weed Seeker Sprayer, Roundup POST
H2 - Weed Seeker Sprayer, PREE + Roundup POST
Volume of Spray Per Plot (GPA)

H1 – Weed Seeker-POST
H2 – PREE followed by Weed Seeker-POST
H3 – Conventional POST
**Percent of Ground Surface Sprayed**

- **H1** – Weed Seeker-POST
- **H2** – PREE followed by Weed Seeker-POST
- **H3** – Conventional POST

### Bar Graph

- **Percent of Ground Sprayed**
- **Patchen/Perfecta Treatments**

Weed Seeker Project Results & Current Activity

- Weed Seeker optically detects and sprays weeds; does not spray bare ground.
- Chemical and spray volume use was reduced an average of 53% in 2001 with a range of 29 to 70% depending on treatment.
- Lowest chemical and spray volume amounts were associated with low weed densities (~3.5% ground cover).
- Preemergence herbicide use significantly reduced weed densities compared to total postemergence herbicide treatments.
- Collaboration with Trent Teegerstrom to work on economics of Weed Seeker sprayer use.
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