

Jason Davis

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in 12 gallons of solution



Hands-On In-Person Trainings

411 Applicators at Pigsoicum

Affiliate Training and Certification Program for New Herbicide-Resistant Crop Systems

Enlist 2017

1,100 Applicators Certified in 2017

If I use the right nozzles and pressure should I still be concerned about drift?

BMP's Vs Restriction



Equipment Regulations:

- Limited Nozzles
- Restricted Pressures
- &
- Specified Boom Height
- Application Volume
- Slower Speeds

TTI 11004 @ 60 psi
1% of spray volume < 200um

80 acre dicamba application @ 15 GPA
12 gal of full rate solution CAN move...

How Far?

Follow the label and your states buffer & weather restrictions!

Simply Put

New Labels Requirements:

1. Equipment Set-up is specific
2. Spray environment req's are challenging
3. ALL assume volatility has been corrected

Its complicated

resources



Prezi

**Equipment Regulations:
Limited Nozzles
Restricted Pressures
&
Specified Boom Height
Application Volume
Slower Speeds**

Resources

Arkansas Application Requirements for Engenia™ Herbicide

MP542
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RESEARCH & EXTENSION
University of Arkansas System

- 10 mph or less, less than 3 mph only when no inversion is present

Wind Speed

Boom Height

- No higher than 24" above target

- Maximum travel speed of 15 MPH

Travel Speed

Nozzle

- TeeJet TTI 11004

Engenia™ may only be tank-mixed with products that have been tested and found not to adversely affect the spray drift properties of Engenia. A list of those products may be found at engeniataankmix.com

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MP 542 @ uaex.edu

Arkansas Buffer Requirements for Engenia™ Herbicide

- 100' buffer zone in all directions.
- ¼ mile buffer zone downwind from field of application to sensitive crops.
- When adjacent to field of application, buffer can include roads, structures, non-sensitive crops, and fields prepared for planting.
- DO NOT APPLY while wind is blowing toward neighboring specialty crops! (See label for complete list)
- DO NOT APPLY under circumstances where spray drift may occur to food, forage, or other plantings that might be damaged or the crops thereof rendered unfit for sale, use, or consumption.

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR!

Jason Davis, Application Technologist, University of Arkansas System Division of Agriculture

MP542-PD-1-2017H

Hands-On In-Person Trainings



411 Applicators at Pigposium



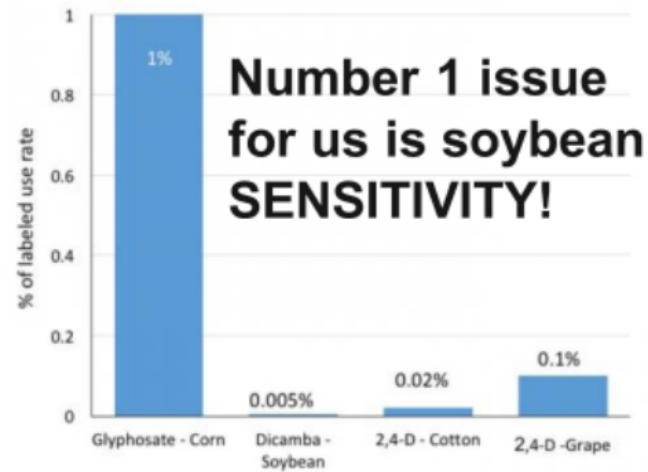
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University of Arkansas System

Arkansas' Training and Certification Program for New Herbicide-Resistant Crop Systems

Enlist Duo and Enlist One Herbicide
Used In
Enlist Soybean/Corn/Cotton

1,100 Applicators Certified in 2017

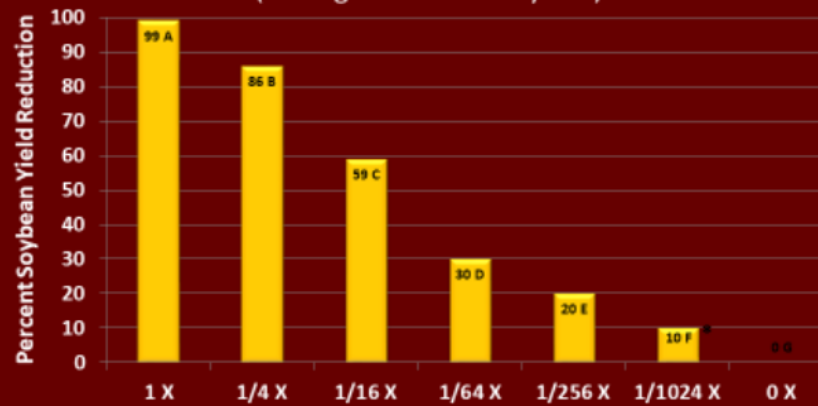
Figure 1. Lowest observed dose causing significant visual crop response.



“Soybean is 200 times more sensitive to dicamba as corn is to glyphosate”

Dr. Bob Hartzler, Univ. of Iowa

Soybean Yield Reductions By Dicamba Application Rate (Averaged Over 6 site years)



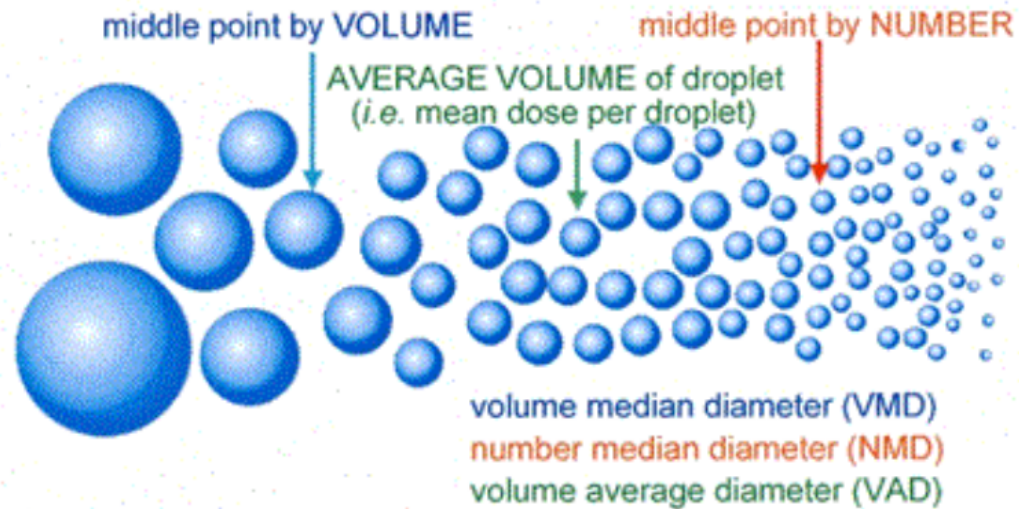
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Fraction of dicamba rate applied:
1 X = 0.5 lb ae/A or 1pt/A Clarity sprayed at R1

9 drops in 12 gallons of solution

Droplet statistics

Consider a population of 100 spray droplets, sorted by diameter ...



Nozzle Requirements

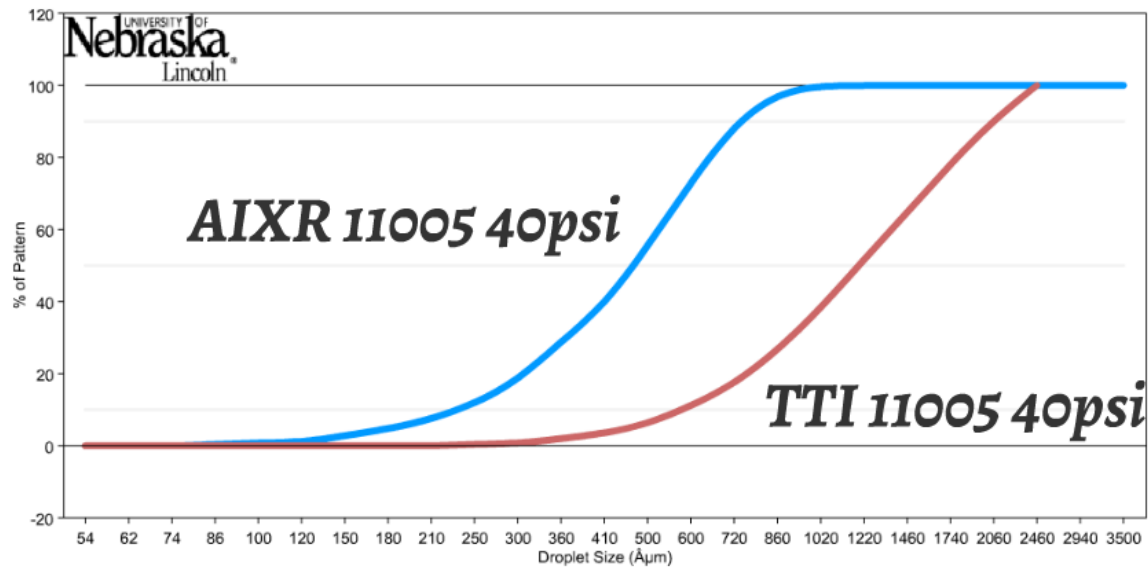
Enlist Duo Nozzles

ALLOWABLE NOZZLES AND OPERATING PRESSURE (PSI)

MANUFACTURER	MODEL	0	10	20	30	40	50	60	70	80	90	100
ABJ AGRI	ABJ11004				MIN 30	MAX 40						
	ABJ11006				MAX 30							
GREENLEAF	TDXL11003			MIN 20		MAX 40						
	TDXL11004			MIN 20		MAX 45						
	TDXL11006			MIN 20					MAX 75			
	TDXL11003-D				MIN 30						MAX 90	
	TDXL11004-D				MIN 30						MAX 90	
	TDXL11006-D				MIN 30							MAX 100
HYPRO JOHN DEERE	ULD12004			MIN 15						MAX 70		
	ULD12006			MIN 15			MAX 50					
LECHLER	ID11004				MIN 30	MAX 40						
	ID11005				MIN 30				MAX 60			
TEEJET	A111004				MIN 30				MAX 60			
	A111006				MIN 30				MAX 60			
	A111008				MIN 30						MAX 70	
	A1TTJ60-11006			MIN 20		MAX 40						
	A1XR11003			MIN 15		MAX 30						
	A1XR11004			MIN 15		MAX 40						
WILGER	MR11006				MIN 25				MAX 60			
	MR11008				MIN 25				MAX 60			

Always read and follow the product label as well as state and local requirements.

All between **XC** and **UC**



	Nozzle 1	Nozzle 2	Nozzle 3	Nozzle 4
Nozzle	Manufacturer: TeeJet Nozzle Type: TTI Orifice Size: 11005 Pressure: 40 psi Solution: Water	Manufacturer: TeeJet Nozzle Type: AIXR Orifice Size: 11005 Pressure: 40 psi Solution: Water	Manufacturer: Nozzle Type: Orifice Size: Pressure: Solution:	Manufacturer: Nozzle Type: Orifice Size: Pressure: Solution:
Dv ₁₀	409.6	231.2		
Dv ₅₀	850.0	470.9		
Dv ₉₀	1469.7	750.1		

UC

TTI11005

40PSI



VC

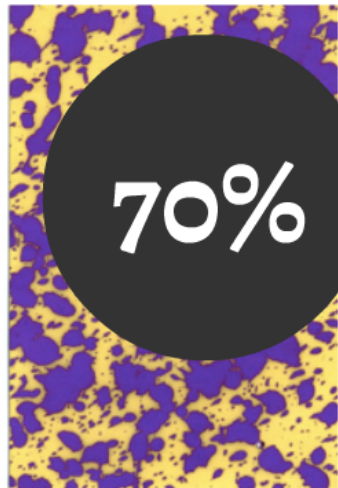
AIXR11005

40PSI



7 x more <200um droplets

**Nozzle size and Pressure
Limit Coverage**



TTI 11004 20 gpa



TTI 11004 10 gpa

Volume makes it up!

*If I use the right nozzles
and pressure should I
still be concerned about
drift?*



TTI 11004 @ 60 psi
1% of spray volume < 200um

80 acre dicamba application @ 15 GPA
12 gal of full rate solution CAN move...

How Far?

EVAPORATION AND DISTANCE TRAVELED

Droplet Diameter (microns)	Terminal Velocity (ft/sec)	Time to Evaporate (sec)	Distance from nozzle (inches)
20	0.04	0.30	<1
50	0.25	1.80	3
100	0.91	7.00	9
200	2.4	29.0	25

Source: W.F. 10% R11.25 gal Kansas State University 01F-2444

HOW FAR WILL PARTICLES GO?

Droplet	Diameter (in µm)	Time to fall 24 inches	Travel distance in 3 mph wind	10 mph	1200 gal total application
Fog	5	13.2 min	3,200 ft	11,200 ft	1% = 12 gal full rate droplets 1/1000 x rate dicamba can reduce soybean yield by 10% if exposed at R1-R2
Very fine	20	50 sec	220 ft	770 ft	
Fine	100	2 sec	44 ft	154 ft	
Medium	240	1.2 sec	8.8 ft	31 ft	
Coarse	400	0.4 sec	1.7 ft	6 ft	
Fine rain	1,000	0.2 sec	1 ft	4 ft	

Source: Handbook Spray Tech N0001 00000

Follow the label and your states buffer
& weather restrictions !

2 gal of full rate solution CAN move.

How Far?

EVAPORATION AND DISTANCE TRAVELED

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Assumes: 90 F, 36% RH, 25 psi

Kansas State University MF-2444

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Source: Herbicide Spray Drift, NDSU Extension

10 mph	1200 gal total application
11,200 ft	
770 ft	1% = 12 gal full rate droplets
154 ft	1/1000 x rate dicamba can
31 ft	reduce soybean yield by 10%
6 ft	if exposed at R1-R2
4 ft	

Follow the label and your states buffer & weather restrictions!

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Source: *Herbicide Spray Drift*, NDSU Extension

label and your states buffer



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Source: 90 E-106 R11.25.pdf Kansas State University 01F-2444

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Source: Handbook Spray Drift N0001-00000

Follow the label and your states buffer
& weather restrictions !

Environmental and Weather Regulations

Buffers

BUFFER SITUATION – INFIELD BUFFER

- Field Buffer
- Buffer
- Field
- Road
- Ditch



Wind Speed Requirements

Apply when winds are 3 to 10 mph



Wind Speed	Label Requirement	Comments
< 3 mph	DO NOT spray	Avoid temperature inversions.
3 to 10 mph	Spray ONLY IF wind is blowing away from neighboring sensitive crops	This includes non-dicamba tolerant soybeans
> 10 mph	DO NOT spray	Consider wind gusts

Additional state regulations may apply.

Monitor wind speed and direction during application and adjust accordingly

Wind

Inversions

Avoid Temperature Inversions

- **ONLY** apply between sunrise and sunset
- **DO NOT** apply when temperature inversions exist at the field level
 - temperature inversions at the field level are characterized by increasing temperatures with altitude
 - Presence can be indicated by ground fog, smoke, hot air and dust hanging over a road or presence of dew or frost
- Most inversions occur between 2 hours before sunset until 1 hour after sunrise



Confirm that field level inversions **DO NOT** exist before application

Buffers

BUFFER SITUATION – INFIELD BUFFER

COLOR LEGEND

- Blue
RRX Soybeans
- Green
Non-Dicamba Tolerant Soybeans
- Yellow
Corn
- Brown
Agricultural Fields Prepared for Planting



Wind Speed Requirements

Apply when winds are 3 to 10 mph



Wind

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Monitor wind speed and direction during application and adjust accordingly

These slides were prepared by BASF to satisfy US EPA requirements. Please check with your state pesticide regulatory authority as additional requirements may be imposed by state regulatory authorities. DATE 11/17.



Inversions

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- **Most inversions occur between 2 hours before sunset until 1 hour after sunrise**



Confirm that field level inversions DO NOT exist before application

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Environmental and Weather Regulations

Buffers

BUFFER SITUATION – INFIELD BUFFER

- Field
- Buffer
- Road
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- Water



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Confirm that field level inversions **DO NOT** exist before application

Lets Simplify

- 1. Equipment set up*
- 2. Window when weeds are $< \text{or} = 4''$*
- 3. Field must be dry enough to cross*
- 4. Tank-Mix and Volume appropriate*
- 5. Apply one hour after sunrise*
- 6. Stop approximately 2 hours before sunset*
- 7. Wind must be blowing 3-10 mph*
- 8. Wind can not be gusty*
- 9. Must be blowing toward non-sensitive area*
- 10. Leave out buffer if applicable (ditch banks)*
- 11. Keep all considerations while spraying X,000 acres*

Simply Put

New Labels Requirements:

- 1. Equipment Set-up is specific*
- 2. Spray environment req's are challenging*
- 3. ALL assume volatility has been corrected*

Its complicated

9.1.5 Application Awareness

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR.

The interaction of equipment and weather related factors must be monitored to maximize performance and on-target spray deposition. The applicator is responsible for considering all of these factors when making a spray decision. The applicator is responsible for compliance with state and local pesticide regulations, including any state or local pesticide drift regulations.

- 4. Regardless they must be followed*

Its complicated

9.1.5 Application Awareness

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- 4. Regardless they must be followed*

BMP's Vs Restriction

Jason Davis

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Drift Control \swarrow \searrow Efficacy

Minimize and Preserve Leaf Coverage

- 70% TTI loss on target
- 30% TTI loss on target

Volume makes it apply!

Evolution of BMP's

- 1970s
- 1980s
- 1990s
- 2000s
- 2010s

Evolution of BMP's

- 1970s
- 1980s
- 1990s
- 2000s
- 2010s

Equipment Regulations

- Limited Nozzles
- Restricted Pressures
- Specified Boom Height
- Application Volume
- Slower Speeds

Resources

- Equipment Regulations
- Limited Nozzles
- Restricted Pressures
- Specified Boom Height
- Application Volume
- Slower Speeds

If I use the right nozzles and pressure should I still be concerned about drift?

TTI losses of 20% per 2% of spray volume = common for more abundant application @ 15 GPM vs 10 GPM @ full rate solution - 100% water - How low?

Environmental and Weather Regulations

- 1. Equipment used to apply
- 2. Nozzle selection
- 3. Boom height
- 4. Application volume
- 5. Spray speed
- 6. Wind speed
- 7. Humidity
- 8. Temperature
- 9. Time of day
- 10. Time of year
- 11. Time of day
- 12. Time of year
- 13. Time of day
- 14. Time of year

Simply Put

- 1. Equipment used to apply
- 2. Nozzle selection
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- 5. Spray speed
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- 7. Humidity
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- 10. Time of year
- 11. Time of day
- 12. Time of year
- 13. Time of day
- 14. Time of year

Less Simplify

- 1. Equipment used to apply
- 2. Nozzle selection
- 3. Boom height
- 4. Application volume
- 5. Spray speed
- 6. Wind speed
- 7. Humidity
- 8. Temperature
- 9. Time of day
- 10. Time of year
- 11. Time of day
- 12. Time of year
- 13. Time of day
- 14. Time of year