



# Innovations in Citrus Weed Control

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Dr. William B. McCloskey  
Department of Plant Sciences  
Cooperative Extension  
University of Arizona



## Potential Orchard Floor Management Strategies

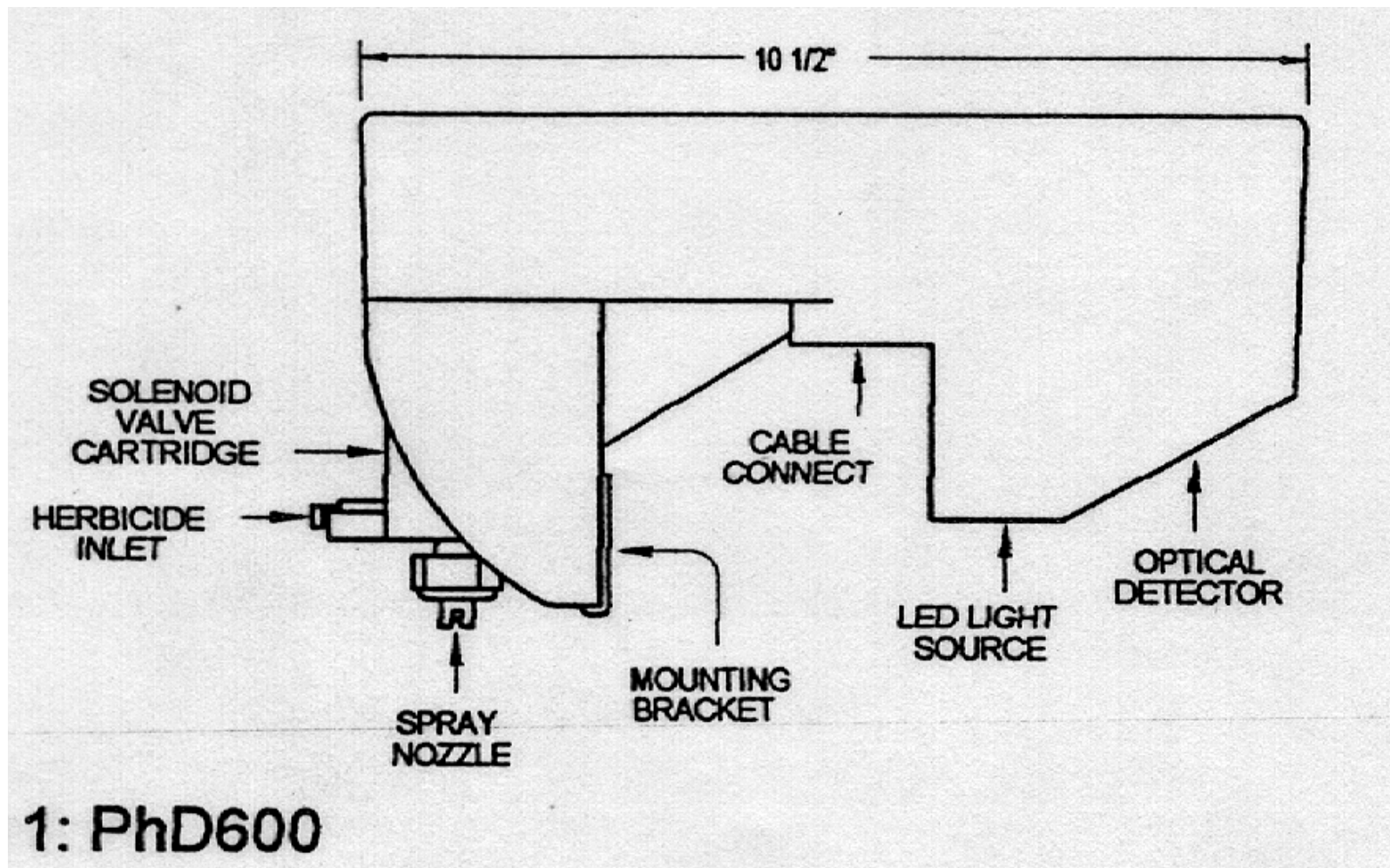
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- Mechanical weed control only (mowing, disking, Perfecta cultivator)
- Post-emergence herbicides only (broadcast or spot treatment)
  - Broadcast herbicide applications waste chemical by spraying bare ground
  - High cost of manual spot spraying
  - 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

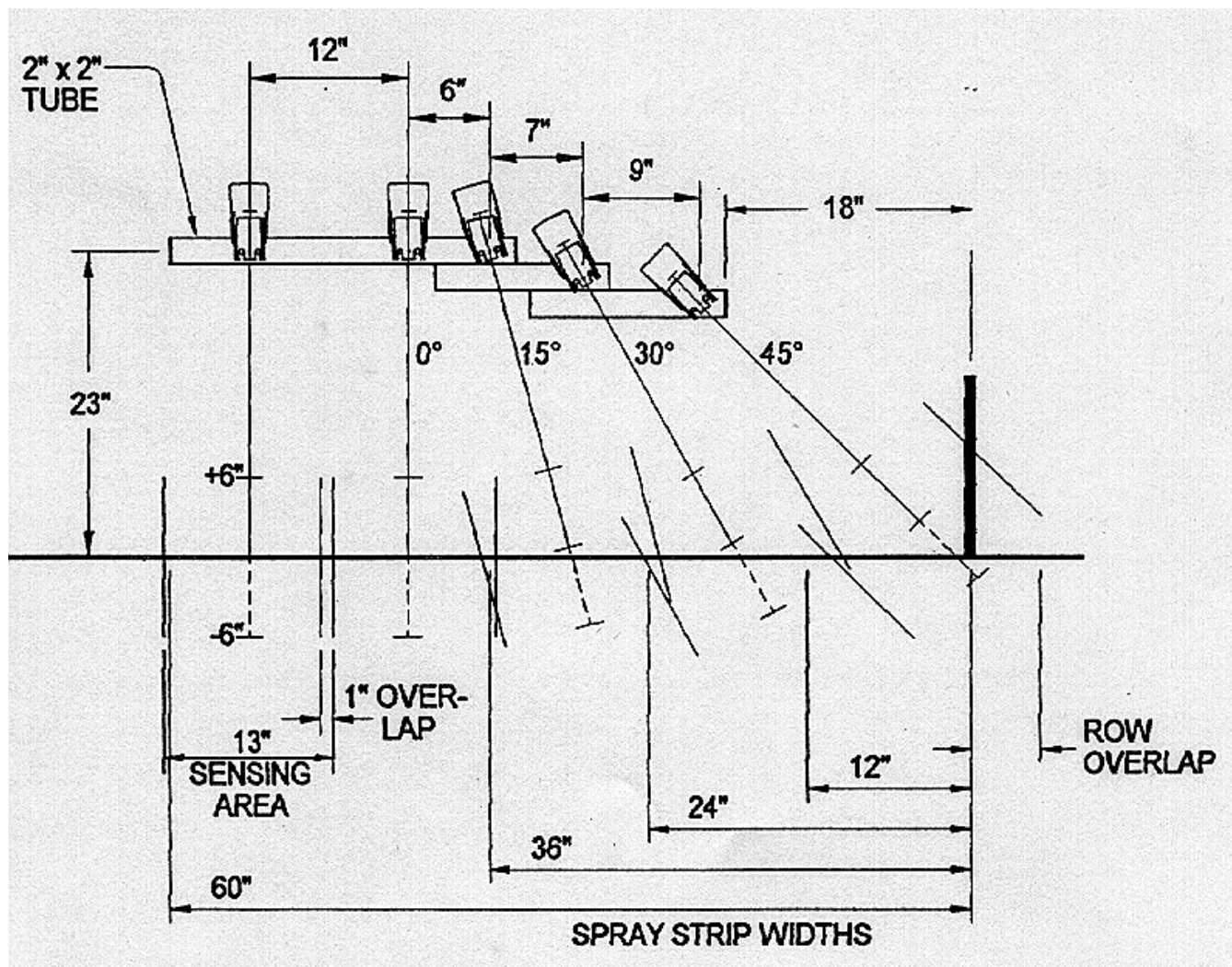
# Weed Seeker Sensor Controlled Spray Nozzle



# Weed Seeker Spray Unit



# Weed Seeker Boom Configuration





## Weed Seeker Tree-Project Goals

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- 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



# Patchen/Kawasaki Mule Sprayer





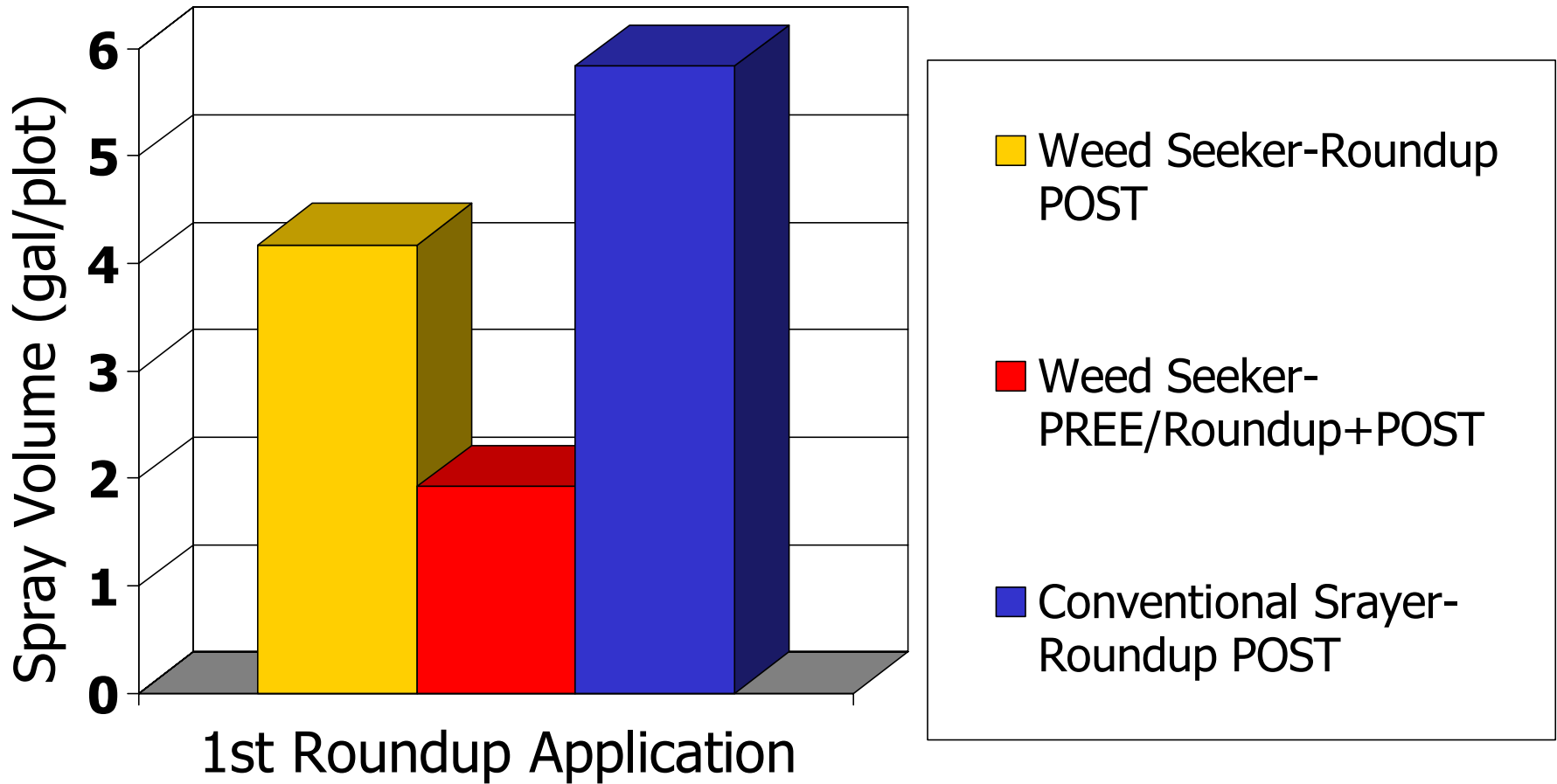
# Digital Image Analyzed For Percent Weed Ground Cover



# Digital Image Analyzed For Percent Weed Ground Cover



# Roundup Ultramax Spray Volumes – Oct. 15, 2001



Plots were 0.38 acres



# H1 - Weed Seeker Sprayer, Roundup POST





## H2 - Weed Seeker Sprayer, PREE + Roundup POST

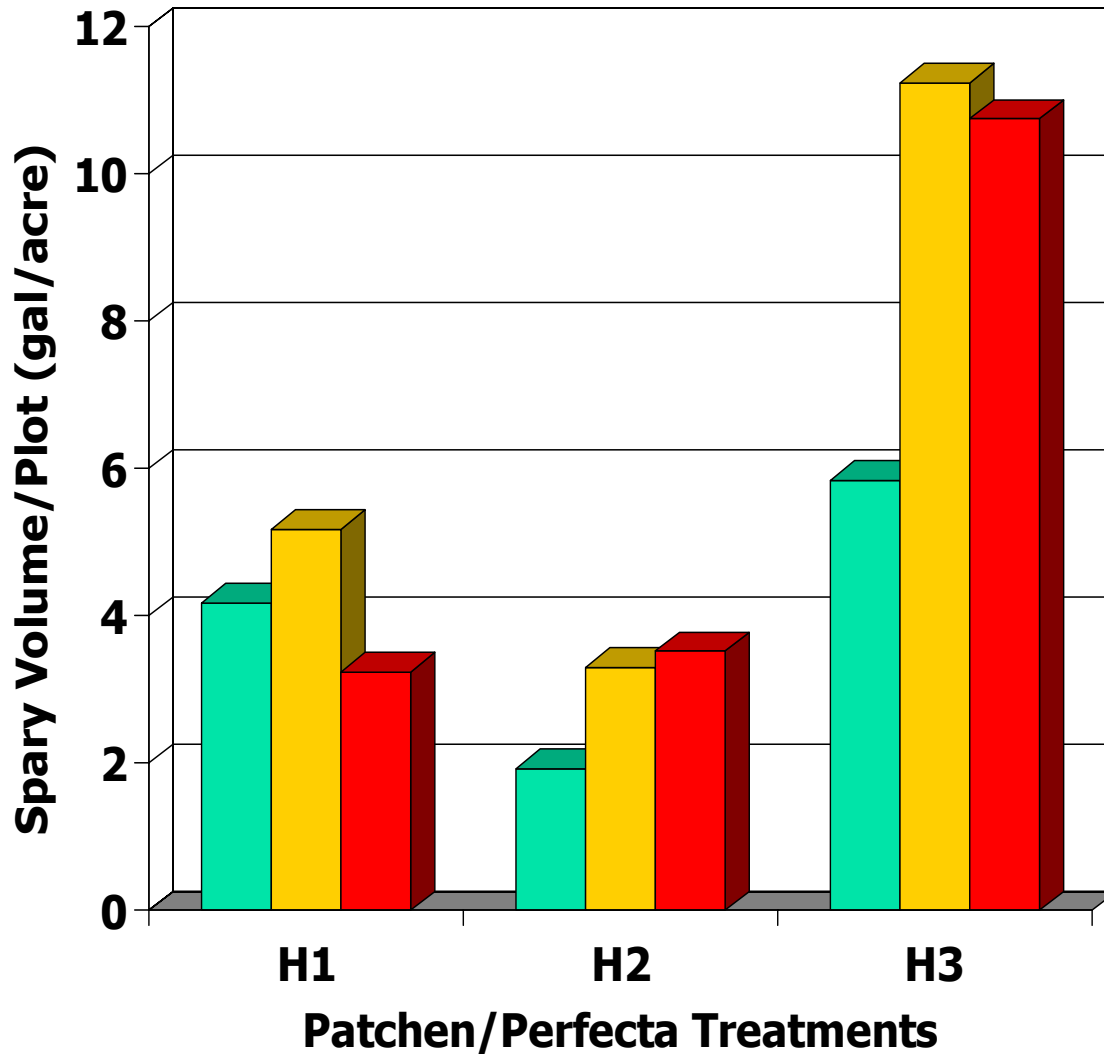




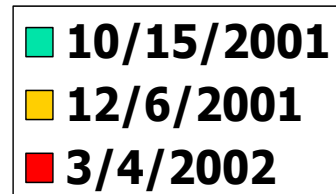
## H3 - Conventional Sprayer – Roundup POST



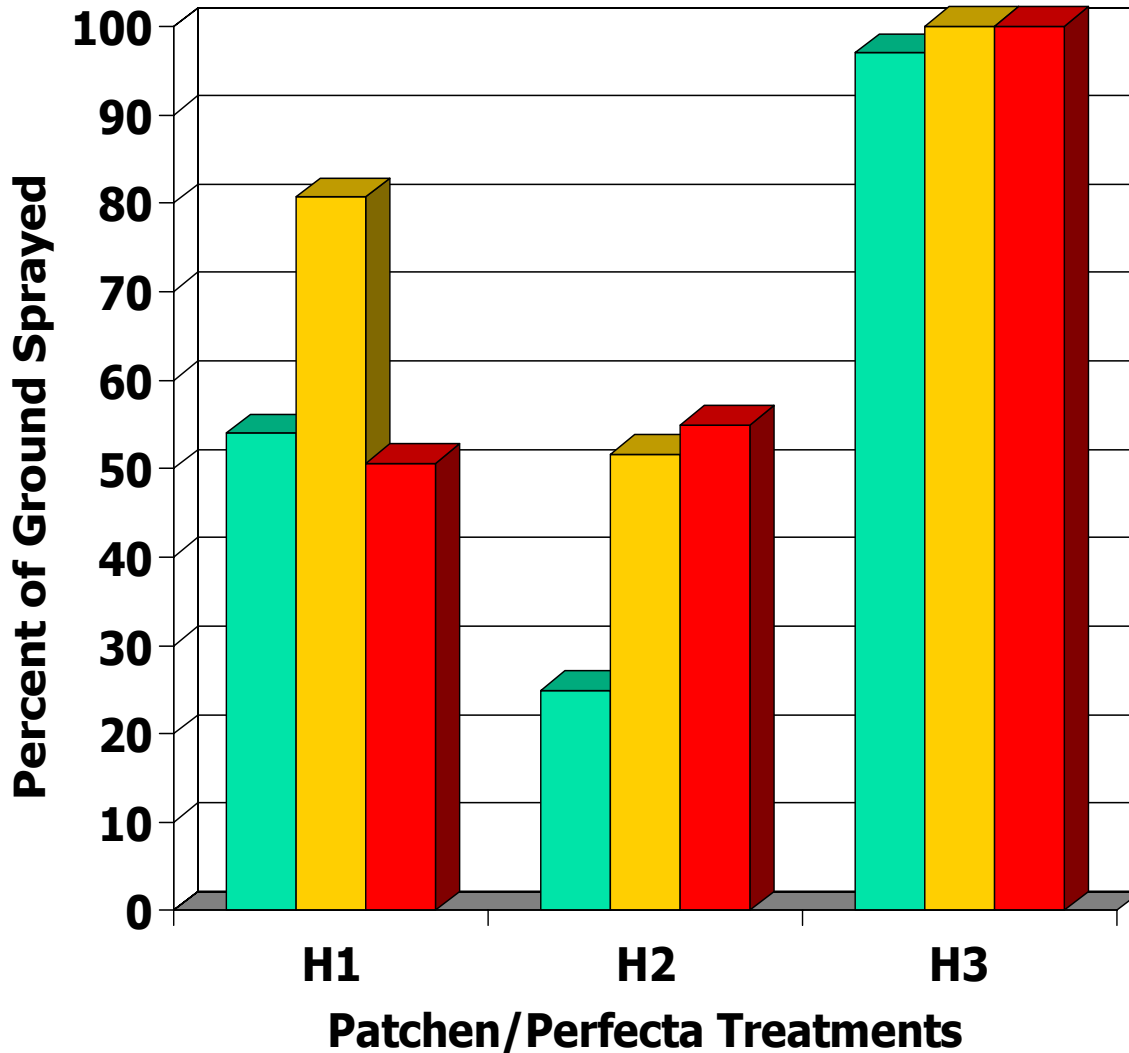
# Volume of Spray Per Plot (GPA)



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

10/15/2001  
12/6/2001  
3/4/2002





## Weed Seeker Project Results & Current Activity

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- 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.
- Thanks for support from:
  - Arizona Citrus Research Council
  - Yuma Mesa Pest Abatement District
  - University of Arizona Cooperative Extension IPM Grant
  - Arizona Department of Agriculture – Specialty Crops Grant Program
  - Glen Curtis for use of an orchard block