

# Pre-emergent Herbicide Options for Onions

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**Rui Liu, Ph.D.**

Assistant Professor - Weed Science

Washington State University

Irrigated Agriculture Research and Extension Center, Prosser, WA



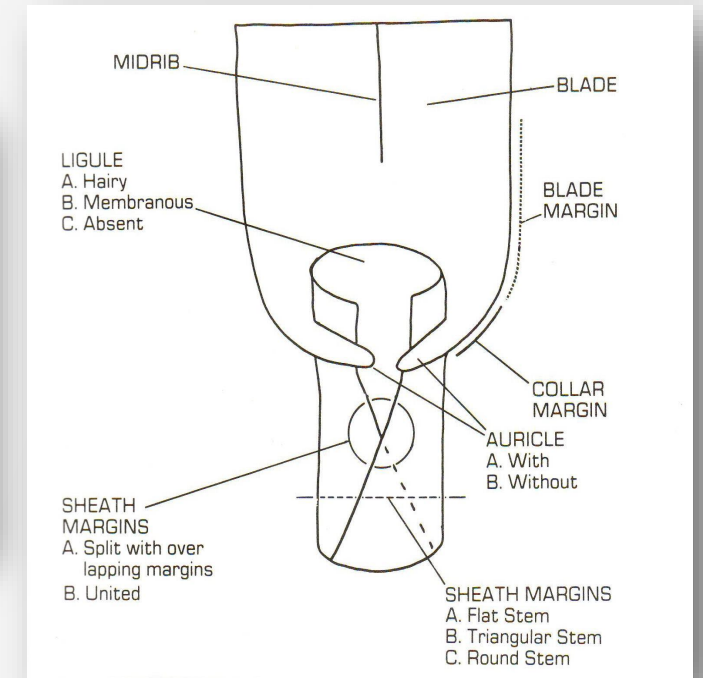
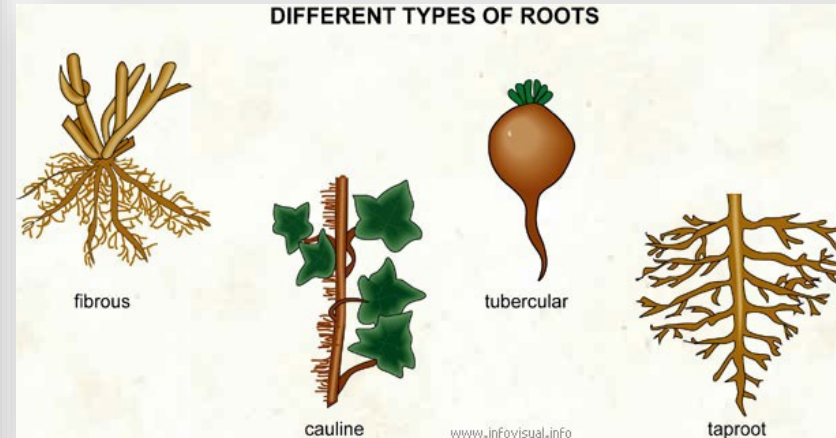
WASHINGTON STATE UNIVERSITY  
**EXTENSION**

# Outline

- Problematic weeds in onions
- Pre-emergence herbicides and herbicide groups
- Herbicide resistance and management
- Onion PREs & research update



# Plant Characteristics

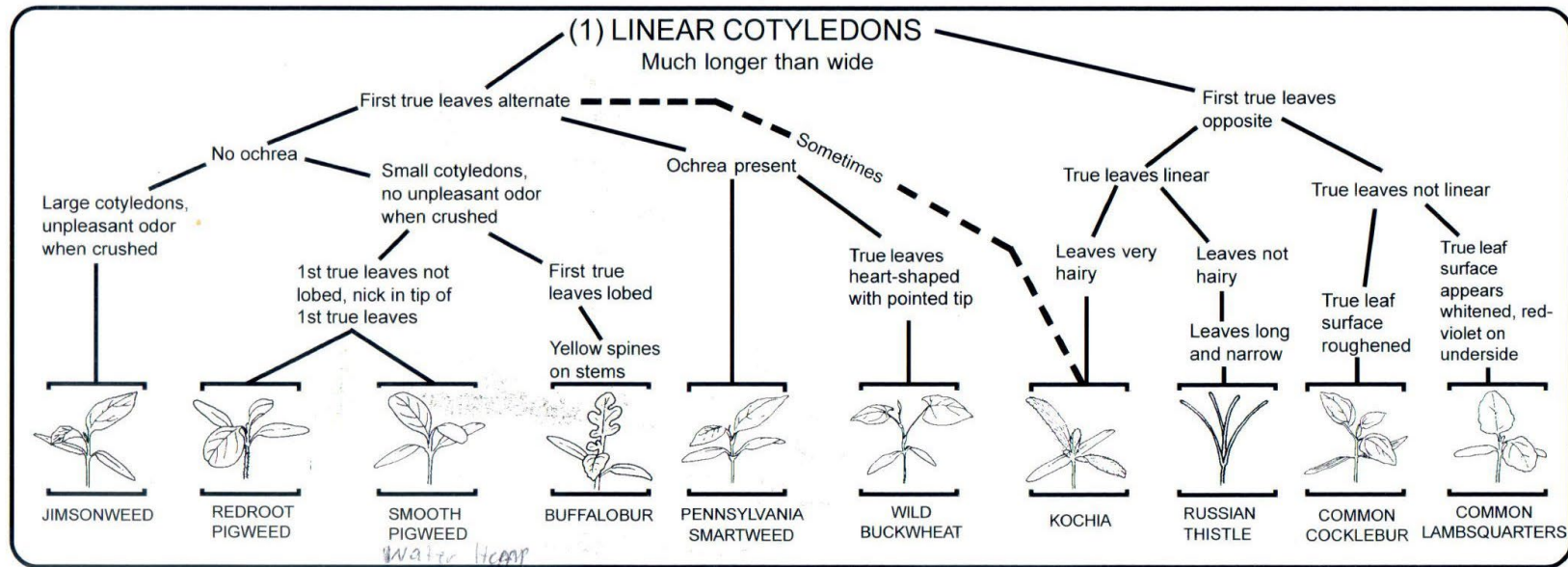
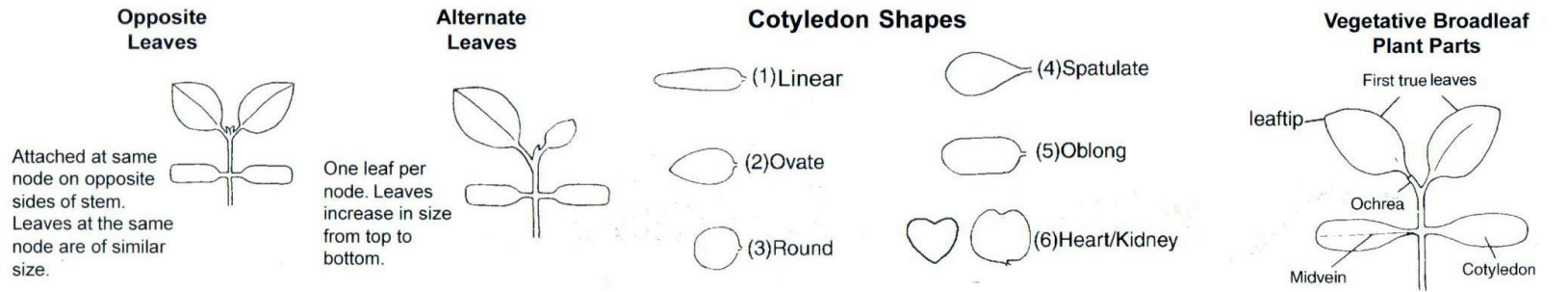


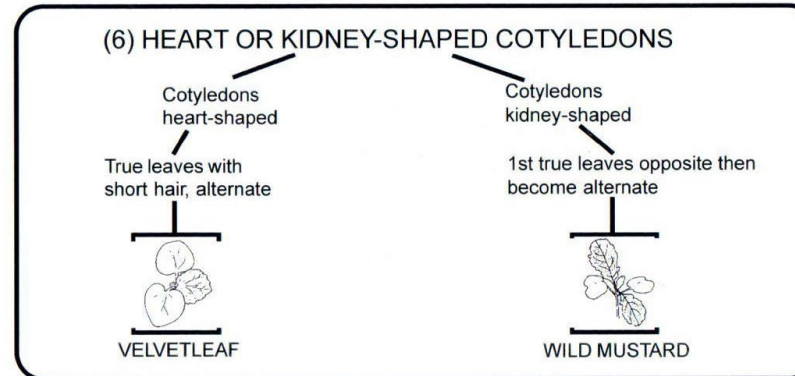
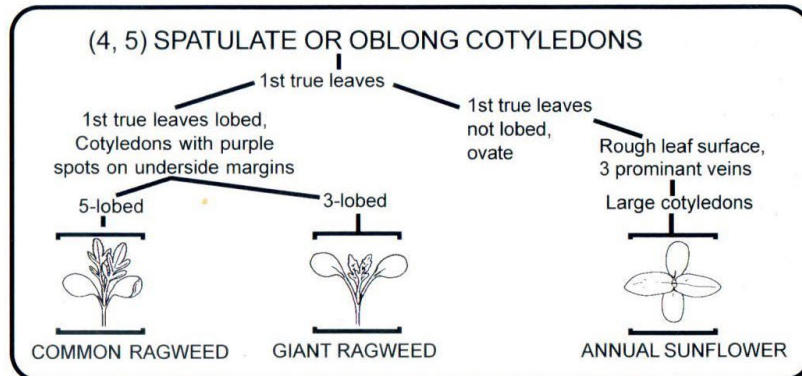
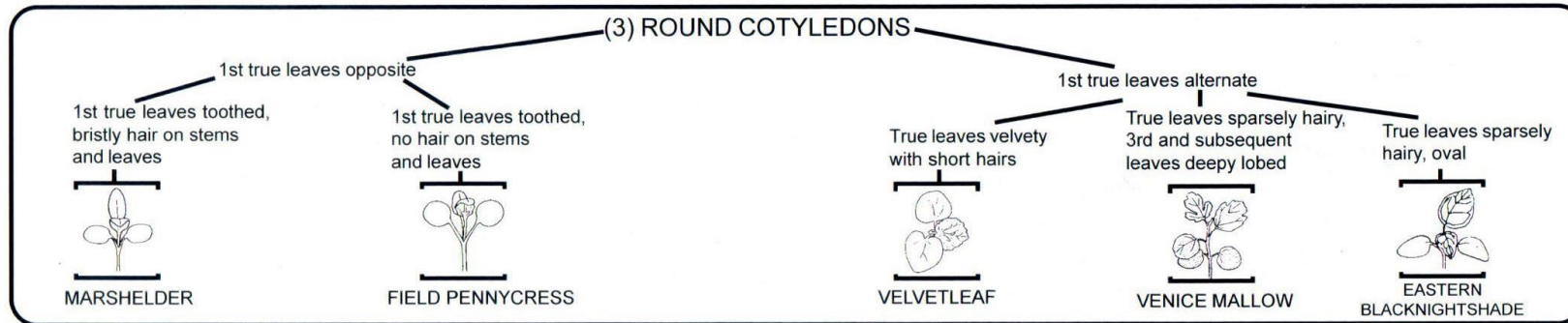
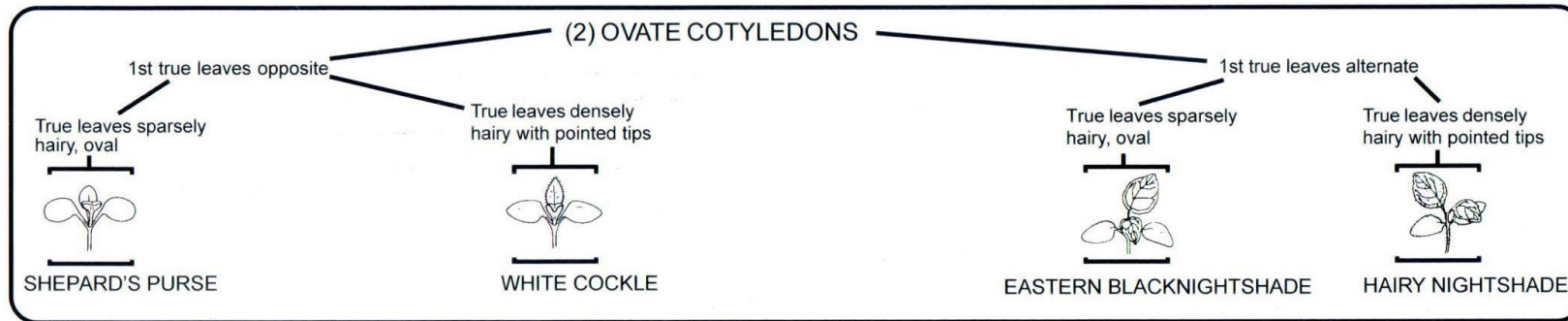
# Broadleaf and Grass Weed Seedling Identification Keys

Beverly Durgan, Weed Scientist  
Department of Agronomy and Plant Genetics

COLLEGE OF AGRICULTURAL, FOOD, AND ENVIRONMENTAL SCIENCES

## BROADLEAF WEED SEEDLING IDENTIFICATION KEY TERMINOLOGY





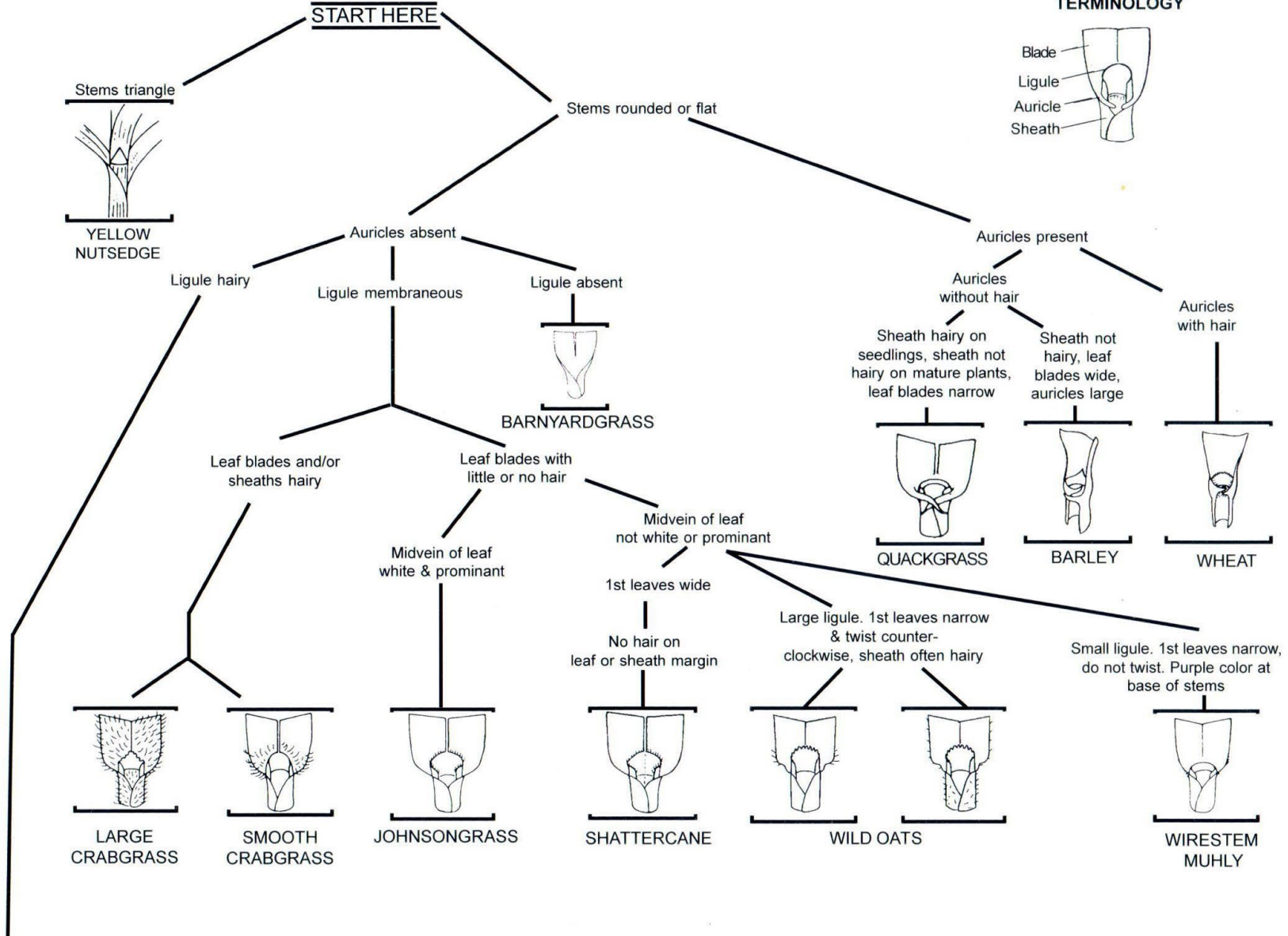
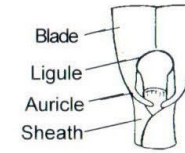
[www.extension.umn.edu](http://www.extension.umn.edu)

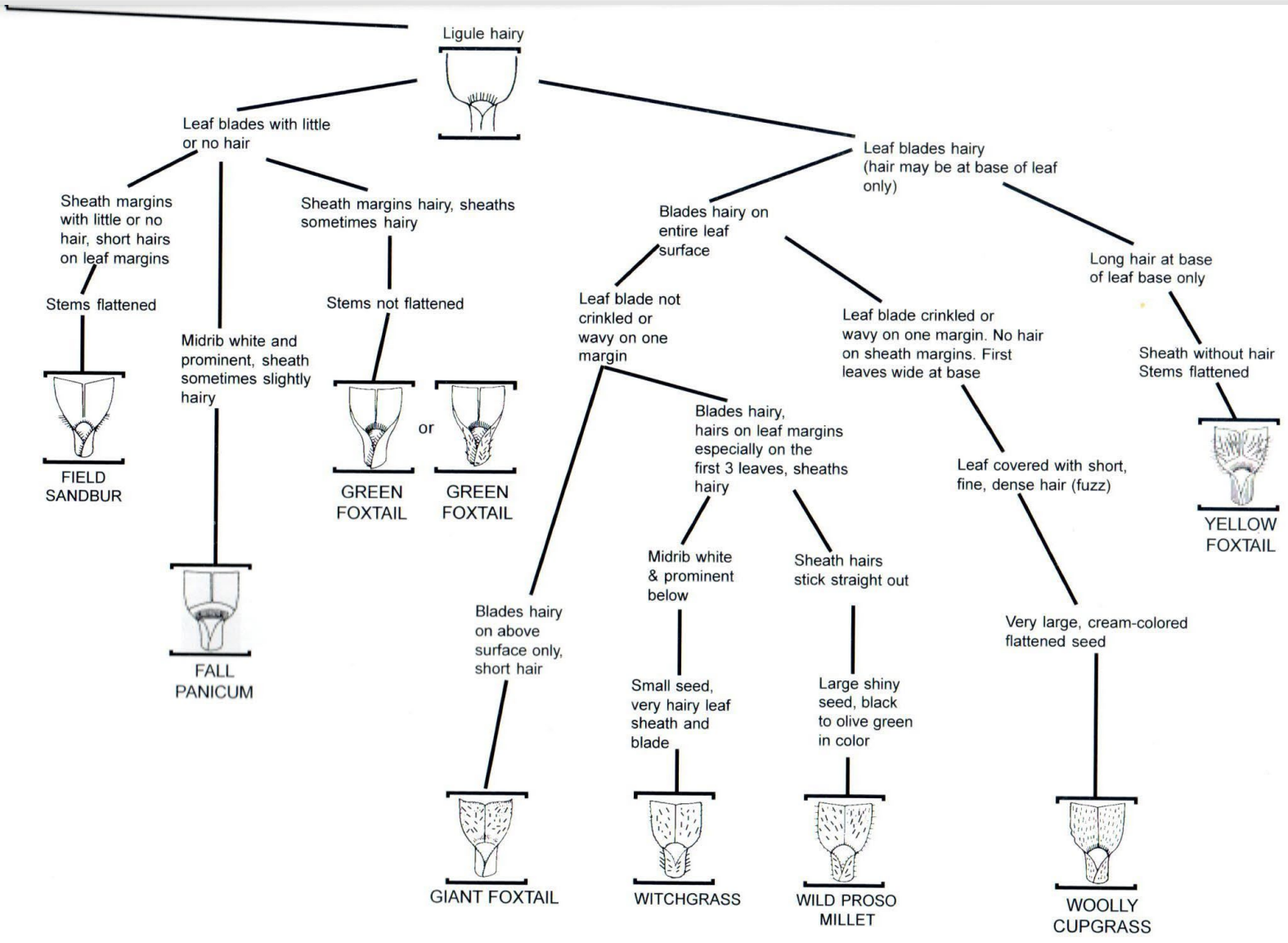
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# GRASS WEED SEEDLING IDENTIFICATION KEY

## TERMINOLOGY







**Dallisgrass**  
Membranous Ligule



**Quackgrass**  
Clasping Auricle



# Outline

- **Problematic weeds in onions**
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- Herbicide resistance and management
- Onion PREs & research update



# Common Lambsquarter

- Cotyledons and seedling leaves have mealy gray cast
- Green, inconspicuous flowers without petals
- A utricle with a thin papery covering over the seeds
- Short, much-branched taproot



# Puncturevine

- “Stickers”; “goathead”
- Summer annual broadleaf
- Extensive root system, forms dense mats
- Yellow flowers, five petals
- Fruit- sharply pointed burrs



# Barnyardgrass

- Leaves- rolled in the shoot, smooth
- Ligules- none
- Auricles- none



# Yellow Nutsedge

- Perennial, belongs to sedge (*Cyperaceae*) family
- Native of North America
- Favors wet environment
- Seedhead yellowish-brown or straw color



plant



seedling



Triangular stem



Flower

- Forms brown to tan- colored tubers at the tips of rhizomes



- A single tuber can produce about 1,900 plants and over 7,000 tubers in a growing season

# Yellow nutsedge in onion field



Tim Waters, Washington State University

# Kochia

- Family “Chenopodiaceae”
- Early & extended emergence
- High yield losses (up to 95%)
- Aggressive growth (C4 plant)
- High degree of outcrossing and pollen-mediated gene flow
- Prolific seed producer (>100,000 seeds/plant)
- Tumbling “seed dispersal”





# Russian Thistle

- Stems have reddish or purple stripes
- Leaves are alternate, long, and very thin or needle-like
- Flowers are small and inconspicuous and develop in the upper leaf axils
- Mature plants break off at ground level and “tumble”

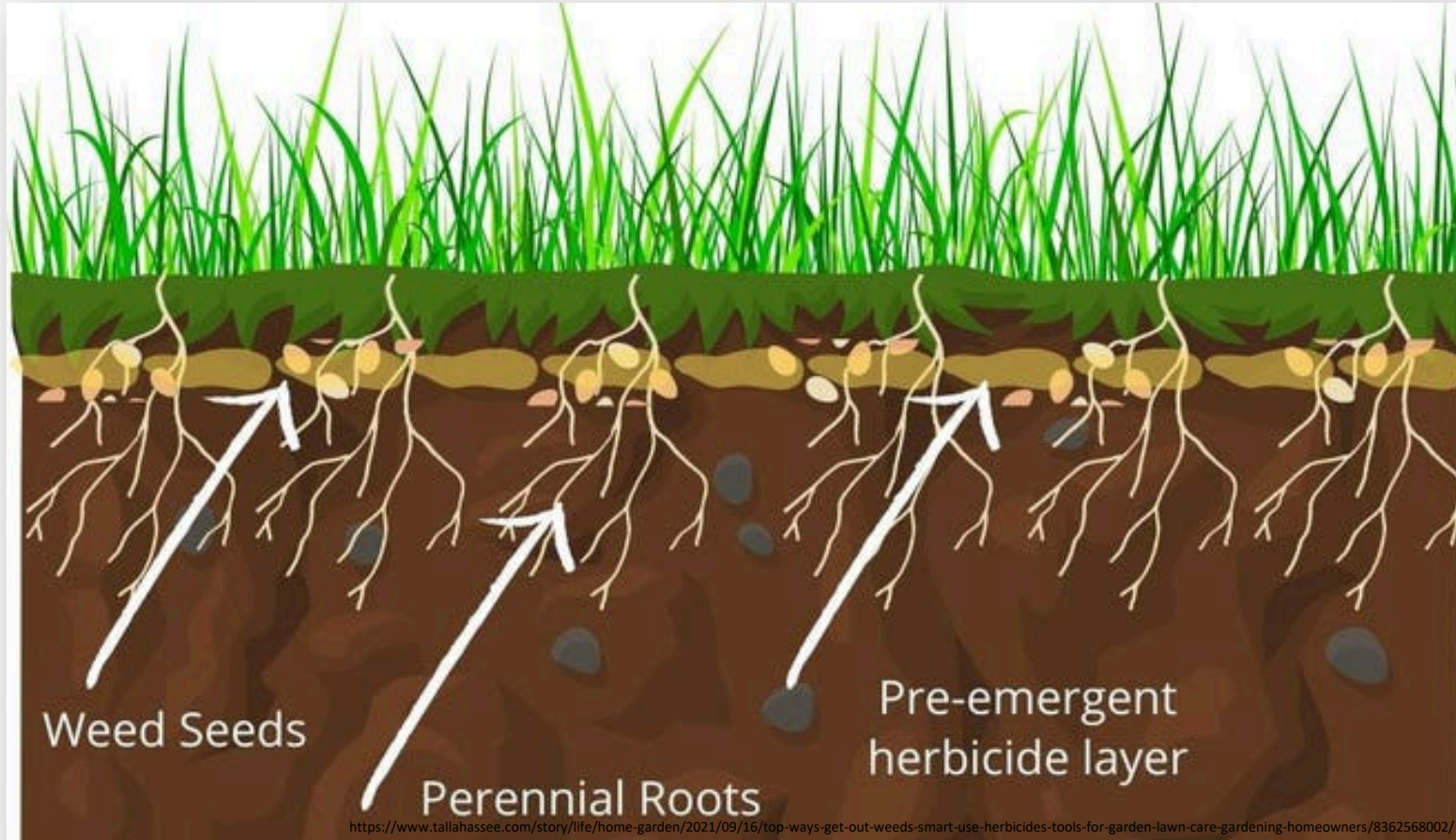


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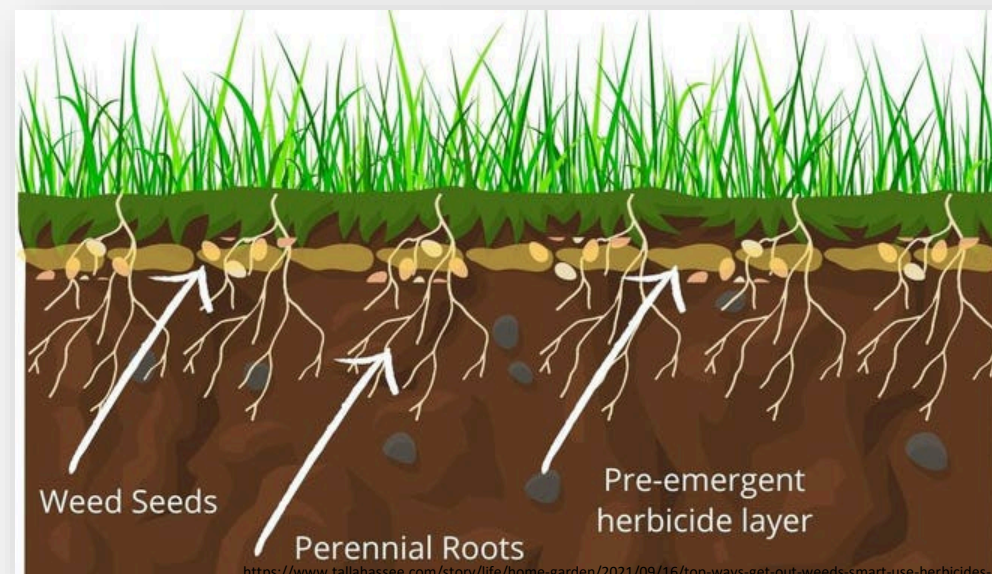


# Pre-emergent herbicides



# Pre-emergent herbicides

- Prevent seedling establishment
- Won't kill weed seeds
- Inhibit the growth of root or shoot, or both
- Need incorporation to the soil by irrigation or rainfall
- Stay in the soil for a while (residue effect), degrade after ~8 to 12 wks



<https://www.tallahassee.com/story/life/home-garden/2021/09/16/top-ways-get-out-weeds-smart-use-herbicides-tools-for-garden-lawn-care-gardening-homeowners/8362568002/>



# Herbicide groups

- **MOA: mode of action**, the way herbicide affects a plant, controls the susceptible plant
- **SOA: site of action**, a specific process in a plant that herbicide disrupts to interfere with plant growth and development

**HERBICIDE CLASSIFICATION**  
 Repeated use of herbicides with the same site of action can result in the development of herbicide-resistant weed populations.

**Take ACTION**  
 Herbicide-Resistance Management

**by MODE OF ACTION (MOA)** (effect on plant growth)

This chart groups herbicides by their modes of action to assist you in selecting herbicides 1) to maintain greater diversity in herbicide use and 2) to rotate among effective herbicides with different sites of action to delay the development of herbicide resistance.

SITE-OF-ACTION GROUP	SITE OF ACTION	NUMBER OF RESISTANT WEED SPECIES IN U.S.		
		CHEMICAL FAMILY	ACTIVE INGREDIENT	PRODUCT EXAMPLES (Trade Name)
1 <b>LIPID SYNTHESIS INHIBITORS</b>	1 <b>ACETYL-CoA Carboxylase</b>	Triazolopyrimidinone	glyphosate	Atrazine, Roundup
			oxyfluorfen	Blattler
			pyraflufen-ethyl	Blattler
			pyraflufen-ethyl	Blattler
		Phenylpyrazoles	acetochlor	AquaClear, Aquanaught
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler
			florasulam	Blattler

**by PREMIX**

This chart lists premix herbicides alphabetically by their trade names so you can identify the premix's component herbicides and their respective sites-of-action groups. Refer to the Site of Action chart on the left for more information.

PREMIX	COMPONENT		SITE-OF-ACTION GROUP
	ACTIVE INGREDIENT	TRADE NAME	
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
ACRION	glyphosate	Atrazine	10
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ACRION	glyphosate	Atrazine	10



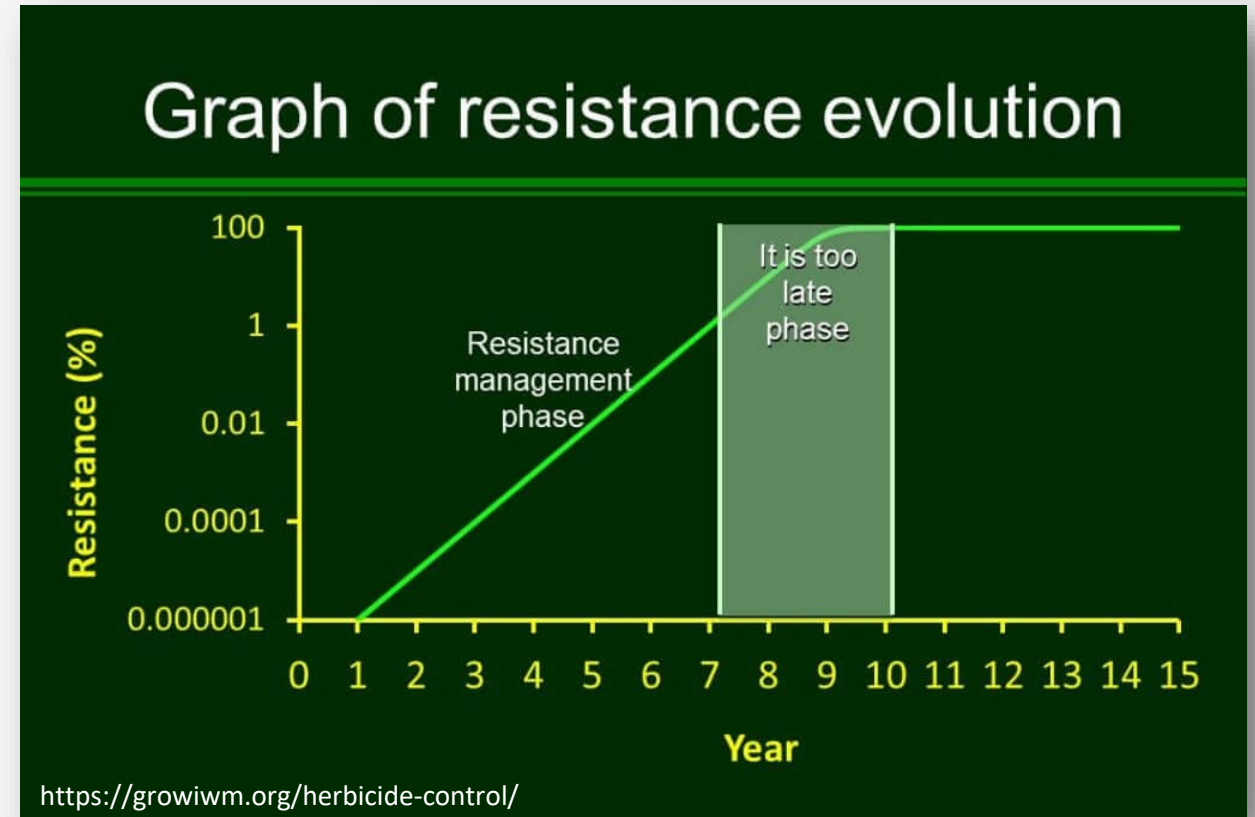
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# Herbicide resistance

- **Definition:** The inherited ability of a plant to survive and reproduce following exposure to a dose of herbicide normally lethal to the wild type.
- A consequence of selection pressure imposed by continuous use of the SOA



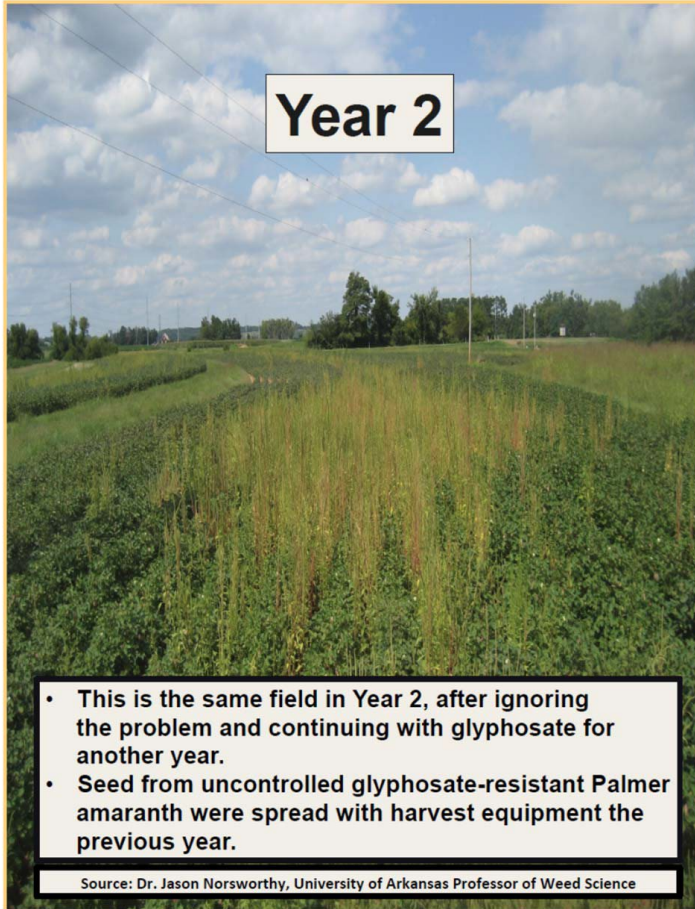
# How quickly can you lose a technology?



**Year 1**

- This is the result of one escaped weed from the previous year.
- Growers may recognize they have a problem but often say, "I think I can get one more year out of glyphosate".


Source: Dr. Jason Norsworthy, University of Arkansas Professor of Weed Science



**Year 2**

- This is the same field in Year 2, after ignoring the problem and continuing with glyphosate for another year.
- Seed from uncontrolled glyphosate-resistant Palmer amaranth were spread with harvest equipment the previous year.

Source: Dr. Jason Norsworthy, University of Arkansas Professor of Weed Science



**Year 3**

**Be Proactive, Don't Allow a Buildup of Resistance!**

- This is the same field in Year 3 after continuous use of glyphosate.
- Glyphosate-resistant Palmer amaranth had spread over the entire field resulting in complete crop loss.

Source: Dr. Jason Norsworthy, University of Arkansas Professor of Weed Science





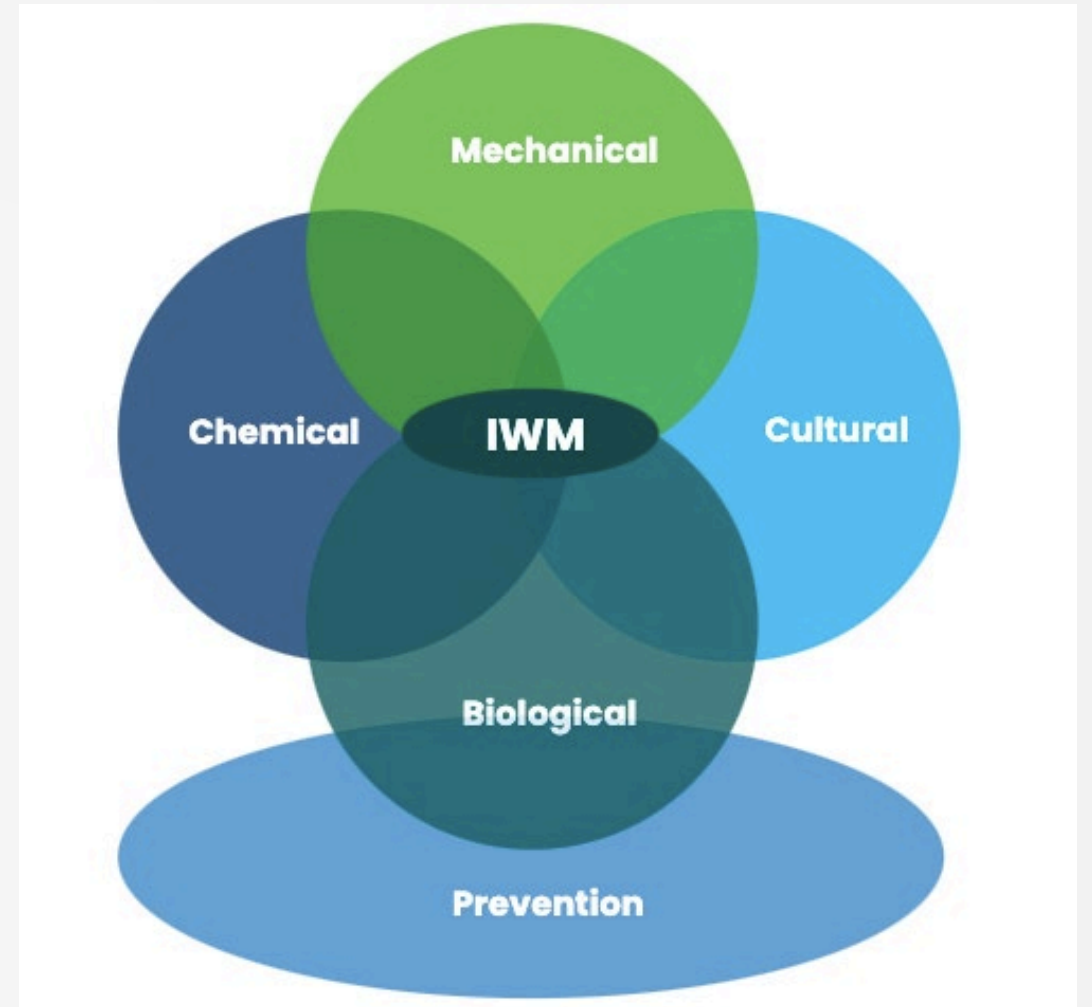
# Herbicide- resistant weeds in PNW

- Group 5, 6,7 (PSII-inhibitor) herbicides in mint and grass seeds
- Group 1 (ACCase), Group 9 (EPSP synthase) herbicides in vegetables



# Integrated Weed Management (IWM)

- Using multiple control tactics
- Include many methods in a growing season to allow producers the best chance to control troublesome weeds



IWM is composed of mechanical, cultural, chemical and biological tactics (credit: GROW)



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# Pre-emergent Herbicide Options in Onions

Group	A.I.	Trade Name	Rate (lb ai/A)
15 VLCFA	dimethenamid-P	Outlook	0.56-0.84
15 VLCFA	s-metolachlor	Dual Magnum	0.64-1.27
15 VLCFA	pyroxasulfone	Zidua	0.065 -0.09





## PRE (continued)


Group	A.I.	Trade Name	Rate (lb ai/A)
3 mitosis	pendimethalin	Prowl H2O, etc	0.475 -1.42
3 mitosis	dacthal	DCPA	4.5-10.5
14 PPO	flumioxazin	Chateau	0.13
16 unknown	ethofumesate	Nortron, Ethotron	1.875



Weed / Horticultural Weed Management / Vegetable Crops

# Onion

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Joel Felix

Revised: March 2022

This article includes information on dry bulb and green onions, leeks, shallots, and spring onions.

- Preplant
- Preemergence, Delayed Preemergence, Early Postemergence
- Postemergence
- Sprout Inhibition



# Herbicide treatment tested in 2023

Trt	Treatment Name	Active Ingredient	Rate (fl oz/a)
1	Untreated Check	-	-
2	Prowl H2O	Pendimethalin	16
3	Outlook	Dimethenamid- P	10
4	Nortron	Ethofumesate	16
5	Dacthal	DCPA	160
6	Zidua	Pyroxasulfone	2
7	Dual Magnum	S-metolachlor	11
8	Prowl H2O	Pendimethalin	24
9	Outlook	Dimethenamid- P	14
10	Dacthal	DCPA	224
11	Zidua	Pyroxasulfone	2.75
12	Dual Magnum	S-metolachlor	21
13	Nortron	Ethofumesate	8



# Weed Control % in 2023 season

Trt	Herbicide	Rate	Redroot pigweed	Redroot pigweed	Redroot pigweed	Redroot pigweed
			6/23	7/8	7/22	8/7
1	Check		0	0	0	
2	Pendimethalin	16	95	85	70	65 b
3	Dimethenamid- P	10	95	90	80	79 ab
4	Ethofumesate	16	95	80	78	70 b
5	DCPA	160	95	85	75	78 ab
6	Pyroxasulfone	2	95	80	78	72 b
7	S-metolachlor	11	95	88	78	76 ab
8	Pendimethalin	24	95	85	80	73b
9	Dimethenamid- P	14	95	80	75	73 b
10	DCPA	224	95	85	80	79 ab
11	Pyroxasulfone	2.75	95	90	85	79 ab
12	S-metolachlor	21	95	90	80	85 ab
13	Ethofumesate	8	95	75	60	27 c

Different letters within a column indicate significant difference (p<0.05)



# Weed Control % in 2023 season

Trt	Herbicide	Rate	Puncturevine	Puncturevine	Puncturevine	Puncturevine
			6/23	7/8	7/22	8/7
1	Check		0	0	0	0
2	Pendimethalin	16	95	75	40	5 ef
3	Dimethenamid- P	10	95	70	30	0 f
4	Ethofumesate	16	95	80	35	17 cde
5	DCPA	160	95	95	90	92 a
6	Pyroxasulfone	2	95	80	40	29 bc
7	S-metolachlor	11	95	75	30	14 def
8	Pendimethalin	24	95	80	35	23 cd
9	Dimethenamid- P	14	95	75	30	13 def
10	DCPA	224	95	95	95	95 a
11	Pyroxasulfone	2.75	95	75	50	40 b
12	S-metolachlor	21	95	75	30	1 f
13	Ethofumesate	8	95	80	50	30 bc

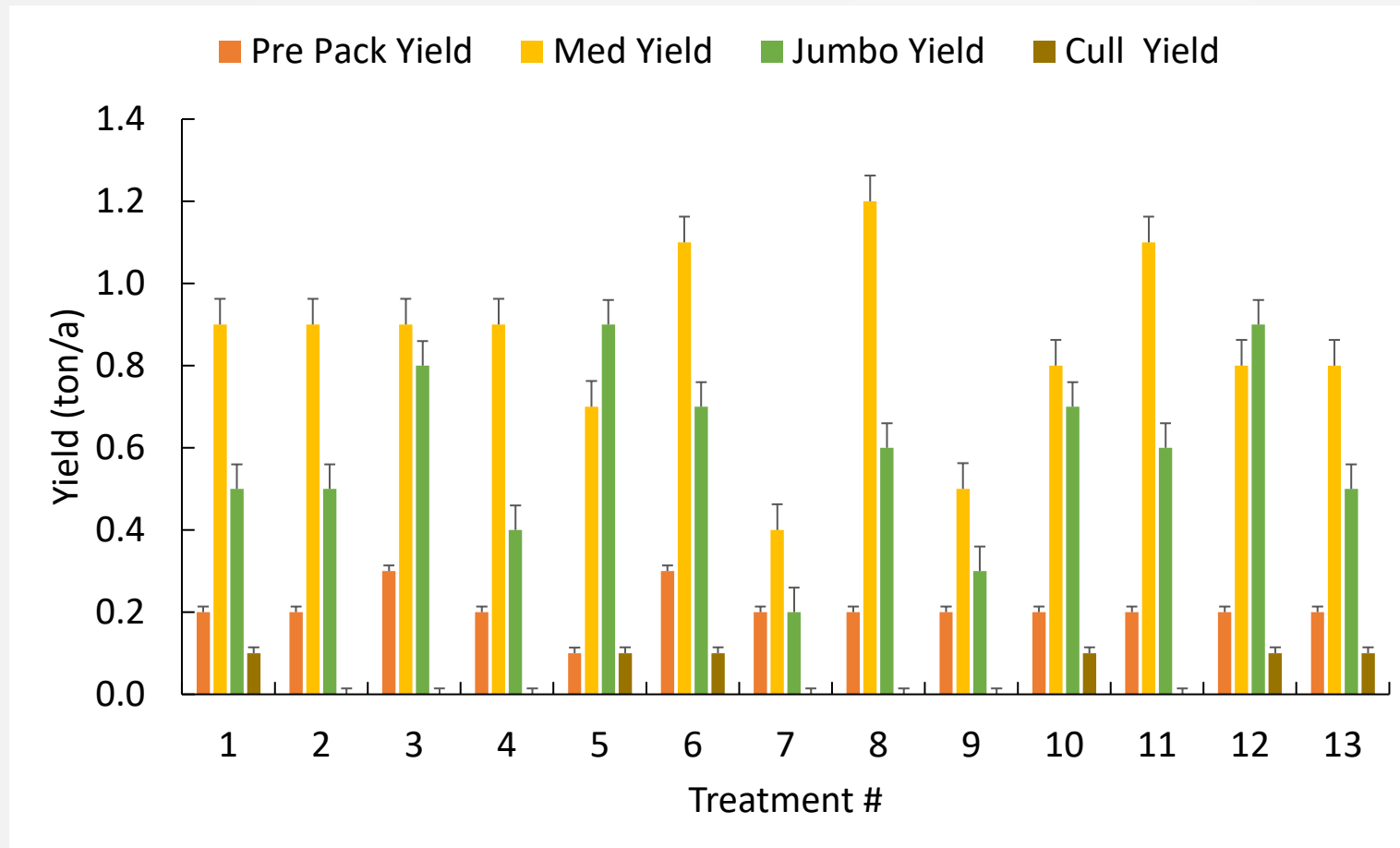
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# Weed Control % in 2023 season

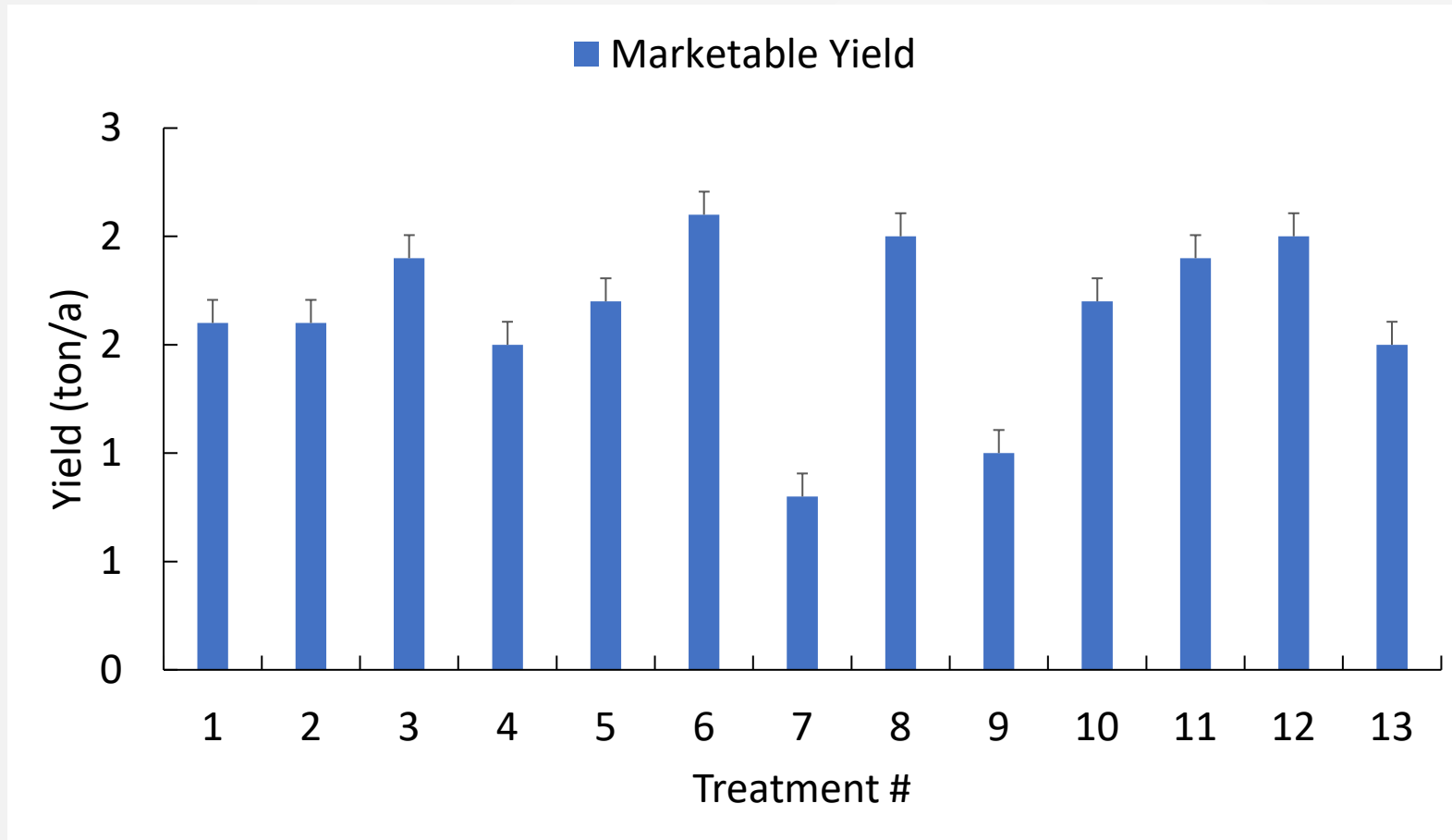
Trt	Herbicide	Rate	Lambsquarter	Lambsquarter	Lambsquarter	Lambsquarter
			6/23	7/8	7/22	8/7
1	Check		0	0	0	0
2	Pendimethalin	16	95	90	90	89 a
3	Dimethenamid- P	10	95	85	80	78 ab
4	Ethofumesate	16	95	80	75	61 bc
5	DCPA	160	95	90	85	83 ab
6	Pyroxasulfone	2	95	80	78	74 ab
7	S-metolachlor	11	95	95	90	89 a
8	Pendimethalin	24	95	85	80	79 ab
9	Dimethenamid- P	14	95	80	75	59 cd
10	DCPA	224	95	90	90	86 a
11	Pyroxasulfone	2.75	95	75	60	45 d
12	S-metolachlor	21	95	90	90	88 a
13	Ethofumesate	8	95	70	45	13 d

Different letters within a column indicate significant difference (p<0.05)

# Onion grade and yield



# Onion grade and yield



# Summary

- Herbicide treatments had no significant injury on onion, except for Dacthal (3-5%)
- Overall, weed control % decreased as the season progressed.
- Dacthal provided excellent control on puncturevine (92- 95%) throughout the season
- Control % on redroot pigweed did not differ from low and high rates of different herbicides, ranging from 65% to 85%, except Nortron at 8 fl oz/a (27%). Similarly, for lamsquarter control



# Thank You!



Email: [rui.liu@wsu.edu](mailto:rui.liu@wsu.edu)

Office: 509-786-9354

Twitter/ X: @IAREC\_weeds



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