

Controlling Problem Weeds in Eastern KS

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Current Weed Control Issues

- ☛ New Herbicide Technologies
- ☛ New Trait Technologies
- ☛ Herbicide Resistance



Autumn Super (Bayer)



- ☛ Autumn Super contains 6% Iodosulfuron-methyl (Autumn) + 45% thiencarbazone-methyl
- ☛ Apply 0.5 oz product with COC or MSO at 1% v/v and UAN at 1.5 to 2 qt/a or AMS at 1.5 to 3 lb/a
 - Fall applied up to 1 month before corn planting
 - Fall applied up to 2 months before soybean planting
 - Three months before wheat planting
 - DO NOT USE if intending to plant any other crop
 - | 9 to 18 mo. Restriction + 15 to 30" rainfall required

“Q” products (DuPont) for Corn



- ☛ **Q indicates a safener has been added**
- ☛ **Accent Q, Steadfast Q, Require Q**
- ☛ **New Resolve Q, Realm Q**

Basis Blend (DuPont) for Field Corn only



- ☛ ***Basis Blend* contains: 20% rimsulfuron (*Resolve SG*) + 10% thifensulfuron-methyl (*Harmony SG*)**
- ☛ **Use rate is 0.825 to 2.5 oz/a**
 - **Apply 1.25 oz as fallow treatment in the spring or fall to emerged actively growing weeds less than 3" tall. Apply 1.25-1.5 oz (up to 2.5 oz) preplant or preemergence to corn**
 - **Apply 0.825 oz to field corn in the spike through the two collar stage of growth**
 - ┆ **Do not apply to corn having 3 collars or corn 6" tall.**

Resolve Q (DuPont) for Field Corn only



- ☛ ***Resolve Q*** contains: 18.4% rimsulfuron (*Resolve SG*) + 4% thifensulfuron-methyl (Harmony SG)+Safener
- ☛ Use rate is 1.25 to 2.5 oz/a
 - Apply PRE 1.25 to 2.5 oz
 - Apply POST 1.25 oz to corn up to 7 collar or 20 inch tall which ever is most restrictive
 - Apply to 1 to 2 inch grass weeds and less than 5 inch broadleaf weeds for best control

Realm Q (DuPont) for Field Corn only



- ☛ *Realm Q* contains: 7.5% rimsulfuron (*Resolve*) + 31.25% mesotrione (*Callisto*)+Safener
- ☛ Use rate is 4 oz/a
 - = to 1.2 oz Resolve + 2.5 fl oz Callisto
 - Apply Early POST to corn up to 7 collar or 20 inch tall which ever is most restrictive
 - Apply to 1 to 2 inch grass weeds and less than 5 inch broadleaf weeds for best control

Evaluation of PRE applied herbicides in corn, Kansas Rivervalley 2011. (Thompson and Adee).

Treatment	Rate	App	Crgr	Imgy	Paam
Basis+atra	0.5 oz + 1qt	PRE	95	92	99
Prequel+atra	1.66 oz + 1qt	PRE	92	91	99
Cinch ATZ	1 qt	PRE	100	92	99
SureStart	1.75 pt	PRE	94	82	100
SureSt+atra	1.75 pt+1 qt	PRE	97	97	100
Lexar	3 qt	PRE	100	97	100
LSD (0.05)			9	6	4

Evaluation 3 weeks after treatment, just prior to early post treatments.

Dow AgroSciences DHT Corn



- ☛ **DHT = Dow AgroSciences Herbicide Tolerant**
- ☛ **GMO trait –**
 - **Gene confers resistance to 2,4-D**
 - **Same gene confers resistance to aryloxfenoxy
propionic acids (FOPS)**
 - **A premix of 2,4-D (new formulation with glyphosate)
will be used**
- ☛ **Earliest would be 2013 for limited introduction**

Fierce



- ☛ Premix from Valent containing 33.5% flumioxazin (Valor) and 42.5% pyroxasulfone (Zidua) WDG.
- ☛ Timing: Fall, EPP through preemergence.
- ☛ Application rate: 3 to 4.5 oz/acre
 - 3 oz Fierce = 2 oz Valor + 1.5 oz KIH 485
- ☛ Preemergence control of grass and broadleaf weeds, including pigweeds.

Zidua



- ☛ New product from BASF containing 85% pyroxasulfone.
- ☛ Preplant through preemergence, and postemergence in corn and soybeans.
- ☛ Rates: 2 to 2.5 oz/a?
- ☛ Weeds: preemergence control of annual grass and broadleaf weeds, including pigweeds.

Anthem



- ☛ New premix from FMC containing pyroxasulfone and Cadet.
- ☛ Preplant, preemergence in corn and soybeans.
- ☛ Rates: 5 -7 fl oz/a?
- ☛ Weeds: annual grass and broadleaf weeds, including pigweeds.

Eastern KS 2011



Eastern KS 2011



Management or Resistance?



Introduction

- ☛ Increase in no-till cropping systems throughout central and eastern Kansas
- ☛ This change in cropping system has cause new challenges in weed control
- ☛ A major weed problem in no-till wheat and soybean is achieving effective control of marestail



Introduction

- ☛ Maretail is a winter annual weed that overwinters in the rosette stage and bolts in the spring
 - Multiple flushes can occur in the fall, spring, summer
 - | Northern areas fall germination more common
 - | Southern areas spring germination more common



Seedling



Rosette



Bolting



Seed head

Introduction

- ☞ Maretail can produce up to 200,000 seeds/plant
- ☞ Mechanism of seed dispersal is by wind
 - Can spread up to 1,475 ft from its original seed source
- ☞ Not much competition research has been done with maretail
 - Study in Michigan where soy yield reduced >80%
 - | MI study may be an overestimate of yield loss w/ maretail

Herbicide Resistance

- ☛ Mareestail has developed herbicide resistance to five herbicide modes of action across 16 states including Kansas
 - Glyphosate
 - Paraquat
 - Atrazine
 - ALS-inhibiting herbicides
 - Diuron



Glyphosate Resistant Marestalk in KS

Sumner Co. →

Miami Co. →

Check →



Glyphosate Rate: 1 pt 1 qt 1.5 qt 0

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Glyphosate Rate: 1 pt 1 qt 1.5 qt 0

Marestail Control

- ☛ Marestail is fairly easy to control when plants are a rosette with systemic herbicides
 - Glyphosate, 2,4-D, SU herbicides, FirstRate
- ☛ When plants bolt, effective control with herbicides is greatly reduced
 - Glyphosate and 2,4-D are still important to include in tank mixes for bolted marestail if possible
 - Contact herbicides seem to work better on bolted marestail than rosette
 - | Growing point exposure

Marestail Control in Wheat (Winfield)

Treatment	Rate	Application Stage	
		Rosette (Dec-21)	Bolted (April-8)
		% Control on May 19th	
Banvel	8 floz	100	-
Huskie	15 floz	84	100
Aim	1 floz	34	5
Finesse	0.4 oz	90	88
Powerflex	3.5 oz	55	80
LSD (5%)		24	

Shoup, Zimmerman, & Peterson, 2010

Marestail Control Ahead of Soybean (Hillsboro)

Treatment	Rate	Application Stage	
		Rosette (Mar-29)	Bolted (May-5)
		% Control 5WAT	
Roundup PMax	22 floz	84	63
2,4-D amine	32 floz	95	54
Ignite	22 floz	77	90
First Rate	0.7 oz	71	71
Gramoxone	32 floz	6	78
LSD (5%)		16	7

Shoup, Roberts, & Peterson, 2010

Marestail Control Ahead of Soybean (Osage County)

Treatment (Sprayed 4/20)	Rate	Fall Germ	Spring Germ
		———% Control 5WAT———	
RuPM	22oz	77	75
2,4-D	16oz	87	95
RuPM+2,4-D	22oz + 16oz	95	100
AuthFirst+RuPM+2,4-D	3oz + 22oz + 16oz	99	100
Sharpen+RuPM	1oz + 22oz	79	100
Sharpen+RuPM+Ignite	1oz + 22oz + 29oz	90	100
LSD (5%)		14	6



Fall Germinated



Spring Germinated

Marestail Control in Soybean (Manhattan)

Treatment	Rate	1WAT	5 WAT	10 WAT
% Control				
Roundup PMax	22 oz	30	57	57
Roundup PMax	44 oz	37	60	57
Cadet	0.9 oz	20	0	0
RU PMax + Cadet	22+0.9 oz	50	47	47
FirstRate	0.3 oz	47	73	63
RU PMax + FirstRate	22+0.3 oz	47	87	95
Classic	0.5 oz	53	53	40
RU PMax + Classic	22+0.5 oz	53	73	77
LSD (5%)		6	10	8

Marestail Control

- 🐼 Several herbicide options in wheat and corn
 - Wheat: 2,4-D, Dicamba, Huskie, Finesse
 - Corn: Atrazine, Callisto, Laudis, Status, SU herbicides
- 🐼 Fall or early spring applications are the best management practice for controlling marestail ahead of soybean
 - Tank mixes of glyphosate, 2,4-D, dicamba, ALS on rosette
 - Tank mixes of glyphosate, 2,4-D, dicamba, Ignite, Sharpen, FirstRate on bolted marestail
- 🐼 Marestail control in soybean with Glyphosate + FirstRate
 - Second herbicide option Glyphosate + Classic
 - Ignite in Liberty Link soybeans

Waterhemp



Herbicide Resistance

☛ Waterhemp has developed resistance across SIX herbicide MOA (Heap 2011)

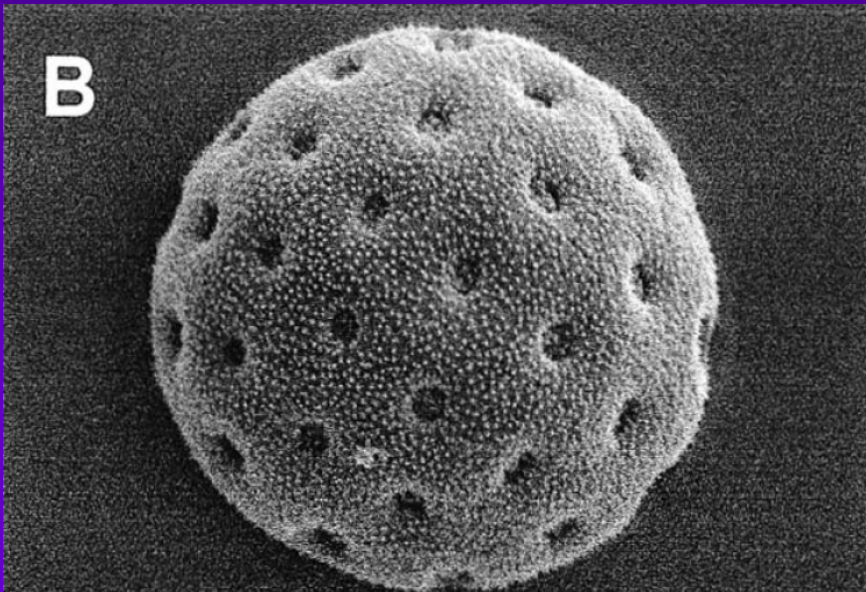
- ALS Resistance
- Triazine Resistance
- PPO Resistance
- Glyphosate Resistance
- HPPD Resistance
- 2,4-D

☛ WERE RUNNING OUT OF HERBICIDES!!

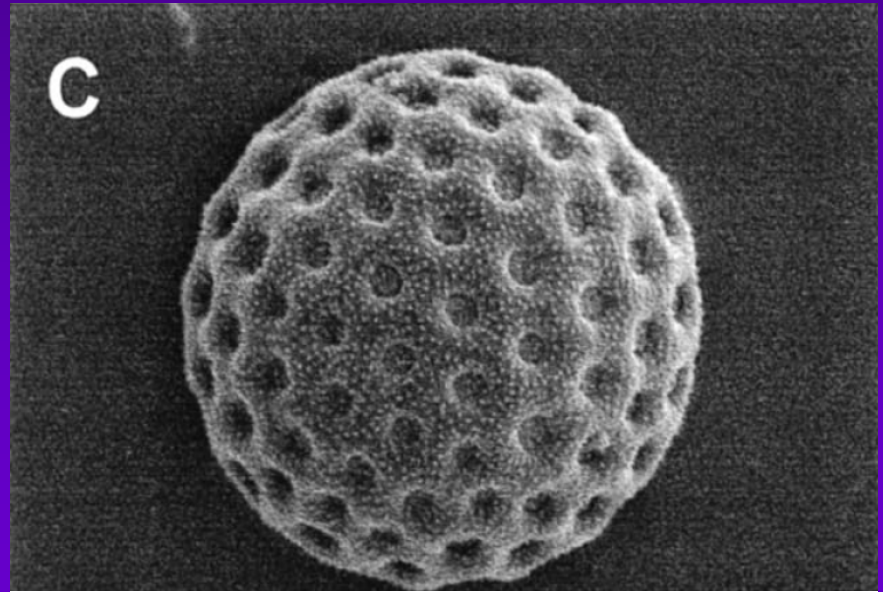


Pigweed Pollination and Genetic Diversity

- ☛ Redroot pigweed, smooth pigweed, and prostrate pigweed are monoecious
 - Male and female parts on same plant
- ☛ Palmer amaranth and common waterhemp are dioecious plants
 - Male and female parts on separate plants



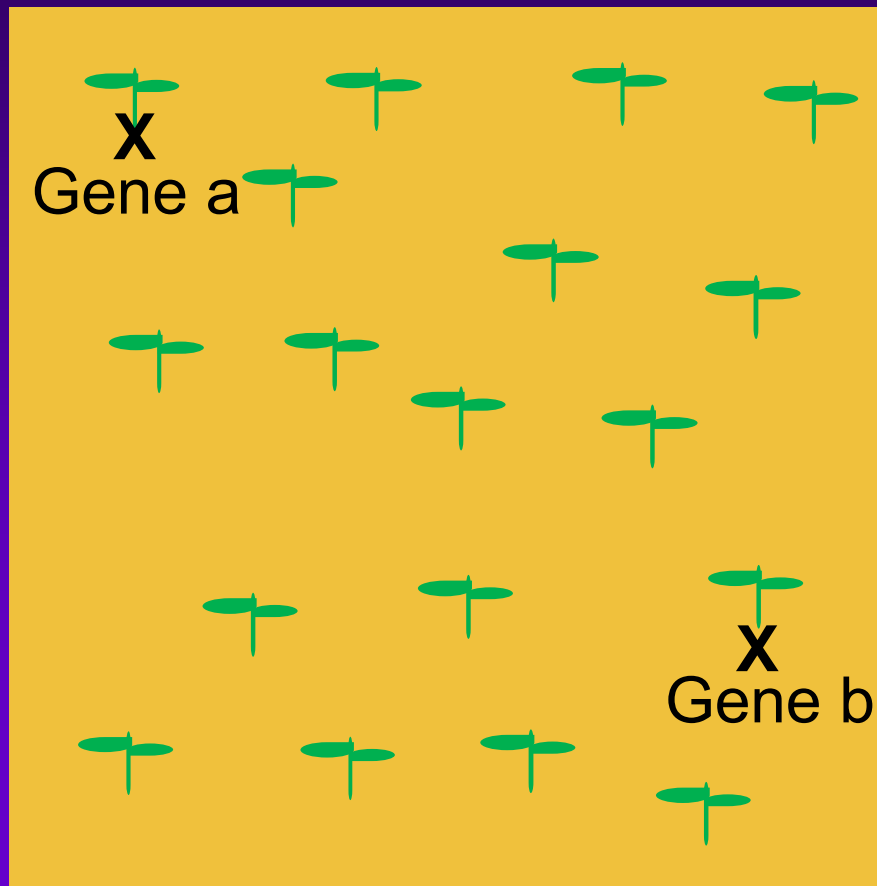
Prostrate pigweed



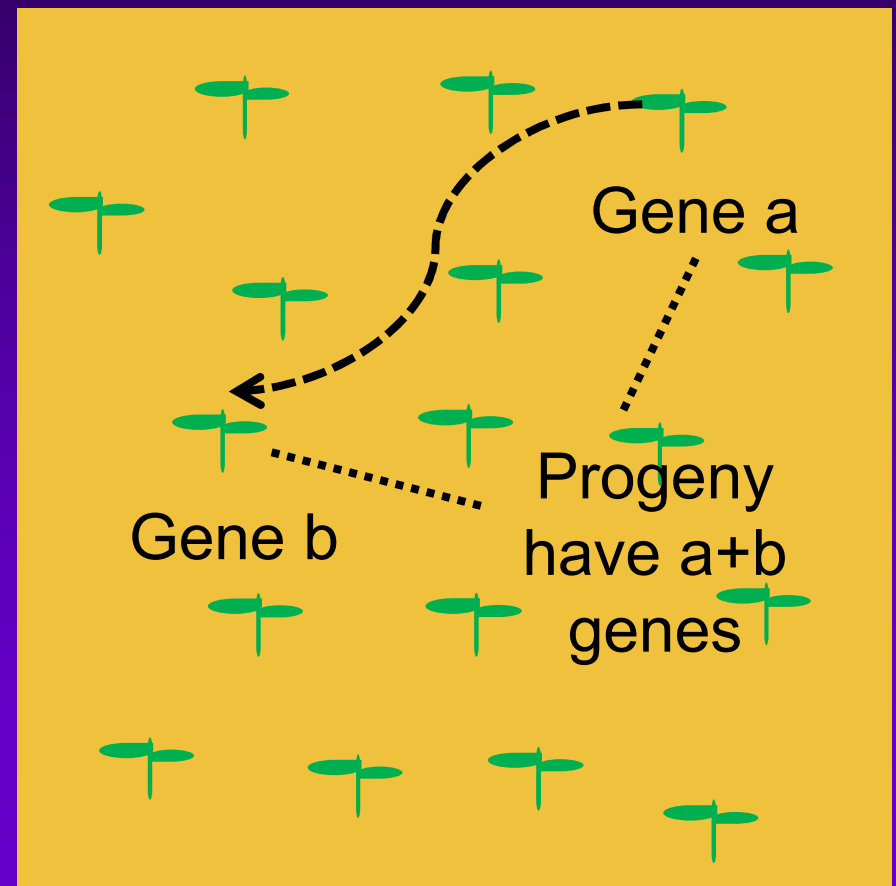
Common waterhemp

Pollination and Multi-Gene Resistance

Monoecious resistance



Dioecious resistance



Single vs. Multiple Gene Resistance

☛ Male and female (dioecious) pigweed species

- Quick development of single gene resistance
 - | Genetic diversity
- Quick stacking of multiple gene resistance
 - | Cross pollination



GLYPHOSATE RESISTANCE

Glyphosate Resistant Waterhemp Control

Foundation preemergence herbicides

- Soybeans: Prefix, Authority, Valor, Fierce, Intrro
- Corn: Atrazine premixes, Lexar/Lumax, Balance Flexx, Corvus, Verdict, Sharpen

Postemergence herbicide options

- Soybean – Flexstar, Cobra, Ultra Blazer
- Corn – Callisto, Laudis, Capreno, Impact, Status

Liberty Link programs

Glyphosate resistant waterhemp control at Ottawa, KS in 2011 (Peterson, Shoup, and Putman).

Herbicide	Rate	Waterhemp Control		
		6/28	7/20	9/6
	(oz/a)		(%)	
Roundup Power Max	22	-	16	15
Valor XLT/ RUPM	4 /22	91	91	86
Valor XLT/RUPM+Flexstar	6.5/22+20	89	92	86
Auth XL/RUPM+Flexstar	6.5/22+20	98	97	96
Auth First/RUPM+Flexstar	6.5/22+20	90	96	94
Fierce/RUPM+Flexstar	4.5/22+20	100	100	100
LSD (5%)		7	4	5

Roundup Power Max



Fierce/Roundup PM+Flexstar



Broadleaf weed control at Manhattan, KS in 2010 with good activation (Peterson and Thompson).

Herbicide	Rate	Paam	Vele	Iimg
		------(%)-----		
Valor XLT	3 oz	96	100	90
Fierce	3 oz	99	99	87
Authority First/Sonic	3.2 oz	97	100	87
Authority XL	4 oz	98	93	90
Prefix	2 pt	100	53	50
OpTill	2 oz	89	100	83
Prowl H2O	2.5 pt	50	83	27
LSD (5%)		7	4	5

Broadleaf weed control at Manhattan, KS in 2010
with delayed activation (Peterson and Thompson).

Herbicide	Rate	Paam	Vele	Iimg
	(oz/a)	-----	(%)-----	
Valor XLT	3.5	99	87	73
Authority First	3.2	75	70	77
Authority XL	4	63	63	73
Authority Assist	5	80	67	80
Fierce	3	98	100	73
LSD (5%)		8	13	12

Future for Weed Management

Dicamba resistant soybeans from Monsanto – 2014?

- Metabolism based resistance, stacked with Roundup Ready trait
- Monsanto and BASF developing new lower volatility formulation of dicamba

DHT (Enlist) resistant soybeans from Dow AS – 2015?

- Resistance to 2,4-D, stacked with glyphosate resistance
- Metabolism based resistance
- Dow developing new low volatility formulation of 2,4-D that will be pre-mixed with glyphosate called Enlist Duo.

Future for Weed Management

☛ HPPD resistant soybeans – 2016?

➤ Syngenta and Bayer collaboration

- | Gene from oat
- | Stacked with glufosinate
- | Tolerance to Balance or Callisto
 - Preemergence injury at high rates (4x) 10-15%
 - Some postemergence injury

➤ Bayer and MS Technologies collaboration

- | Gene from bacteria (*Pseudomonas fluorescens*)
- | Stacked with glufosinate
- | Tolerance to Balance or Callisto (not to Laudis)
 - Similar injury to previous event

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