Air Induction Nozzles – Why are applicators still using flat-fan nozzles?

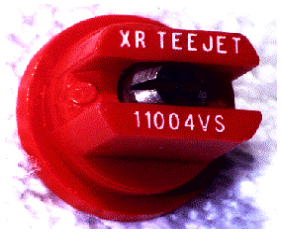
Pesticide Stewardship Conference

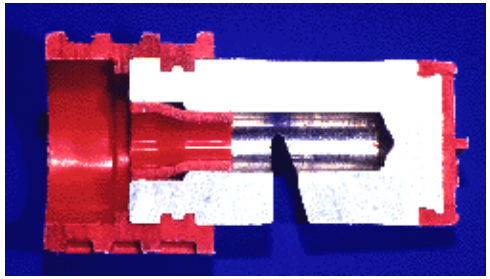
Feb. 8, 2012

Boise, ID

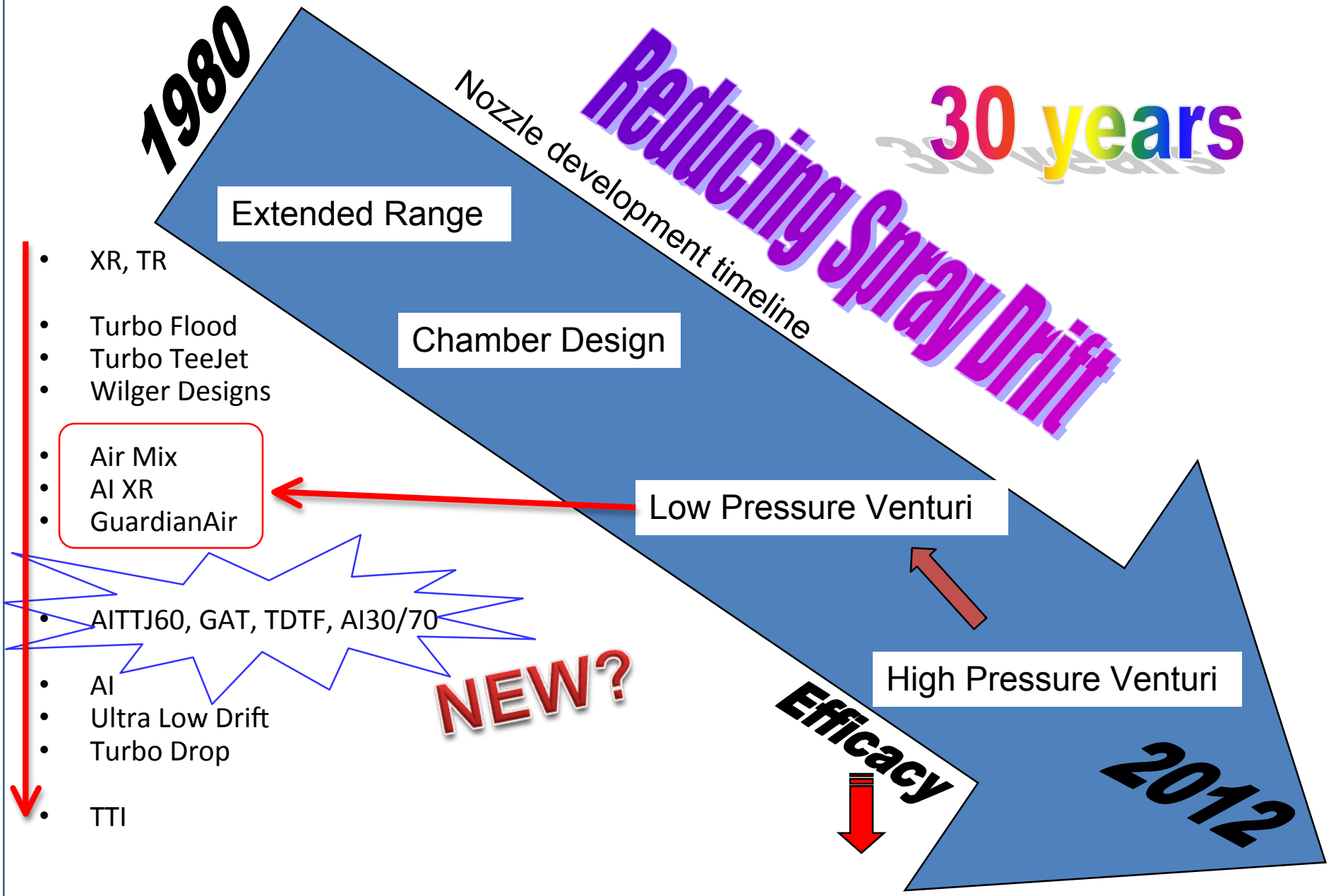
Nozzle Technology:

- Nozzles designed to reduce drift
- Improved drop size control
- Emphasis on ‘spray quality’

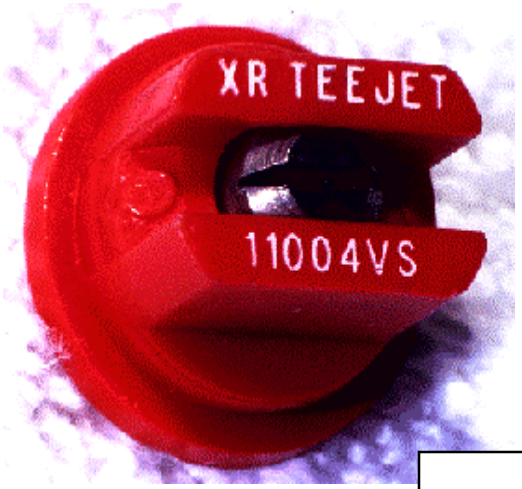


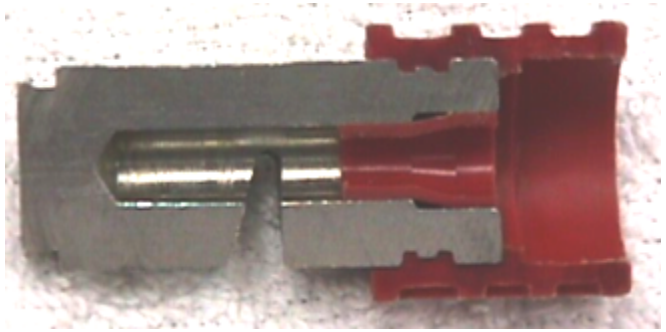


Nozzle Design/Nozzle Efficacy/Drift Trends



Nozzle Types





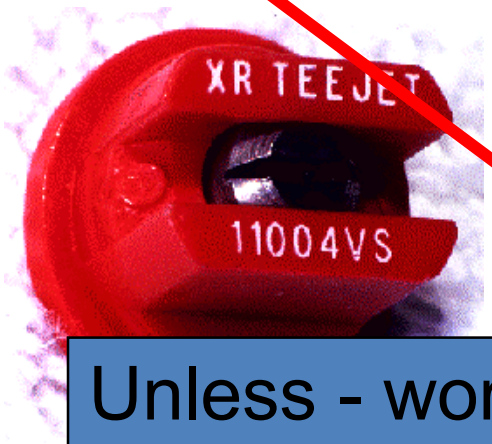
Flat Spray Patterns

flat-fan

chamber

air induced

Extended Range Flat-Fan



- Spray Pattern width: 80° and 110°
- Operating PSI: 15-60 PSI
- Tapered edge flat spray pattern
- Overlap required: 50% -60% for
- Nozzle Spacing: [illegible]
- Optimum [illegible] 30” above
- Recommended PSI: 20-25 PSI

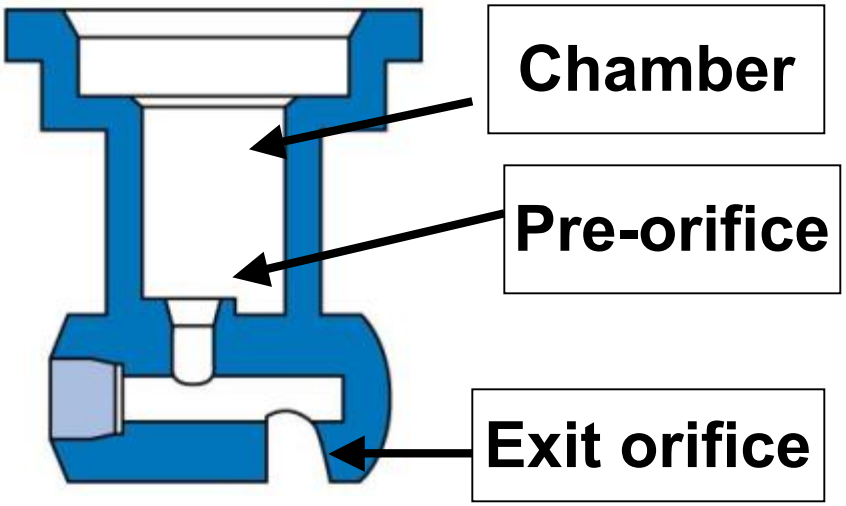
Unless - working with higher application volumes

10 GPA and above - Fungicides

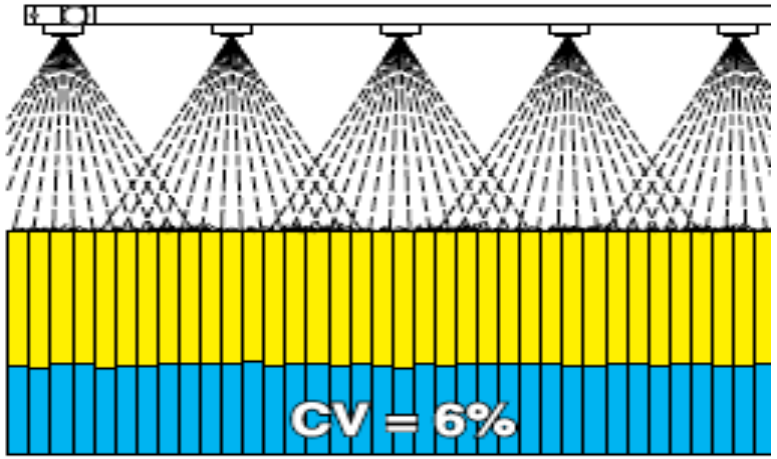
Drift Potential to high compared to other nozzle options

Nozzle Types

Turbulation Chamber Flat-fan:

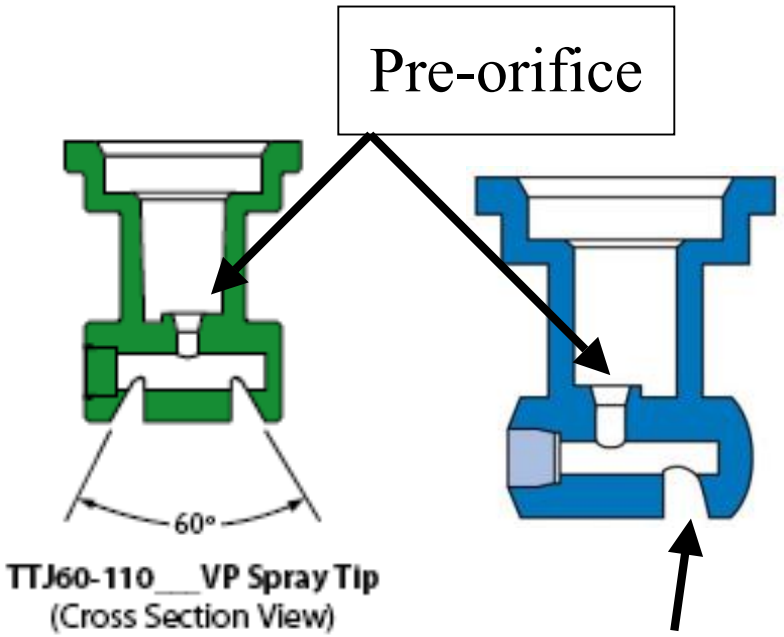


- Spray Pattern width: 110° but more like 125° – 130°
- Operating PSI: 15-90 PSI
- Tapered Edge flat spray pattern
- Overlap required: 50%-60% (20-30% each edge)
- Nozzle Spacing: Typically 20”
- Optimum spray height: 20” above target
- Recommended PSI: 30-40 PSI



Turbo Flat-fan Twin:

- Dual outlet
- Superior leaf coverage
- Droplet range slightly larger that comparable TT flat-fan



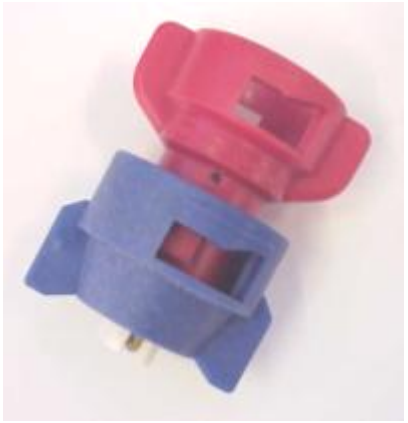
TTJ60-110___VP Spray Tip
(Cross Section View)

Turbo TwinJet – TTJ60

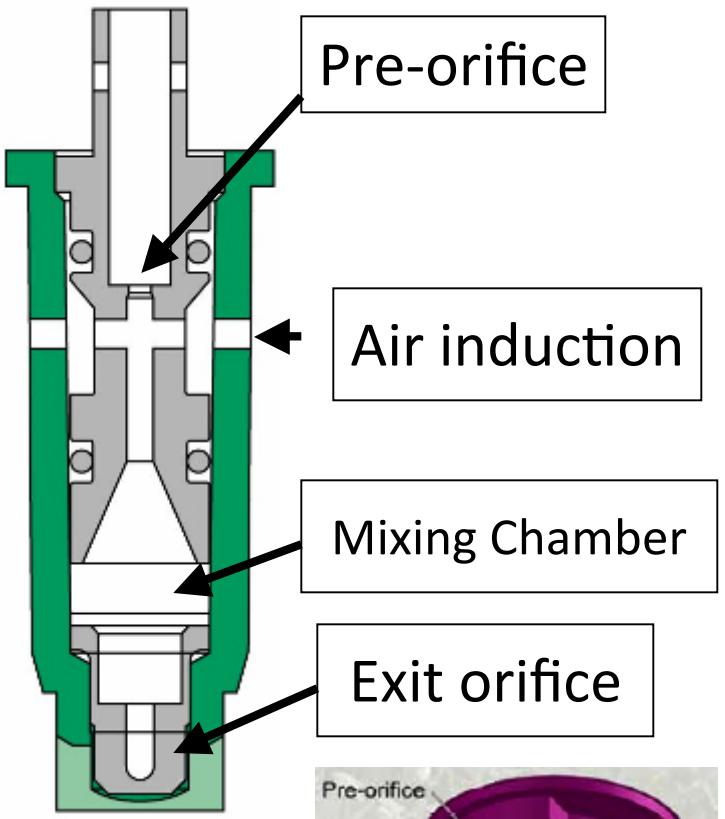
Nozzle Types

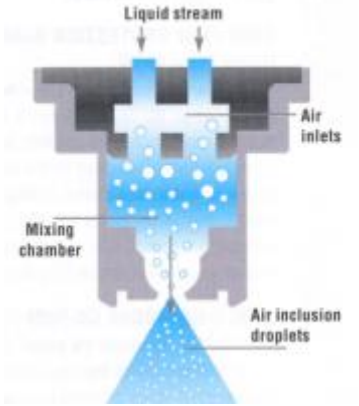
Air-Induction/Venturi Nozzles:

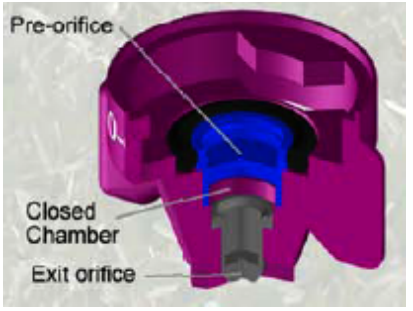
Where air is drawn into the nozzle cavity and exits with the fluid.



Pre-Orifice VENTURI Nozzles:







High Pressure Venturi Designs:

- Spray Pattern: 80° and 110°
- Operating PSI: 30-100 psi
- Tapered Edge flat spray pattern
- Overlap required: 50%-60% for uniform application (20-30% each edge)
- Nozzle Spacing: Typically 20”
- Optimum spray height: 80° - 30” above target or 110° - 20” above target
- Recommended PSI: 50-80 PSI

Turbulation Chamber w/Venturi:

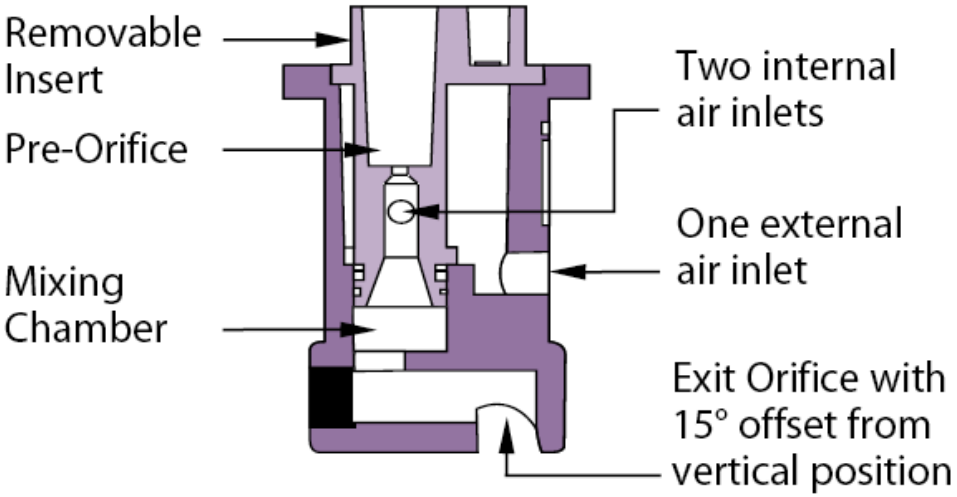
Air Induction Nozzle for Maximum Drift Control

Single Outlet

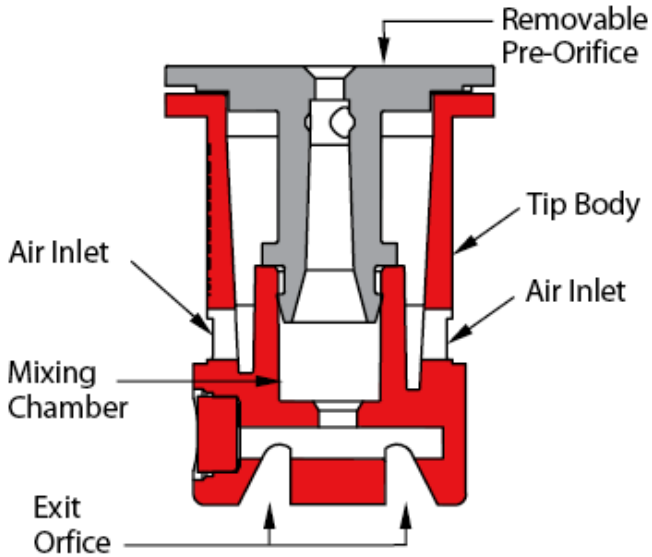
Doubl e Outlet

Turbo Induction - TTI

Al Turbo TwinJet – AITTJ60



TTI110___-VP Spray Tip
(Cross Section View)



AITTJ60-__VP Spray Tip
(Cross Section View)

Turbo Venturi Design:

- Spray Pattern: 110°
- Operating PSI: 15-100 psi
- Tapered edge flat spray pattern
- Overlap required: 50%-60% for uniform application (20-30% each edge)
- Nozzle Spacing: Typically 20”
- Optimum spray height: 110° - 20” above ground
- Recommended PSI: 50-80 PSI

Turbo Twin Venturi Design:

- Spray Pattern: each outlet 110° with 60° between twin outlets
- Operating PSI: 20-90 psi
- Tapered Edge flat spray pattern
- Overlap required: 50%-60% for uniform application (20-30% each edge)
- Nozzle Spacing: Typically 20”
- Optimum spray height: 110° - 20” abovetarget
- Recommended PSI: 40-50 PSI

Improving Potential For Efficacy

AirMix® Nozzles

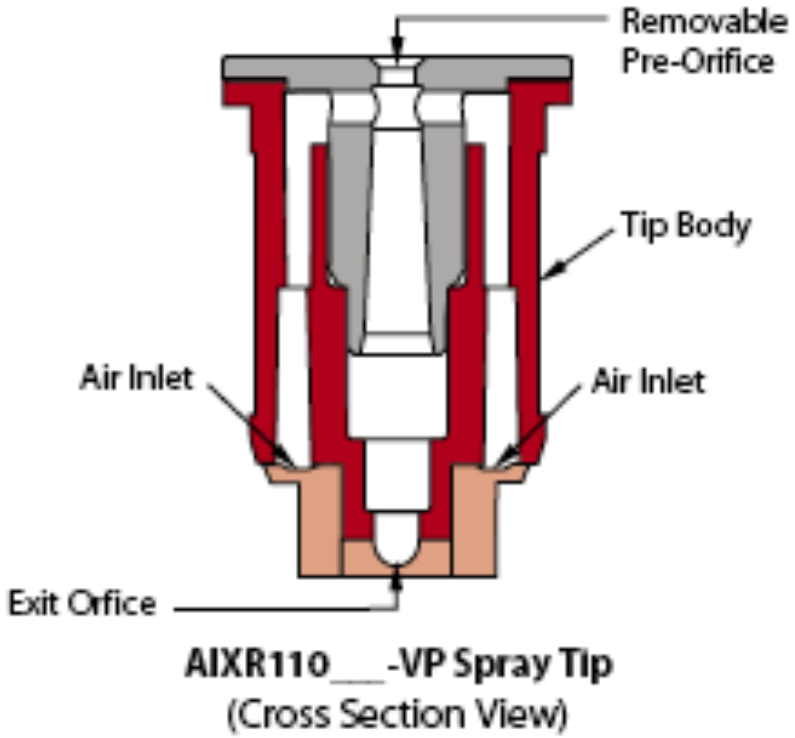
Greenleaf Technologies AIRMIX® 1-800-881-4832

Drift control made easy.

- Advantages
- Application Guidelines
- Droplet Size / Drift Data
- Article: New way of 'plowing' helps grower

Return to Top

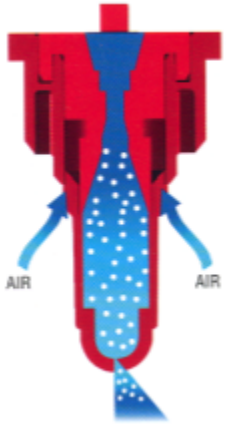
AI XR TeeJet:



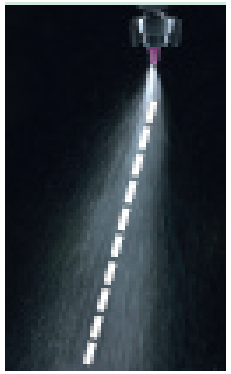
AIXR110___-VP Spray Tip
(Cross Section View)

- **XR outlet with venturi air aspirator**
- **More compact than AI style**
- **Not as much of a pressure drop as AI**
- **2-piece with removable pre-orifice**
- **Recommended pressure range 15 – 90 PSI (40)**

GuardianAir Induction:



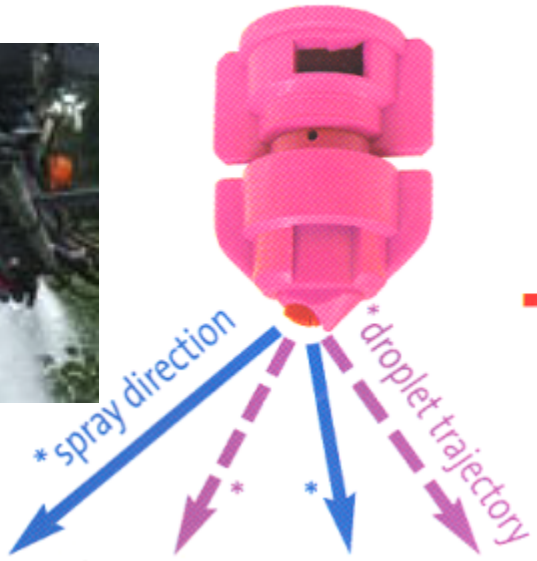
- More consistent droplet
- All-in-one cap and screen
- Wide angle with 15 degree incline toward the rear
- Aim forward or rearword – alternate?

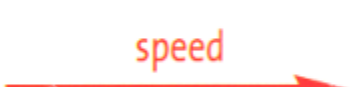


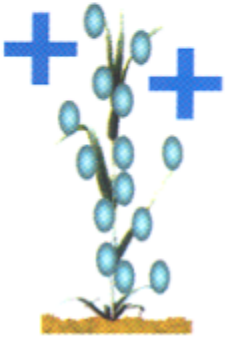
GuardianAir

	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI
GA110-015	XC	XC	VC	C	C	C	M	M	M	M
GA110-02	XC	XC	VC	C	C	C	M	M	M	M
GA110-025	XC	XC	VC	C	C	C	C	C	M	M
GA110-03	XC	XC	VC	C	C	C	C	C	M	M
GA110-035	XC	XC	VC	C	C	C	C	C	M	M
GA110-04	XC	XC	VC	C	C	C	C	C	M	M
GA110-05	XC	XC	VC	C	C	C	C	C	M	M

TurboDrop® Dual Fan





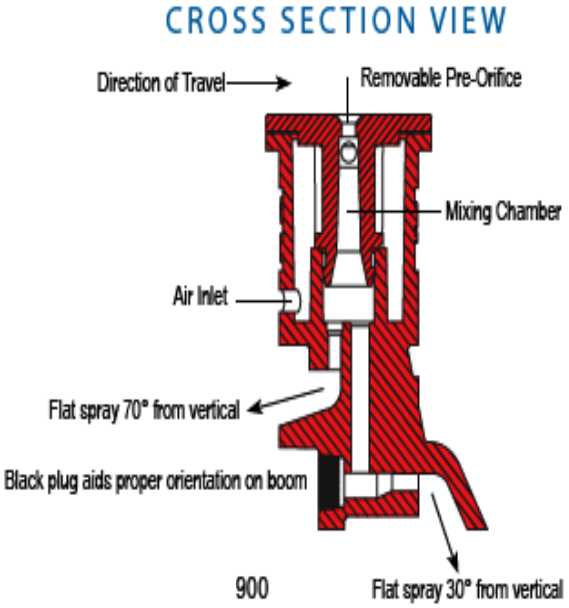


GREENLEAF TECHNOLOGIES

AI3070

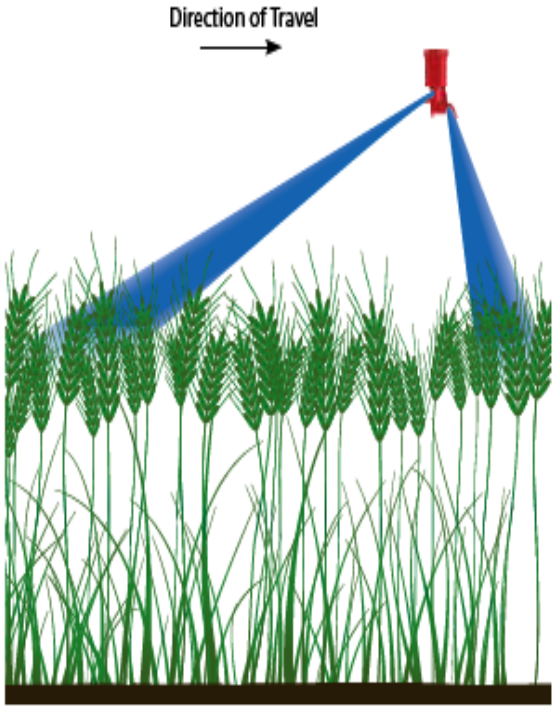
TEEJET®

AIR INDUCTION DUAL
PATTERN FLAT SPRAY TIPS



AI3070 Features & Benefits

- AI3070 produces two wide angle, flat spray patterns for uniform coverage in broadcast applications
- 30° forward tilted spray penetrates dense crop canopies, while the backward tilted 70° spray maximizes coverage of the crop seed head
- Drift resistant drops are produced through the use of a venturi air aspirator
- Large, round, free passages minimize clogging
- All acetal construction for excellent chemical and wear resistance
- Removable pre-orifice for fast and easy cleaning
- Automatic alignment with the use of CP98578-1-NY cap
- Suggested spray pressure range of 20 to 90 PSI (1.5 - 6 bar)



GuardianAIR Twin™

The GuardianAIR Twin tip produces twin high droplet-count medium sprays using precisely tuned air induction technology.

FEATURES & BENEFITS:

- Ideal for high-coverage application of post-emerge plant health protectants
- High-coverage forward and rear facing fans help penetrate complex canopies requiring more thorough coverage
- Incorporates the fundamental characteristics of uniform coverage and reduced drift from the world-renowned GuardianAIR tip range
- Engineered to provide better coverage with more drops per gallon compared to other air-induced sprays
- Easy-to-install, patent-pending locking ring and o-ring seal design makes installation a snap and sealing a sure thing
- Dust is sealed out by the locking ring to reduce contamination of the nozzle when removing it from the sprayer
- Integrated strainers are matched to the nozzle size to prevent over-straining or plugging
- Available in sizes 02 - 08 (including 025) and color coded to indicate the flow for the entire spray assembly

Nozzles-Recommended Use

flat spray **20-25 PSI**

chamber **30-40 PSI**

Low Pressure Venturi **40 PSI**

High Pressure Venturi **50-80 PSI**

Evaluation of Drift Reduction Nozzles and Adjuvants for Glyphosate-Dicamba Applications

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Methods


YAMAHA
GRIZZLY


CAPSTAN
Ag Systems, Inc.
10
20
30
40
50
60
70
80
90
CLOSE
OPEN
PSI
OFF
PWM%
SharpShooter™

Methods

- Spray volume = 94 L/ha (10 GPA)
- Spray speed = 21 km/h (13 MPH)
- Nozzle spacing and height = 51 cm (20 inches)
- Spray mixtures
  - Glyphosate at 840 g ae/ha (0.75 lb ae/A)
  - Dicamba at 280 g ae/ha (0.25 lb ae/A)
  - Ammonium sulfate at 3.0% v/v when required
  - Interlock used with all nozzle types;
  - Control, Array, and Border used with 1 nozzle type

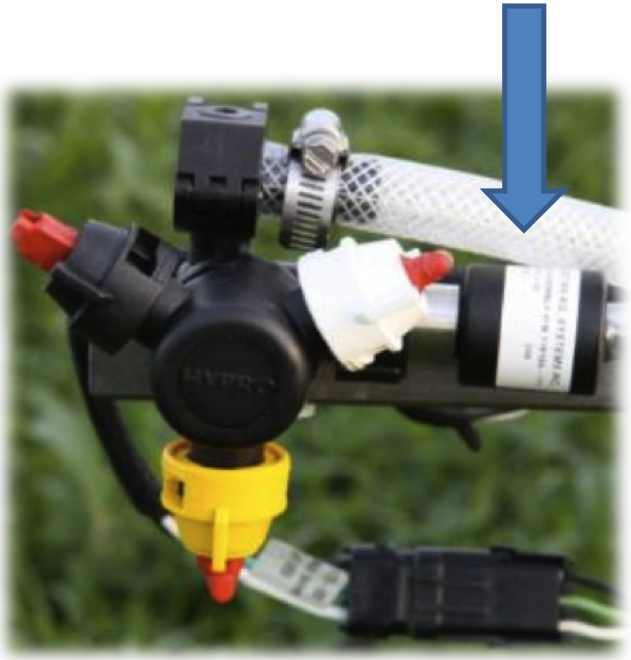
Methods

- Two experiments:
  - 1st on weeds 15 cm (6 in.) in height
  - 2nd on weeds 51 cm (20 in.) in height in corn
- Ratings for test one at 10, 19, and 26 DAT
- Ratings for test two at 8, 14, 28 DAT
- Droplet size analyzed using Sympatec Helos laser diffraction droplet sizing system w/spray solutions



Methods - nozzle types

- Turbo TeeJet: TT11004 at 331 kPa (48 PSI)
- Turbo TeeJet Induction: TTI11004 at 331 kPa (48 PSI)
- Air Induction Extended Range: AIXR11004 at 331 kPa (48 PSI)
- Air Induction Turbo TwinJet: AITTJ60-11004 at 331 kPa (48 PSI)
- Extended Range: XR11006 at 303 kPa (44 PSI) w/70 % duty cycle using pulse width modulation



Methods

- All nozzles tested with and without Interlock at 292 ml/ha (4 fl oz/A)
- Turbo TeeJet tested with:
  - Control at 59 ml per 379 L (2 fl oz per 100 gal)
  - Array at 4.1 kg per 379 L (9 lbs per 100 gal)
  - Border at 2.5% v/v
- 3 replications in RCBD for both tests

INTERLOCK

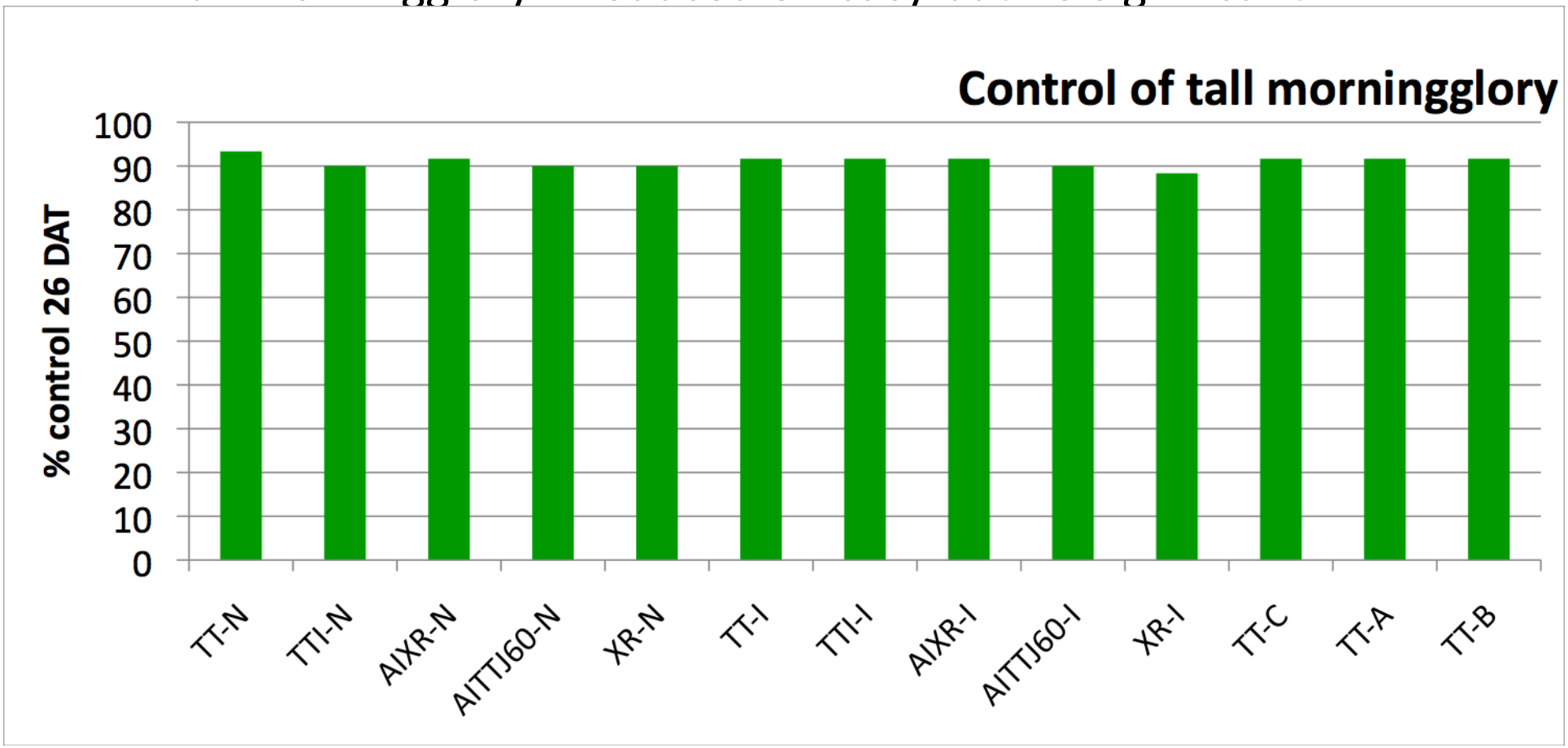
CONTROL™

ARRAY

BORDER

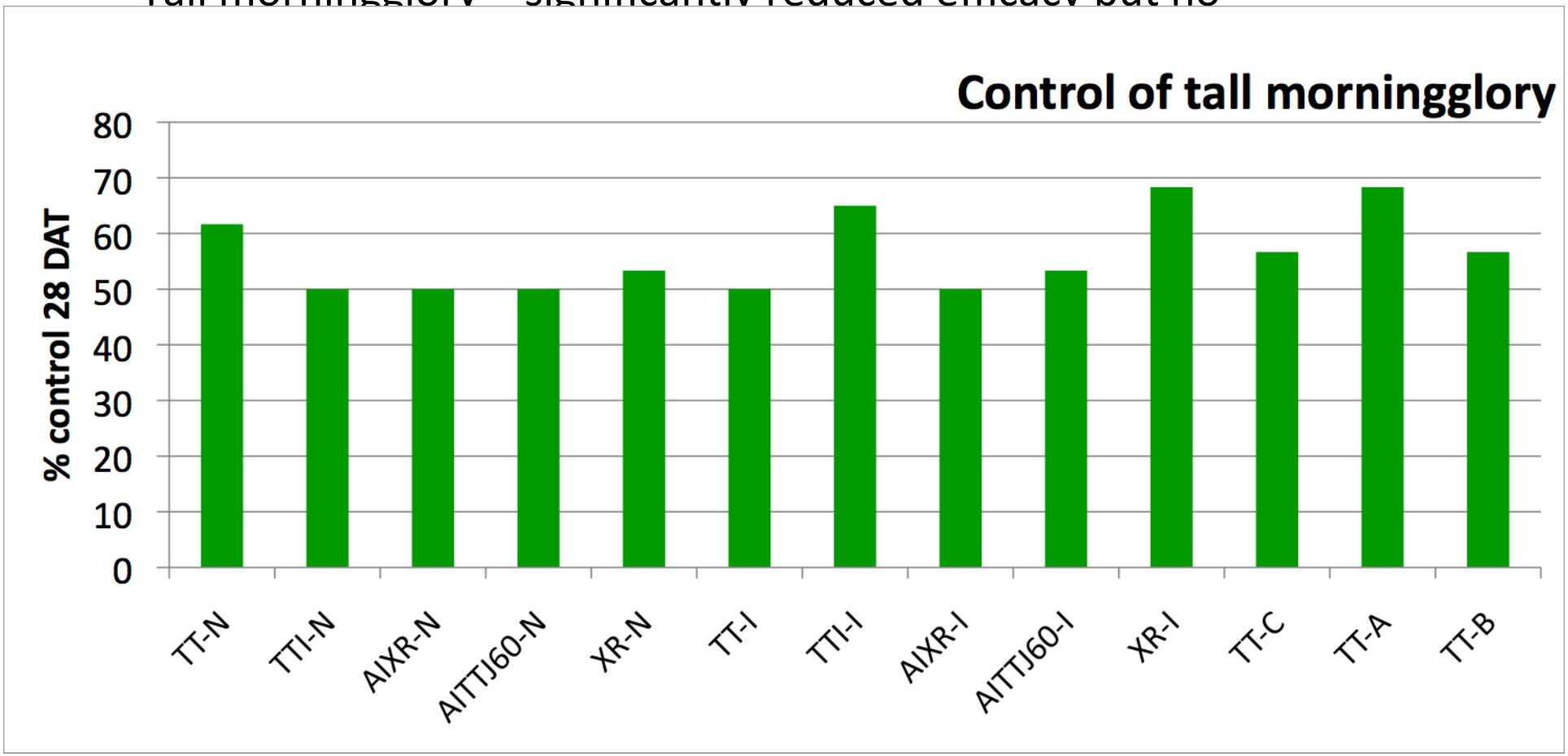
Weed Control Efficacy
15 cm weeds

- Grass, crabgrass, cocklebur, and waterhemp – highly effective and no significant differences
- Tall morningglory – reduced efficacy but no significant

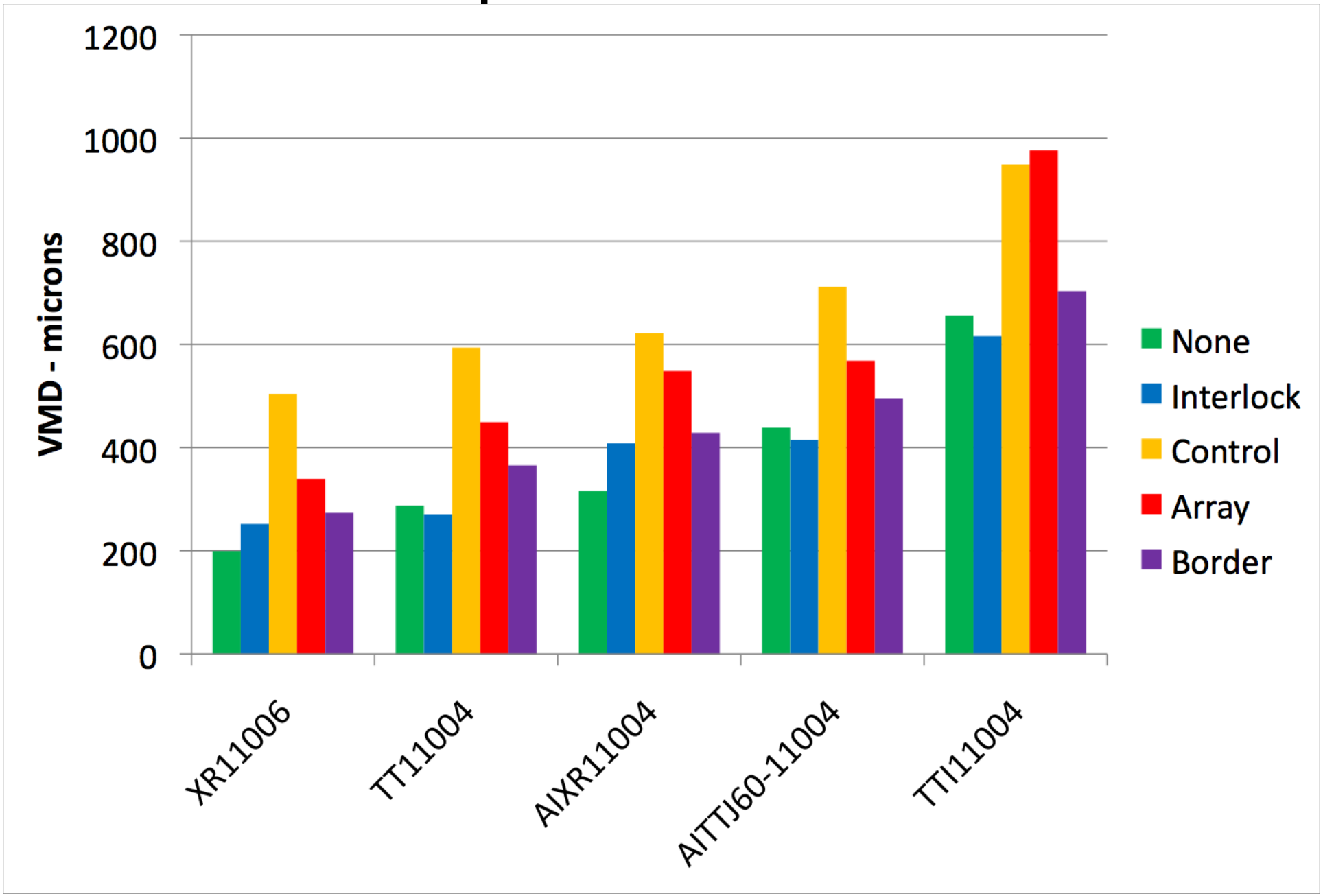


Weed Control Efficacy
51 cm weeds

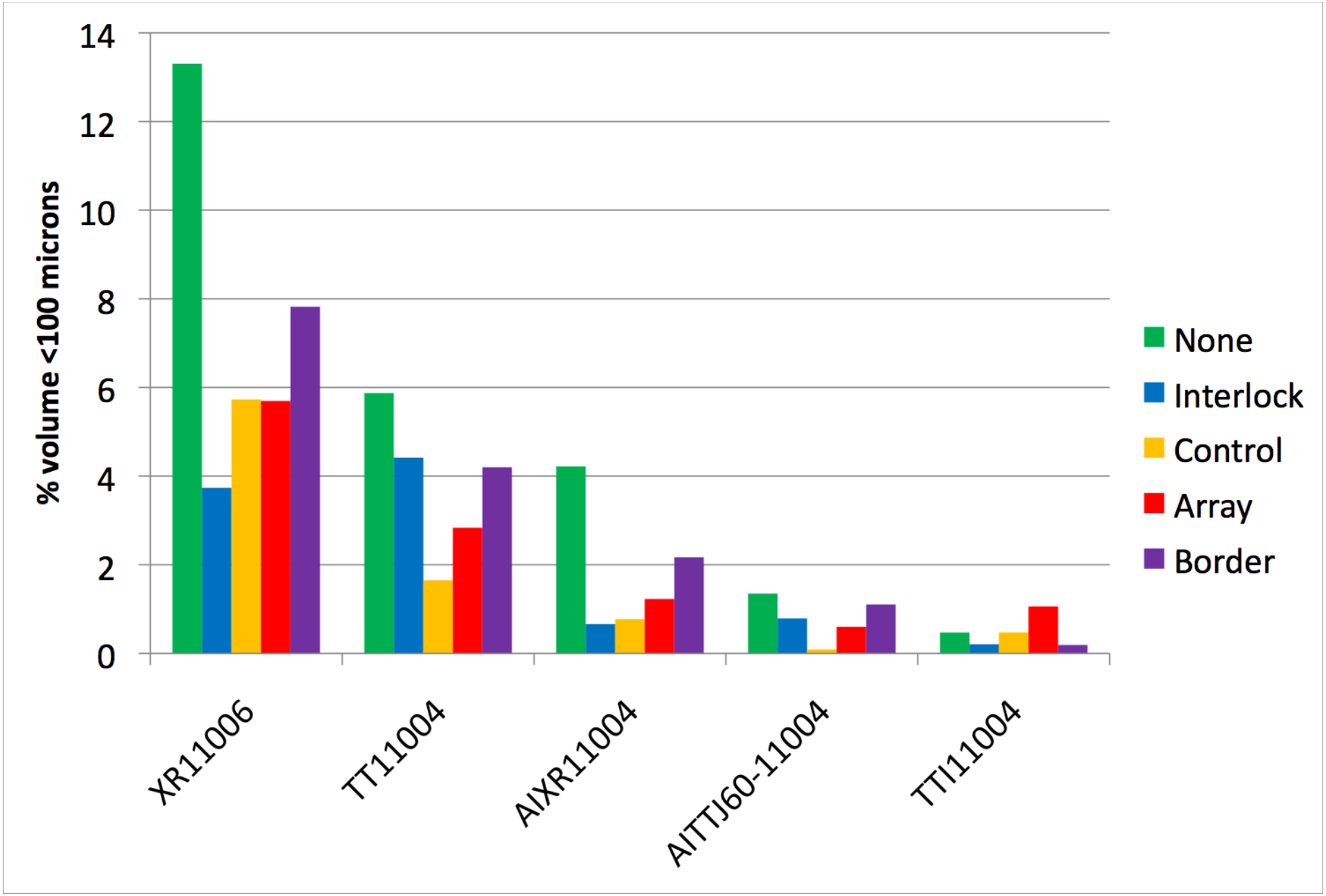
- Grass, crabgrass, cocklebur, and waterhemp – highly effective and no significant differences
- Tall morningglory – significantly reduced efficacy but no



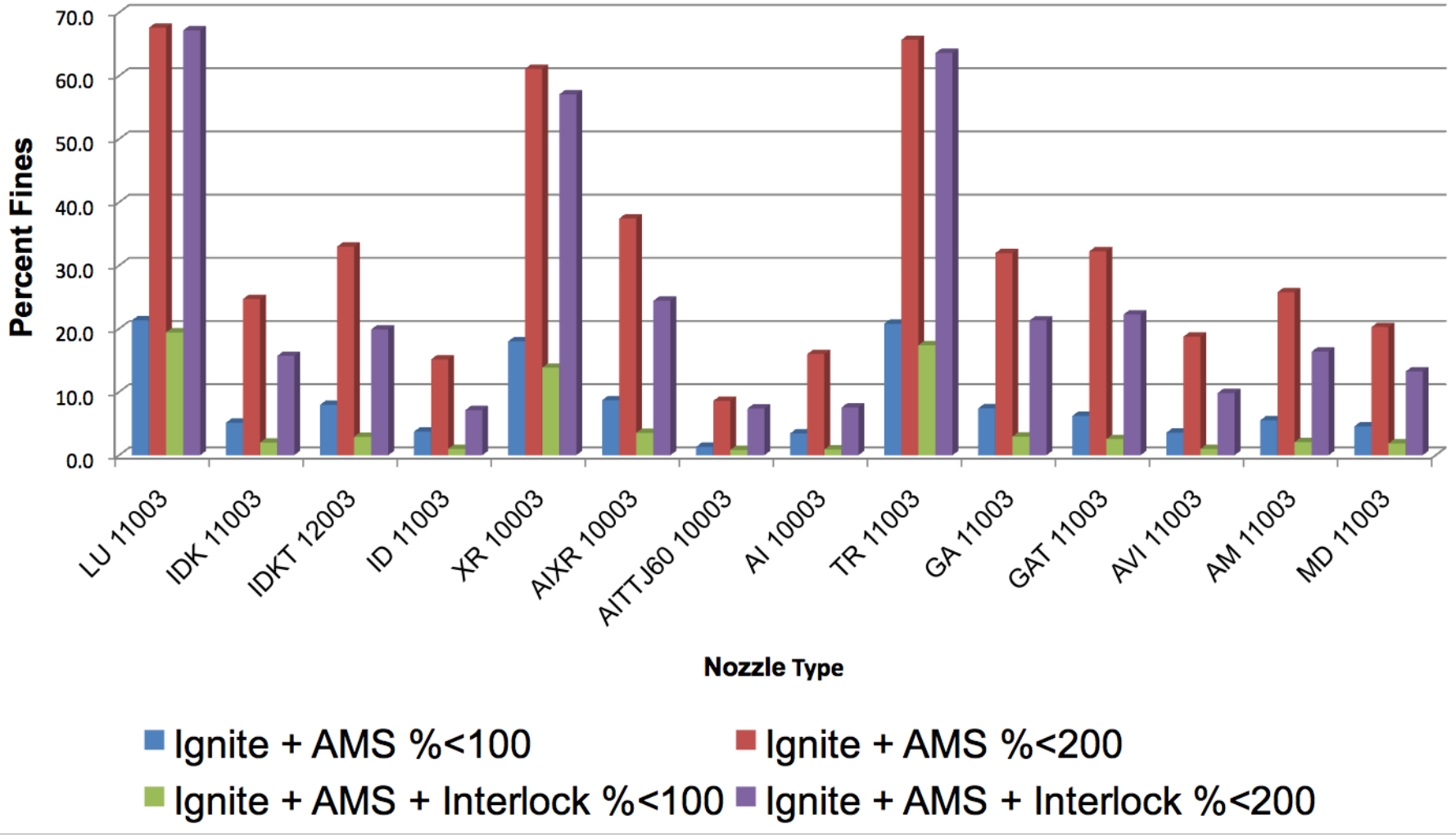
Droplet size - VMD



Droplet size - %V<100



Percent Driftable Fines



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Understanding Application Technology