

Designing an Effective Weed Management Plan

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Methods of Weed Management

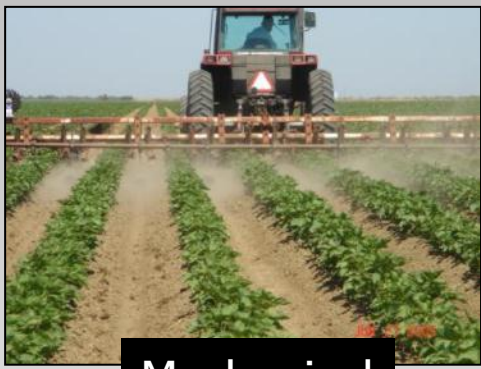
Preventative



3.00% INERT MATTER NET WEIGHT: 15 POUND
1.75% OTHER CROP SEED
0.25% WEED SEED
NOXIOUS WEED SEED:
9 ANNUAL BLUEGRASS PER POUND (0.6 PER OUNCE)



Chemical



Mechanical

Cultural



Chemical Weed Management



26 Sites of Action
69 families







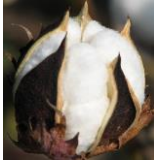





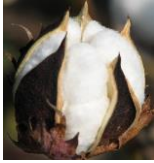












Herbicidal Sites of Action

| WSSA/HRAC Code | Site of Action |
|----------------|--|
| 1 | Inhibition of Acetyl CoA Carboxylase |
| 2 | Inhibition of Acetolactate Synthase |
| 3 | Inhibition of Microtubule Assembly |
| 4 | Auxin Mimics |
| 5 | Inhibition of Photosynthesis at PSII - Serine 264 Binders |
| 6 | Inhibition of Photosynthesis at PSII - Histidine 215 Binders |
| 9 | Inhibition of Enolpyruvyl Shikimate Phosphate Synthase |
| 10 | Inhibition of Glutamine Synthetase |
| 12 | Inhibition of Phytoene Desaturase |
| 13 | Inhibition of Deoxy-D-Xyulose Phosphate Synthase |
| 14 | Inhibition of Protoporphyrinogen Oxidase |
| 15 | Inhibition of Very Long-Chain Fatty Acid Synthesis |
| 18 | Inhibition of Dihydropteroate Synthase |
| 19 | Auxin Transport Inhibitor |
| 22 | PS I Electron Diversion |
| 23 | Inhibition of Microtubule Organization |
| 24 | Uncouplers |
| 27 | Inhibition of Hydroxyphenyl Pyruvate Dioxygenase |
| 28 | Inhibition of Dihydroorotate Dehydrogenase |
| 29 | Inhibition of Cellulose Synthesis |
| 30 | Inhibition of Fatty Acid Thioesterase |
| 31 | Inhibition of Serine-Threonine Protein Phosphatase |
| 32 | Inhibition of Solanesyl Diphosphate Synthase |
| 33 | Inhibition of Homogentisate Solanesyltransferase |
| 34 | Inhibition of Lycopene Cyclase |
| 0 | Unknown |

Herbicidal Sites of Action

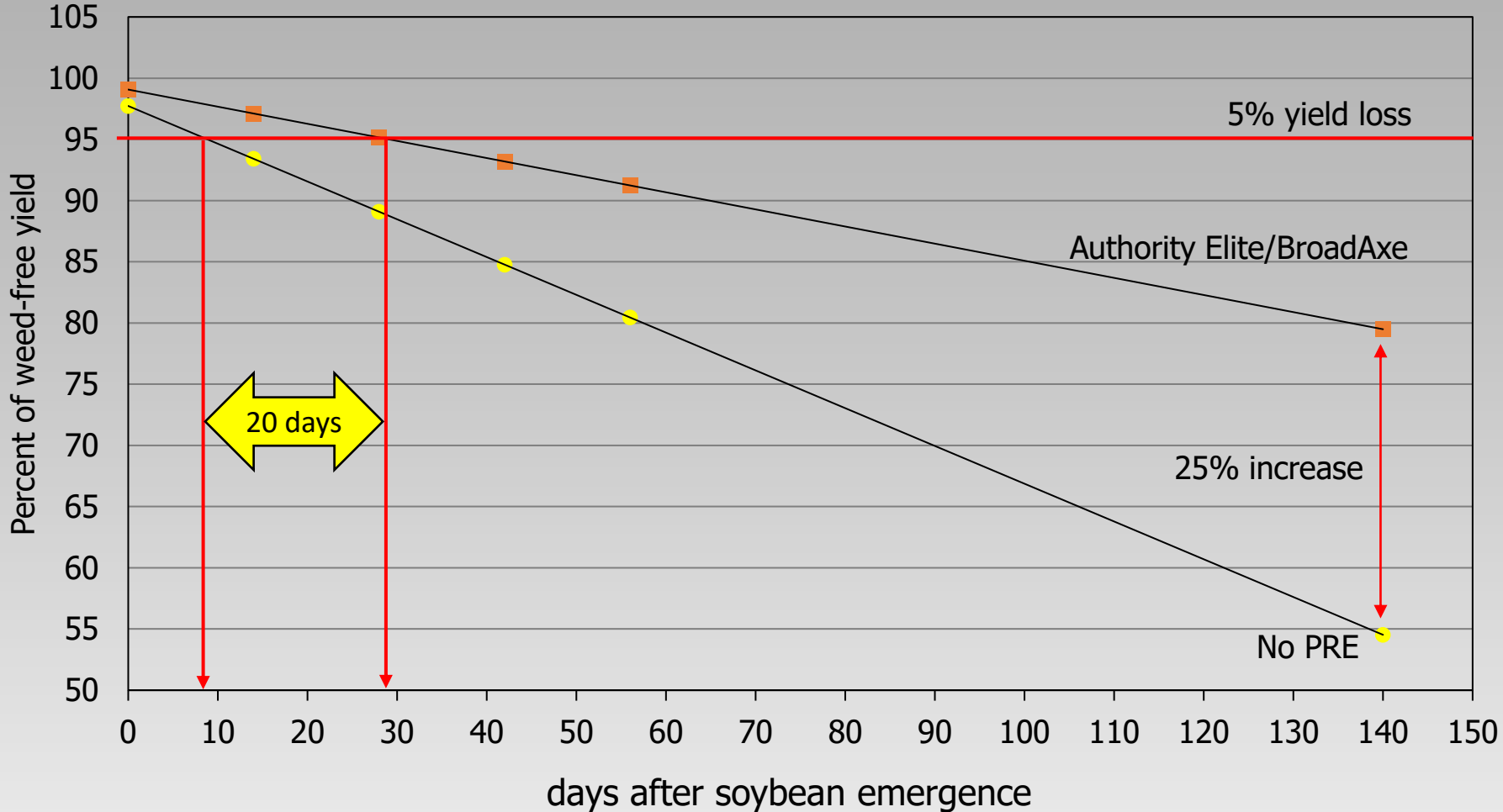
| WSSA/HRAC Code | Site of Action | Corn | Cotton | Soybean |
|----------------|--|------|--------|---------|
| 1 | Inhibition of Acetyl CoA Carboxylase | | X | X |
| 2 | Inhibition of Acetolactate Synthase | X | X | X |
| 3 | Inhibition of Microtubule Assembly | X | X | X |
| 4 | Auxin Mimics | X | X | X |
| 5 | Inhibition of Photosynthesis at PSII - Serine 264 Binders | X | X | X |
| 6 | Inhibition of Photosynthesis at PSII - Histidine 215 Binders | X | | X |
| 9 | Inhibition of Enolpyruvyl Shikimate Phosphate Synthase | X | X | X |
| 10 | Inhibition of Glutamine Synthetase | X | X | X |
| 13 | Inhibition of Deoxy-D-Xyulose Phosphate Synthase | | X | X |
| 14 | Inhibition of Protoporphyrinogen Oxidase | X | X | X |
| 15 | Inhibition of Very Long-Chain Fatty Acid Synthesis | X | X | X |
| 22 | PS I Electron Diversion | X | X | X |

| | | | | |
|----|---|---|---|---|
| 1 | clethodim, Assure II | |  |  |
| 2 | Classic, FirstRate, Python, LeadOff |  |  |  |
| 4 | 2,4-D, dicamba |  |  |  |
| 5 | atrazine, metribuzin |  |  |  |
| 9 | glyphosate |  |  |  |
| 10 | glufosinate |  |  |  |
| 14 | Ultra Blazer, Reflex, Valor, Sharpen, Aim, Spartan |  |  |  |
| 15 | Zidua, Warrant, Outlook, metolachlor, S-metolachlor |  |  |  |

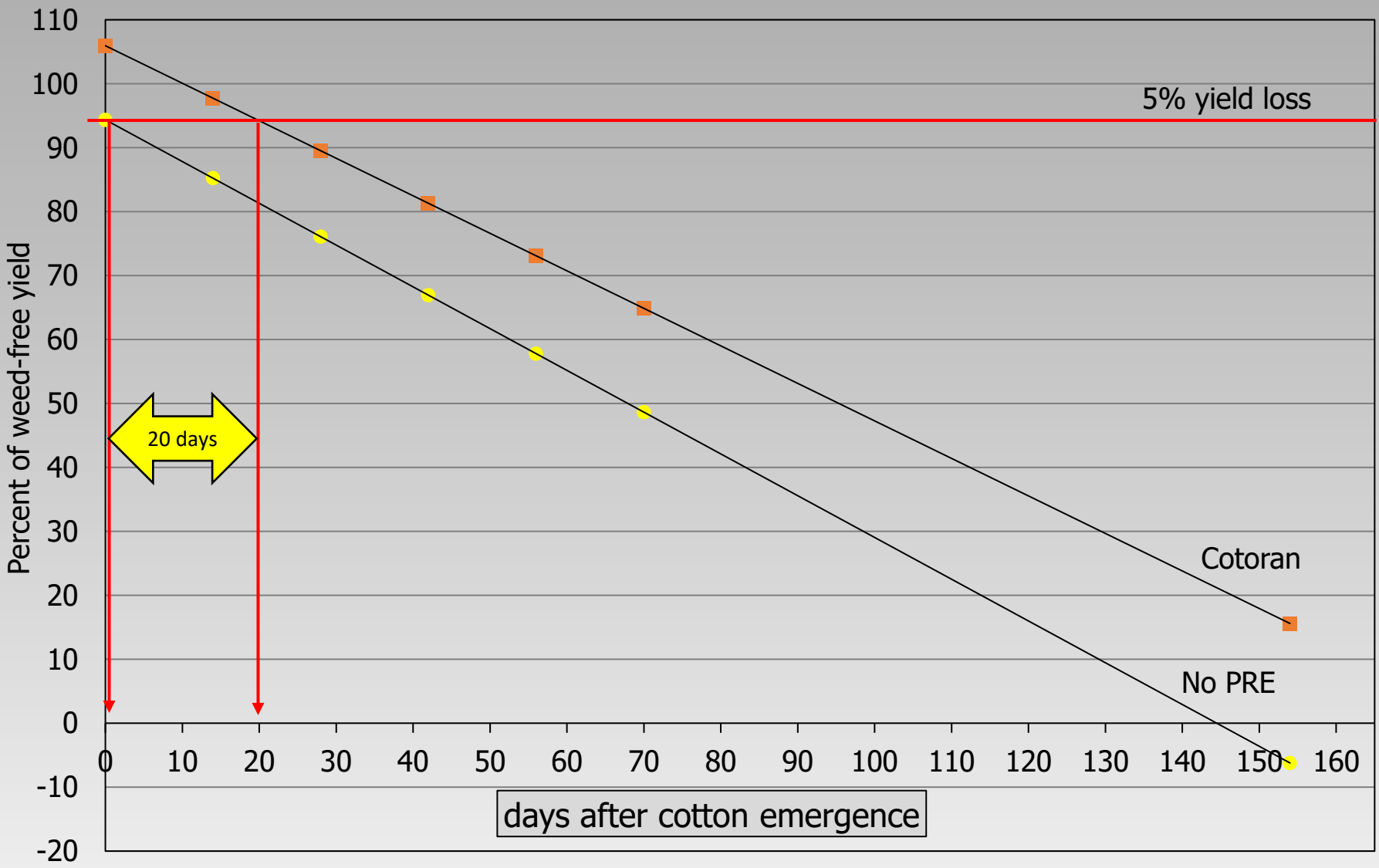
Weed Management



Effect of PRE herbicide in soybean



Effect of PRE herbicide in cotton



Choice spectrum

on weed



| Products |
|-----------------|
| Valor |
| Dual Magnum |
| Boundary |
| Canopy |
| Envive |
| Authority Elite |
| Fierce |
| Trivence |

| lory | smellmelon |
|------|------------|
| | 7 |
| | 7 |
| | 8 |
| | 7 |
| | 8 |
| | 8 |
| | 9 |
| | 8 |

2 AI's per product for soybean PRE

| Active ingredients | Trade name(s) | Manufacturer |
|-------------------------------------|--|--|
| acetochlor + fomesafen | Warrant Ultra ; Forrest | Bayer; Sharda |
| chlorimuron + flumioxazin | Valor XLT | Valent |
| flumioxazin + pyroxasulfone | Fierce ; Fierce EZ | Valent |
| fomesafen + metolachlor | Vise; Vice; Sharp | ADAMA; Innvictis; Sharda |
| fomesafen + <i>S</i> -metolachlor | Prefix | Syngenta |
| metribuzin + chlorimuron | Canopy , Cloak, Metrixx Plus | Corteva; Nufarm; Sharda |
| metribuzin + flumioxazin | Panther MTZ; Dimetric Charged | Nufarm; Winfield |
| metribuzin + metolachlor | Tailwind; Priority MTZ; Me-too-lachlor MTZ; Galvan; Headwin* | ADAMA; Albaugh, Drexel, Innvictis; Sharda* |
| metribuzin + <i>S</i> -metolachlor | Boundary ; Moccasin MTZ* | Syngenta; UPL |
| metribuzin + sulfentrazone | Authority MTZ | FMC |
| sulfentrazone + pyroxasulfone | Authority Edge ; Authority Supreme * | FMC |
| sulfentrazone + cloransulam | Authority First ; Sonic ; Vandal First; Antares Prime* | FMC; Corteva; Innvictis; Helena* |
| sulfentrazone + metolachlor | Vandal MOC | Innvictis |
| sulfentrazone + <i>S</i> -metochlor | Authority Elite ; BroadAxe XC ; Vandal S-MOC | FMC; Syngenta; Innvictis |
| sulfentrazone + chlorimuron | Authority XL ; Vandal XL | FMC; Innvictis |

3 AI's per product for soybean PRE

| Active ingredients | Trade name(s) | Manufacturer |
|--|---------------------------|-------------------|
| chlorimuron + flumioxazin + pyroxasulfone | Fierce XLT | Valent |
| chlorimuron + flumioxazin + thifensulfuron | Envive; Enlite* | Corteva |
| flumioxazin + pyroxasulfone + metribuzin | Kyber; Fierce MTZ | Corteva; Valent |
| fomesafen + metribuzin + S-metolachlor | Intimidator | Loveland |
| metribuzin + chlorimuron + flumioxazin | Trivence | Corteva |
| S-metolachlor + sulfentrazone + metribuzin | Antares Complete; Tribal* | Helena; Loveland* |

Historically used PRE AI's in soybean

| Active ingredient | WSSA/HRAC # | 2 AI per product | 3 AI per product | Total products |
|-------------------|-------------|------------------|------------------|----------------|
| metribuzin | 5 | 13 | 6 | 19 |
| sulfentrazone | 14 | 10 | 2 | 12 |
| flumioxazin | 14 | 5 | 6 | 11 |
| metolachlor | 15 | 9 | 0 | 9 |
| chlorimuron | 2 | 7 | 2 | 9 |
| S-metolachlor | 15 | 6 | 3 | 9 |
| fomesafen | 14 | 6 | 1 | 7 |
| pyroxasulfone | 15 | 4 | 1 | 5 |
| cloransulam | 2 | 3 | 0 | 3 |
| acetochlor | 15 | 2 | 0 | 2 |
| thifensulfuron | 2 | 0 | 2 | 2 |

Trade names aren't always equal

- **Boundary and Moccasin MTZ**
 - S-metolachlor + metribuzin
 - Boundary – 5.25 + 1.25 lb/gal
 - Moccasin MTZ – 3.35 + 1.116 lb/gal

| Herbicide Trade Name | Rate | Dual Magnum | Metribuzin 75 DF |
|-----------------------------|-------------|-------------------------|-------------------------|
| | pt/A | ----- oz/A ----- | |
| Boundary | 1.5 | 16.5 | 5 |
| Moccasin MTZ | 1.5 | 10.6 | 4.5 |
| Boundary | 2 | 22.1 | 6.67 |
| Moccasin MTZ | 2 | 14.1 | 6 |

Effective weed management program

- Herbicide resistant weeds has shown the requirement for
 - Multiple SoA's per application and per season
 - Use of residuals is a must
 - No tolerance for escapes



Effective

ment program

- **MAKE TR**

COUNT

- Weed sp
- Correct h
- Proper G
- Apply to small weeds – 4 in
- Apply when weather is good
- Nozzles should be no more
- target
- Proper adjuvant

de choice



ve

Effective weed management program



Take home point:

Make the application count



Questions

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