



PURDUE
UNIVERSITY

Weed Science

Latest Developments in Site-Specific Weed Management



Indiana CCA Conference

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Targeted Herbicide Application Technology

- ❑ Real-time camera-based weed detection systems
- ❑ Many companies developing targeted spray systems
 - Green-on-brown
 - Green-on-green
- ❑ System features vary by manufacturer:
 - Nozzle activation: Single (even) or multiple (tapered)
 - Spray nozzle direction: Downward or backward
 - Single- or Dual-tank
 - Sprayer retrofit options available

Precision Spraying Entities *Does not include drones

COMPANY	PRODUCT
 JOHN DEERE	See & Spray Ultimate, Premium
 CNH INDUSTRIAL	 AUGMENTA
 AGCO <small>Your Agriculture Company</small>	WeedSeeker   bilberry
 Greeneye™ TECHNOLOGY	Greeneye Sprayer
 BASF  BOSCH	 ode <small>ONE SMART SPRAY</small>
 WEED-IT <small>precision spraying</small>	Quadro
 AMAZONE	Amaspot
 agrifac	AicPlus
 DAT <small>Dimensions Agri Technologies</small>	Ecopatch
 DeepAgro	Sprai
 SOLINFTEC	Solix
 Carbon Bee	Smart Striker X
 ecorobotix	ARA

<https://www.linkedin.com/in/shanethomasag/recent-activity/all/>

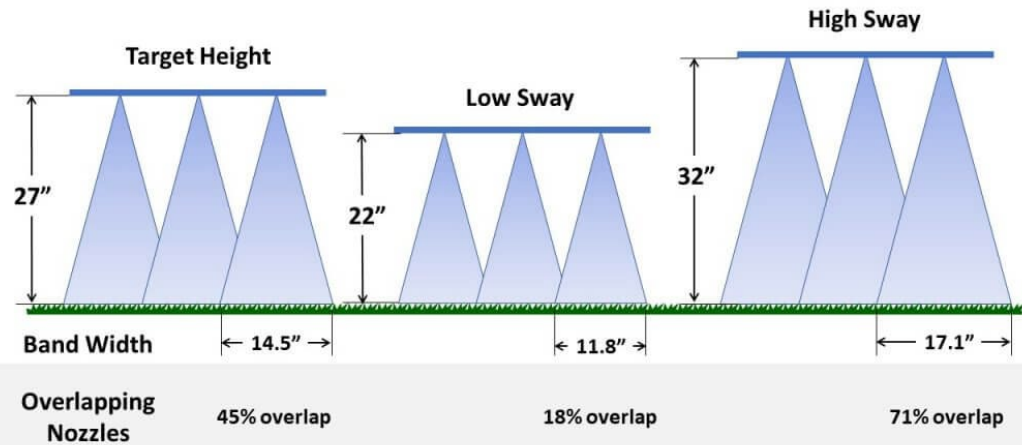
Potential Impact on Weed Management

- ❑ Reduce total herbicide use per acre
 - Can help reduce environmental contamination, drift, and runoff (ESA compliance)
 - Increased profit potential due to reduced input costs
- ❑ Can increase weed control / whole farm efficiency
 - Increase use of full rates of more effective/expensive herbicide products.
 - Less time required for sprayer fill-ups
- ❑ Reduce crop injury and herbicide antagonism



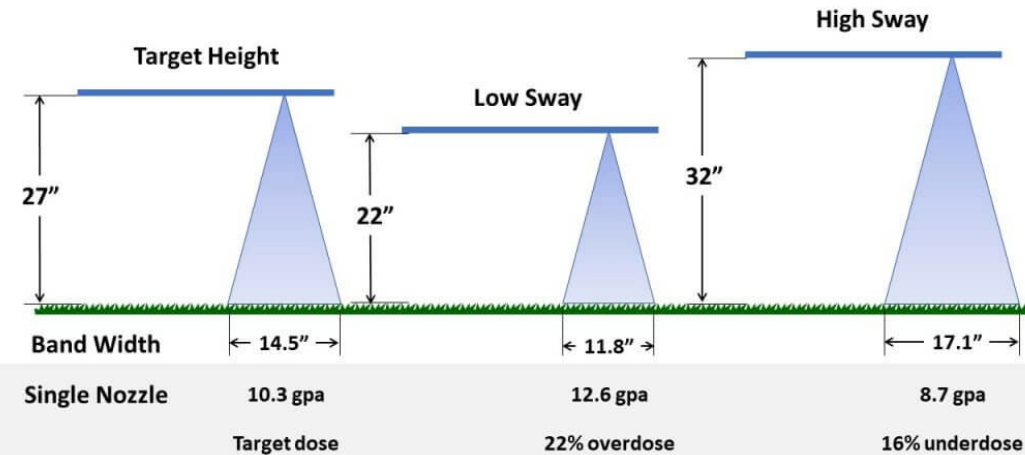
Multiple Nozzle Activation (Tapered)

30° fan, 10" Spacing



Single Nozzle Activation (Even)

30° fan, 10" Spacing



- Lower impact of spray boom height variations.
- Lower chance of missing weeds or delivering the wrong herbicide dose.
- Less herbicide volume savings

- Greater herbicide volume savings
- More sensitive to boom height variations leading to greater risk of missing weeds or delivering the wrong herbicide rate.

Single or Dual-Tank Options

Single-Tank



- Cheaper
- Retrofit options available
- Easier (simpler) mixing and loading



Dual-Tank – See & Spray Ultimate

- Opportunity to broadcast soil residual herbicides while target spraying emerged weeds
- Opportunity to solve many herbicide antagonism issues

A Dual-Tank Spray System Resolved Clethodim Antagonism From Dicamba on Volunteer Corn



See & Spray Technology Research

- Agronomy Test Machine (ATM) equipped with John Deere See & Spray™ Ultimate system



How Much Money Can I Save?

- ❑ It depends...
- ❑ Many factors will influence herbicide savings and the long-term success of the system. Fields with low weed density are preferred.
- ❑ Growers' focus should be on making successful herbicide applications to guarantee long-term effective weed control.



MONEY MATTERS

Factors Affecting Herbicide Savings at POST

- Field weed pressure (weed seedbank)
- Herbicide program and application timing:
 - POST only – Multiple POST passes are likely needed
 - Two-pass (PRE followed by POST w/ residual) – Dual-Tank
 - Three-pass (PRE, early overlapping residual, POST) – Single-Tank
- Cover crops
- Model sensitivity
- Nozzle type, angle, and spacing
- Lateral and longitudinal buffers
- Travel speed, topography, and dust



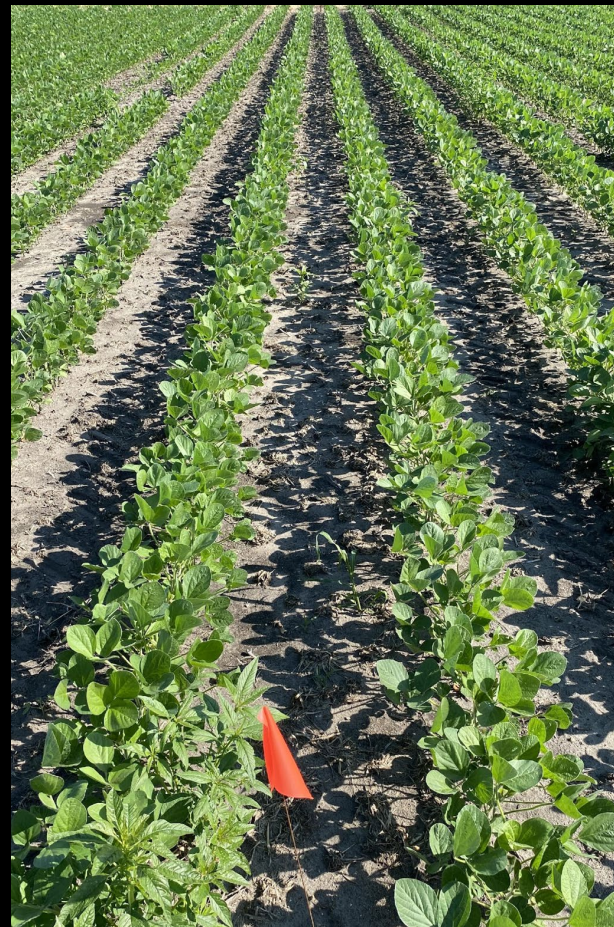
Waterhemp Density at POST – Francesville, IN

No Cover Crop + No PRE

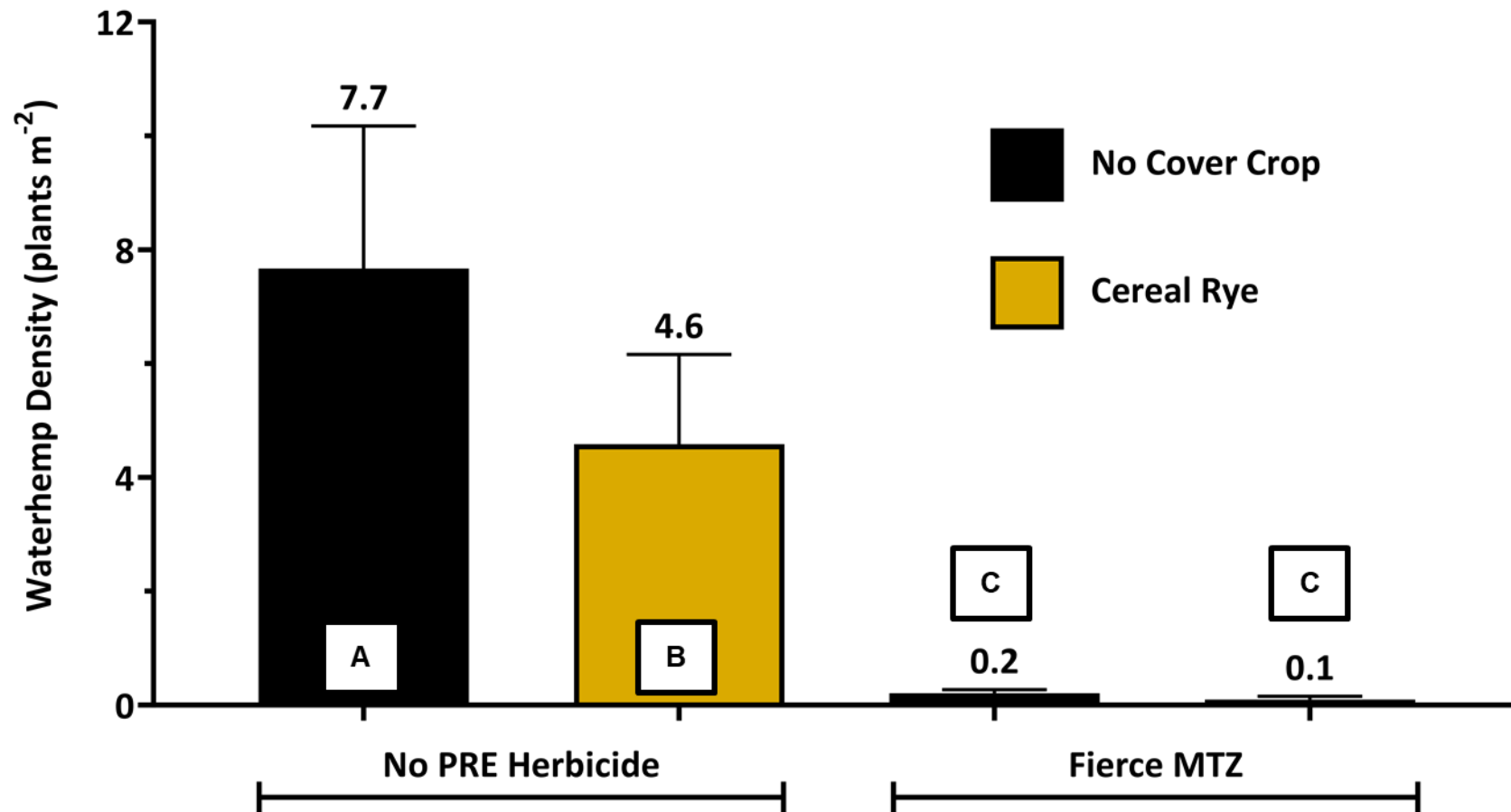
Cereal Rye + No PRE

No CC + Fierce MTZ

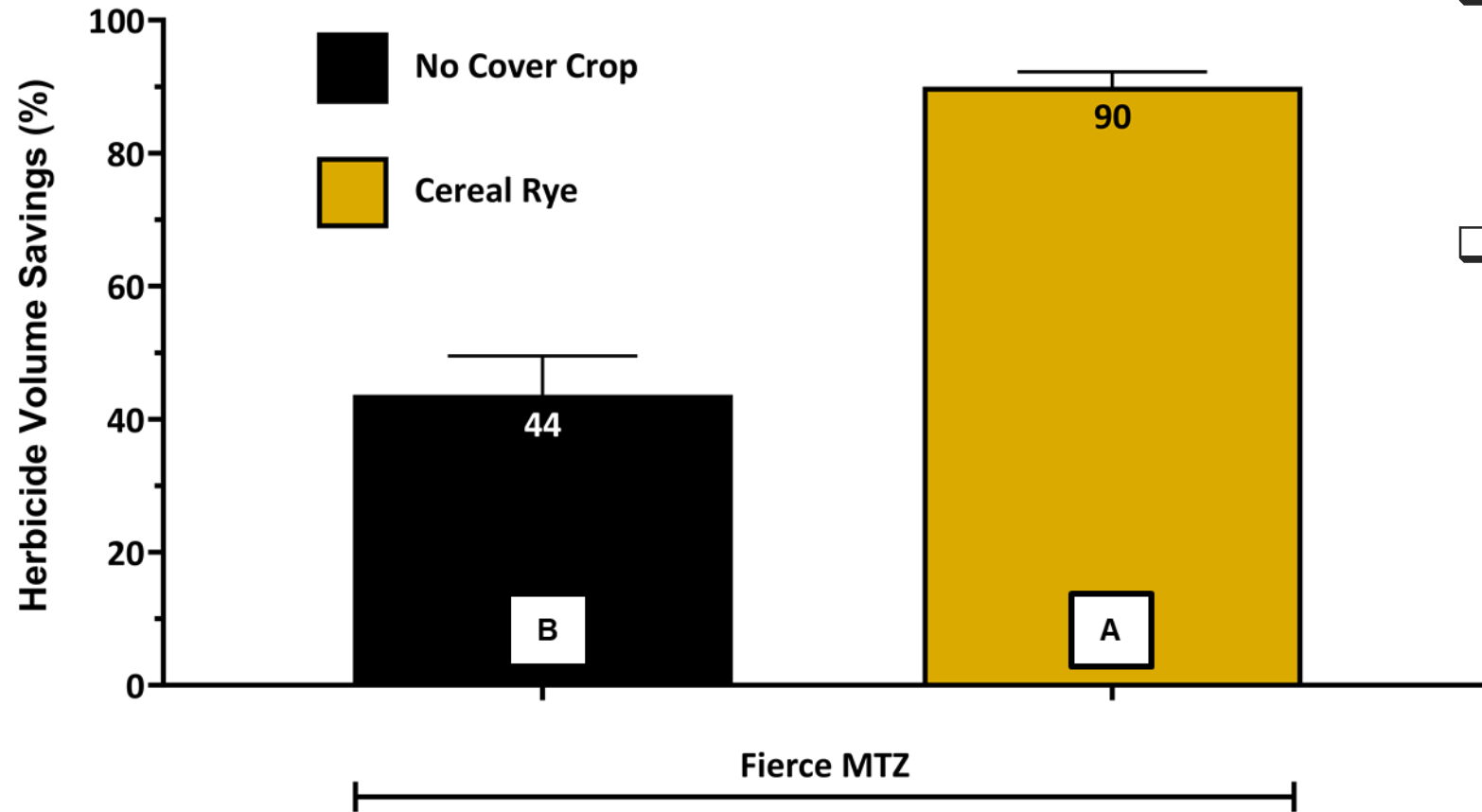
Cereal Rye + Fierce MTZ



Waterhemp Density at POST (plants m⁻²) – Francesville, IN



Herbicide Spray Volume Reduction at POST (%)



- Small differences in weed density and size at POST may have a significant impact on herbicide volume savings.
- Integrated weed management strategies that reduce weed density at POST are recommended:
 - Full rates of PRE herbicides at planting
 - Cover crops
 - Earlier POST apps with overlapping residuals.

Disclaimer: Treatments applied with John Deere See & Spray Ultimate using experimental methods. Specific application methods and herbicide treatments may not be supported commercially. Read and follow all pesticide labels.

Reducing POST Herbicide Injury Using Target Sprays



Factors Affecting Hit Rate and Herbicide Coverage

- Crop model sensitivity
- Weed species, size, density, and distribution
- Lateral and longitudinal buffers
- Nozzle type and spray angle
- Swath displacement (wind speed and direction)
- Topography and sprayer ground speed



Recap - Potential Impacts of Target Spray Tech

- Reduce total herbicide use per acre
 - Reduce environmental contamination, drift, and runoff (ESA compliance)
 - Increased profit potential due to reduced input costs
- Can increase weed control / whole farm efficiency
 - Increase the use of full rates of more effective/expensive products
 - Less time required for sprayer fill-ups
- Reduce crop injury and herbicide antagonism
- For long-term success with targeted sprays, growers should not compromise weed control to increase short-term herbicide savings



Questions?

