



**FMC** | An Agricultural  
Sciences Company

2019

# MULTIPLE-RESISTANT WATERHEMP RESEARCH

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# RESEARCH PLOT LOCATION:

Maria Stein, Ohio  
Blount silt loam

# TRIALS CONDUCTED:

Evaluation of FMC Preemergence Herbicides' Efficacy on Waterhemp

FMC Products' Fit in Enlist™ Trait Soybeans

Influence of Herbicide Group 15 Rates on Residual Weed Control

Time of Day Effect on POST Herbicides



# TRIAL 1:

## Evaluation of FMC Preemergence Herbicides' Efficacy on Waterhemp

**WEEDS IN TRIAL:** Waterhemp, velvetleaf, common lambsquarters, giant foxtail.

**APPLICATION PARAMETERS:** Treatments were applied prior to weed emergence on 6-4-2019; Carrier Volume: 15 GPA; Nozzles: AIXR 11003; Activating Rainfall: 6-6-2019; Photo'd: 51 Days After Application (DAA)

| Treatment | Herbicide                                      | Active Ingredient(s)                       | WSSA MOA  | Use Rate (fl. oz./A) |
|-----------|--|--|-----------|----------------------|
| 1         | Nontreated Check                               | --   | --        | --                   |
| 2         | Boundary® 6.5 EC herbicide                     | metribuzin & S-metolachlor                 | 5, 15     | 32                   |
| 3         | Zidua® Pro herbicide                           | pyroxasulfone & imazethapyr & saflufenacil | 15, 2, 14 | 6                    |
| 4         | Authority® Supreme herbicide                   | pyroxasulfone & sulfentrazone              | 14, 15    | 7                    |
| 5         | Authority Supreme herbicide + Metribuzin 75 DF | pyroxasulfone & sulfentrazone + metribuzin | 14, 15, 5 | 7 + 4 oz./A          |

### TREATMENT 1: NTC

Nontreated Check (51 DAA)  
Weed Density: 217,800 Waterhemp Plants/Acre



# TRIAL 1:

## Evaluation of FMC Preemergence Herbicides' Efficacy on Waterhemp



Trt. 2: Boundary<sup>®</sup> herbicide  
32 fl. oz./A



Trt. 3: Zidua<sup>®</sup> Pro herbicide  
6 fl. oz./A



Trt. 4: Authority<sup>®</sup> Supreme  
herbicide 7 fl. oz./A



Trt. 5: Authority Supreme herbicide  
7 fl. oz./A + Metribuzin 5 oz./A

# TRIAL 2:

## FMC Products' Fit in Enlist™ Trait Soybeans

**WEEDS IN TRIAL:** Waterhemp, velvetleaf, common lambsquarters, giant foxtail.

**APPLICATION PARAMETERS:** Treatments were applied to 5-7" waterhemp on 6-14-2019; Carrier Volume: 15 GPA; Nozzles: AIXR 1100; Time: 11:15 a.m.; Weather: 79 F, 9 mph SW, Mostly Sunny (10% Cloud Cover); Photo'd: 14 & 28 Days After Application (DAA)

| Treatment | Herbicide   | Active Ingredient(s)                                       | WSSA MOA     | Use Rate (fl. oz./A) |
|-----------|---|--|--------------|----------------------|
| 1         | Nontreated Check  | --   | --           | --                   |
| 2         | Cobra® herbicide  | lactofen   | 14           | 12                   |
| 3         | Flexstar® herbicide   | fomesafen  | 14           | 16                   |
| 4         | Roundup PowerMAX® herbicide + Flexstar herbicide + Anthem® MAXX herbicide | glyphosate + fomesafen + pyroxasulfone & fluthiacet-methyl | 9, 14(2), 15 | 32 + 16 + 3.25       |
| 5         | Enlist Duo® herbicide   | 2,4-D + glyphosate   | 4, 9         | 56.5                 |
| 6         | Enlist Duo + Anthem MAXX herbicides                                       | 2,4-D & glyphosate + pyroxasulfone & fluthiacet-methyl     | 4, 15, 14    | 56.5 + 3.25          |
| 7         | Liberty® herbicide  | glufosinate  | 10           | 32                   |
| 8         | Liberty + Anthem MAXX herbicides  | glufosinate + pyroxasulfone & fluthiacet-methyl            | 10, 15, 14   | 32 + 3.25            |

# TRIAL 2:

## FMC Products' Fit in Enlist™ Trait Soybeans



Trt. 1: NTC



Trt. 2: Cobra® herbicide 12 fl. oz./A



Trt. 3: Flexstar® herbicide  
16 fl. oz./A



Trt. 4: Roundup PowerMax®  
herbicide 32 fl. oz./A + Flexstar®  
herbicide (16)+ Anthem® MAXX  
herbicide (3.25)

# TRIAL 2:

## FMC Products' Fit in Enlist™ Trait Soybeans



14 DAA

Trt. 5: Enlist Duo® herbicide  
56.5 fl. oz./A



28 DAA

Trt. 5: Enlist Duo herbicide  
56.5 fl. oz./A



28 DAA

\*Trt. 6: Enlist Duo herbicide 56.5 fl. oz./A +  
Anthem® MAXX herbicide 3.25 fl. oz./A

*\*Enlist Duo herbicide with Anthem MAXX herbicide is not an approved tank mix. Tank-mix approval is anticipated prior to the 2020 season.*

# TRIAL 2:

## FMC Products' Fit in Enlist™ Trait Soybeans



14 DAA

Trt. 7: Liberty® herbicide  
32 fl. oz./A



28 DAA

Trt. 7: Liberty herbicide 32 fl. oz./A



28 DAA

Trt. 8: Liberty herbicide 32 fl. oz./A + Anthem® MAXX herbicide 3.25 fl. oz./A



# TRIAL 3:

## Influence of Herbicide Group 15 Rates on Residual Weed Control

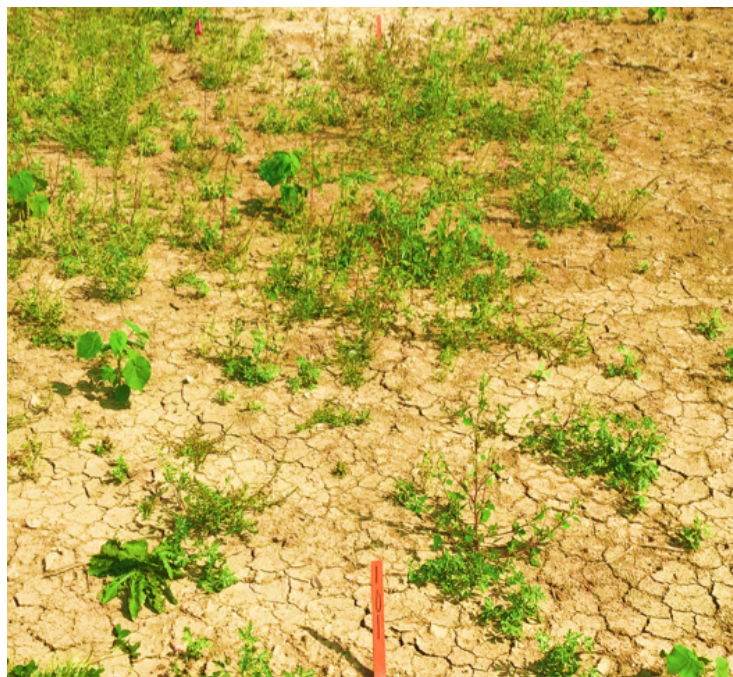
**WEEDS IN TRIAL:** Waterhemp, velvetleaf, common lambsquarters, giant foxtail.

**APPLICATION PARAMETERS:** Treatments were applied prior to weed emergence on 8-9-2019; Carrier Volume: 15 GPA; Nozzles: AIXR 11003; Activating Rainfall: 8-9-2019; Photo'd: 35 Days After Application (DAA)

| Treatment | Herbicide                             | Active Ingredient(s)              | WSSA MOA | Use Rate (fl. oz./A) |
|-----------|---------------------------------------|-----------------------------------|----------|----------------------|
| 1         | Nontreated Check                      | --                                | --       | --                   |
| 2, 7, 12  | Anthem <sup>®</sup> MAXX herbicide    | pyroxasulfone & fluthiacet-methyl | 14, 15   | 3, 4.25, & 6         |
| 3, 8, 13  | Warrant <sup>®</sup> herbicide        | microencapsulated acetochlor      | 15       | 48, 72, & 96         |
| 4, 9, 14  | Outlook <sup>®</sup> herbicide        | dimethenamid-P                    | 15       | 12.8, 16, & 21       |
| 5, 10, 15 | Dual II Magnum <sup>®</sup> herbicide | S-metolachlor                     | 15       | 16, 32, & 48         |
| 6, 11, 16 | Prefix <sup>®</sup> herbicide         | S-metolachlor & fomesafen         | 14, 15   | 32, 40, & 48         |

### TREATMENT 1: NTC

Nontreated Check (35 DAA)



# TRIAL 3:

## Influence of Herbicide Group 15 Rates on Residual Weed Control



Trt. 2: Anthem<sup>®</sup> MAXX herbicide  
3 fl. oz./A



Trt. 3: Warrant<sup>®</sup> herbicide 48 fl. oz./A



Trt. 4: Outlook<sup>®</sup> herbicide  
12.8 fl. oz./A



Trt. 5: Dual II Magnum<sup>®</sup>  
herbicide 16 fl. oz./A



Trt. 6: Prefix<sup>®</sup> herbicide  
32 fl. oz./A

# TRIAL 3:

## Influence of Herbicide Group 15 Rates on Residual Weed Control



Trt. 12: Anthem<sup>®</sup> MAXX herbicide  
3 fl. oz./A



Trt. 13: Warrant<sup>®</sup> herbicide 96 fl. oz./A



Trt. 14: Outlook<sup>®</sup> herbicide  
21 fl. oz./A



Trt. 15: Dual II Magnum<sup>®</sup>  
herbicide 32 fl. oz./A



Trt. 16: Prefix<sup>®</sup> herbicide  
48 fl. oz./A

# TRIAL 3:

## Influence of Herbicide Group 15 Rates on Residual Weed Control



# TRIAL 4:

## Time of Day Effect on POST Herbicides

**WEEDS IN TRIAL:** Waterhemp, velvetleaf, common lambsquarters, giant foxtail.

**APPLICATION PARAMETERS:** Treatments were applied to 5-7" waterhemp on 6-14-2019; Carrier Volume: 15 GPA; Nozzles: AIXR 1100; Time: Noon Application (12:25 a.m.), Sunset Application (9:00 p.m.); Weather: Noon: 79 F, 9 mph SW, Mostly Sunny (10% Cloud Cover) Sunset: 69 F, 9 mph SSW, (30% Cloud Cover); Photo'd: 12 Days After Application (DAA)

| Treatment | Herbicide   | Active Ingredient(s)                                   | WSSA MOA   | Use Rate (fl. oz./A) | Time of Day |
|-----------|---|--|------------|----------------------|-------------|
| 1         | Nontreated Check                                  | --   | --         | --                   | --          |
| 2, 3      | Enlist Duo <sup>®</sup> herbicide                 | 2,4-D + glyphosate                                     | 4, 9       | 56.5                 | Noon        |
|           |   |  |            |                      | Sunset      |
| 4, 5      | *Enlist Duo + Anthem <sup>®</sup> MAXX herbicides | 2,4-D & glyphosate + pyroxasulfone & fluthiacet-methyl | 4, 15, 14  | 56.5 + 3.25          | Noon        |
|           |   |  |            |                      | Sunset      |
| 6, 7      | Liberty <sup>®</sup> herbicide                    | glufosinate  | 10         | 32                   | Noon        |
|           |   |  |            |                      | Sunset      |
| 8, 9      | Liberty + Anthem MAXX herbicides                  | glufosinate + pyroxasulfone & fluthiacet-methyl        | 10, 15, 14 | 32 + 3.25            | Noon        |
|           |   |  |            |                      | Sunset      |

### TRT. 1: NONTREATED CHECK

Nontreated Check (12 DAA)



*\*Enlist Duo herbicide with Anthem MAXX herbicide is not an approved tank mix. Tank-mix approval is anticipated prior to the 2020 season.*

# TRIAL 4:

## Time of Day Effect on POST Herbicides

**NOON**



Trt. 2: Enlist Duo® herbicide  
56.5 fl. oz./A

**SUNSET**



Trt. 3: Enlist Duo herbicide  
56.5 fl. oz./A



Trt. 4: Enlist Duo herbicide  
56.5 fl. oz./A + Anthem® MAXX  
herbicide 3.25 fl. oz./A



Trt. 5: Enlist Duo 56.5 fl. oz./A  
+ Anthem MAXX herbicide  
3.25 fl. oz./A

# TRIAL 4:

## Time of Day Effect on POST Herbicides

**NOON**



Trt. 6: Liberty® herbicide  
32 fl. oz./A

**SUNSET**



Trt. 7: Liberty herbicide  
32 fl. oz./A



Trt. 8: Liberty herbicide 32 fl.  
oz./A + Anthem® MAXX herbicide  
3.25 fl. oz./A



Trt. 9: Liberty herbicide 32 fl.  
oz./A + Anthem MAXX herbicide  
3.25 fl. oz./A

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