

# Halian Ryegrass Control

Jake Gelineau and Eric Smith

# Outline

- Characteristics
- Habitat
- Herbicide Resistance
- Chemical control in Wheat vs. Garbs
- Learn from the Aussie's
- Cultural Control
- Mechanical Control
- Monitoring

# **Characteristics**

- Italian Ryegrass, Lolium multiflorum Lam.
- Native to southern Europe
- Cool-season annual
- Can grow to height of 3 feet
- Small claw-like auricles at leaf sheath and blade junction
- Seed head is a solitary spike with long awns
- Leaf blades are flat, glossy, and generally hairless
- Root system can reach 3 feet deep
- Genetically diverse species



# Characteristics Cont.

- Reproduces entirely by seed
  Can emerge from 7 inches deep
  Seed will germinate in 7 to 10 days
  One plant can produce up to 300,000 seeds
  Seed has physiological dormancy
- On the Palouse seed can be viable for 3 5 years
- Seed dormancy is longer in poorly drained soils



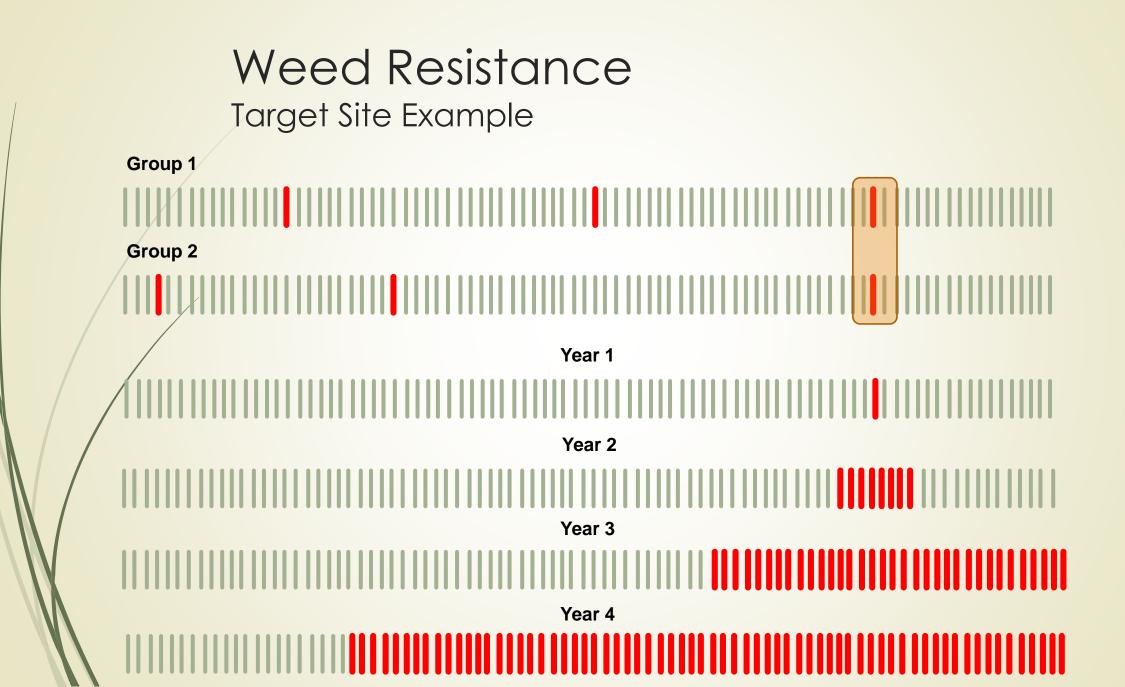
#### Habitat

- Prefers sub-irrigated poorly drained soils
- Adaptive to multiple cropping systems
- Air temps between 68 77
- Soil temps of between 50 65
- Ryegrass is shade intolerant



#### Herbicide Resistance

Cross resistance is the population resistant to two chemicals that use the same site of action Multiple resistance are populations that are resistant to three or more different groups Italian Ryegrass has both cross resistance and multiple resistance In the Pacific Northwest Italian Ryegrass has known resistance to: Group 1(ID,OR,WA), Group 2(ID,OR,WA), Group 9 (OR), Group 10(OR), and Group 15 (ID, OR, WA)



# **Control in Winter Wheat**

- Group 15 is the most effective option we still have in winter wheat
  - Zidua (Pyroxsulfone), Anthem Flex (Pryroxulfone + Carfentrazone), Axiom (Flufenacet +Metribuzin)
  - We like the Pyroxsulfone with Metribuzin combo because the Metribuzin will pick up emerged ryegrass plants
  - We also like Pyroxsulfone with Carfentrazone as it seems that aim is bringing something to the table
  - Followed by Spring application with a Group 2
  - The root pruning effect of the fall application of group 15 makes the group 2 spring application more effective

#### Guide for Herbicide Rotation in the Pacific Northwest

Redistant weeds in the substant weeds in the substant weeds in the substant weeds Yellow startback WA

Common lambaquarters

Figwood spp. Common grounds Annual bluegrose

Figuread upp.

Common lambaquarters

Common groundeal OR

Annual bluegrase OR

Italian yvegraxa OR

ID, OR, WA

10

deal WA

OR; WA

OR

OR.

ID, OR

Italien nysgress Annuel bluegress

Wild get

To avoid selecting for harbicide-resistant woods, do not use herbicides from the same color group mon than once within three years. Alather, rotate to a different group every year of the production system.

Group 1	Herbickle chemical tamily	Harbickle common	Herbicide trade names	Realistant woods in the PNW	States with resistant weeks	Herbicide group number and site of action	Herbickie chemical family	Herberge common	Herbicide trade name
		dethodim	Balact Max, Envoy	Ralian rysgness	ID	Group 4,	pyridines, cont.	*pidoram	Tardon K, Tardon 22
of Cold	cyclohexane- dionex		enveral others			continued		*triclopyr	Garlon, Remedy,
styl CoA boxylaxes (Cases)		sethoxydim	Pozst, several others		ID				Paramount Drive
(Cexe)	-	trakosydim	Achieve	Balsan ryegnass	ID		quinoline certiceylic ecide	*quinclone:	Paramount, Drive
inhibitore	arylosyphenoxy- propanoetes	clodinellop	Discover NG	Relian ryognass	ID	and the second second second	triazines	*etracine	AAtres
	proparicettes			Wildowt	ID ID ID ID	Group 5	briad theirs	"ethilonye	AAtrex
		didatop	Hoelon	Wild out	ID, OR, WA ID, OR, WA	Photosystem II inhibitors			
		-	Barrier & collector	Rafian ryograss Wild cat	ID, OR				
		fanosaptop Buacitop	Puma, Acdaim Fuelade DX	Downy bruma	10,00				
		quizelofop	Assura II, Targa	Bulian ryogram	10			1	and the state
						1		*simezine	Princep, Simazine
	phanylpyrauline	pinusadur)	Asial	kalian nyograss	40, OR		triatintines	*hesasnone *metribuein	Velper, Pronone Sencor, Metri DF
Group 2	imideuplinones	*imazamox	Raptor, Beyond, Clearmax (Beyond + MCRA)	Downy brome	OR		unacia	*bromacil	Hyvar X, Hyvar X-L
Acetolectete		New York Contraction		Spiny sowthistle	WA		Graden .	*terbacil	Sinhar
ALS)		*imazapic	Patence						
nhibitora		*imanapyr	Arsonal, Chopper, enveral others						
		*imazethapyr	Pursuit	Prickly lettuce	(D				
		dimension by	T MI BULL	Kochia	in in		benzothia-	bentazon	Bexagnen
				Spiny sowthistle	ID ID	Photosystem -	diapoles		
				Back mustand	ID	Instruments and	nitrilas	branoxynil	Buctril, Bromos, Bronate (contains MCPA), several
				Maywood	ID	groups 5 and 7 but different			MCPA), several
					and the second second	but different birtding			others
	suffortylureas	*chilorsulfuton	Clean, Telar	Prickly lettuce	ID, OR, WA	bahavor)			
				Kochia	ID, OR, WA				
				Russian thistle	ID, OR, WA	Group 7	unas	*diaron	Karmax, Direx
				Italian nyograss		Photosystem			
				Meywood diamomile	ID, WA	Photosystem Il inhibitore (seme sile as			
				Smallwood falseflax	OR	(sume site as proups 5 and		Minuron	Lonos, Lines
		*chilonsulfutor/	Finessa	Smallwood faborilax	OR	groups 5 and 5 but different		*tabuthiuron	Spike
		mataulfuron				binding behavior)			
		*athumataulfuron	Muster			100			
		"halowalluristi	Sandes			Group 8	thiocarbemates	botylata	Sutan, Sutan+ (contains safemer)
		mesosulturon	Osprey	Italian ryogram	10	Lipid synthesis		rudom	Ro-Neet
		meaceulturon/	Olympus Rex			inhibitors but not ACCase		cycloate EPTC	Fatient
		proposycerbeaone			100 000	inhibitors		EPTC + saferter	Bradicana
		*metaulfuron	Ally, Escort, Gramon	Prickly lettuce	ID, OR			triallate	Far-Go
				Kochie	OR		-	and a base of the	Roundup, several
				Russian thistle	OR		glycines	glyphosata	athers
			water and the second	Smallwood faborlax	OR	CPOP syntheses			
		*nicosulfuron	Accent			and the second se			
		*primisulfuron	Beecon	Downy brume	OR	Group 10	phosphinic words	glulosinais	Rely, Liberty, severa
		*prosulturan	Pauk			Glutamine synthase inhibitors			others
		*rimeulfuron	Matrix			inhibitors			
		*sulfometuron	Oust, Spyder		OR .	Star Wellington			
		*suffosulfuron	Mavanidi, Outrider, Cartainty	Downy brums	OR	Group 14.	diphanylethers	*oxythuorten	Goal, several others
		สีบก็อาจนสีมานา	Hermony	Spiny sowthistle	WA	Inhibitors of	N-phanyl- phthelimidex	Rumidonec	Resource
				Prickly lettuce	ID	protopor- phyrinogen osidase	phthelimidex.		21 . M.I.
				Meywood chamomile	ID .	(Protect)		*Rumiceatin	Chateeu, Valor, SureGuerd
				chainomile		(papered) .	triaringhos	carlentrazone	Aim, several others Spartan, Portiolio
		thileneulfuron/ tribenuron	Harmony Estra, Alfimity			100	10000	*sufferitrazone	Spartan, Portfolio
		"ปาก้อาจนสับกาก"	Canvas				phenyipyrazole	pyrafiulian	ET, Edict
						1000 GAD 10			
		tribenuron/							
		*ShifereuTuron/ Shifereuron/ metsulfuron	Amber	Proble latters	10.08	Group 15	chloroacet- amides	scatochlor	Hamess, Surpass, several others
		tribenuron' metsulfuron *triasuffuron	Amber	Prickly lettuce Korbia	ID, OR	Group 15 Inhibitors of very-long-	chloroscet- amides		Harmass, Surpass, several others MicroTech, several
		tribenuron/ metsulfuron *triaeuffuron	Amber	Kochia	OR	Group 15 Inhibitors of very-long- chen fetty	chioroacet- amidex	alachicz	MicroTech, several others
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	10	dicates harbicides that can persist	in soil for most of the grow	ing weekon or from one growing	season to the next.	© 2007 by the University of Idaho
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Group 15	chloroacet- amides	acetochlor	Harness, Surpass, several others
very-long- chain fatty		alachlor	MicroTech, several others
acid synthesis		dimethenamid(-p)	Outlook
		metolachlor	Stalwart, several others
		s-metolachlor	Dual Magnum, Dual Il Magnum
	oxyacetamides	flufenacet	Define, Axiom (contains metribuzin)
	acetamides	napropamide	Devrinol
$\rightarrow$	isoaxzoline	pyroxasulfone	Zidua

#### New Herbicide Family in Group 15

### Italian Ryegrass Moscow, ID 2016

Untreated

Zidua

#### Italian Ryegrass Potlatch, ID 2016

#### Italian Ryegrass Control in Winter Wheat

Axiom 10 oz 'fb' PowerFlex

Zidua 1.5 oz 'fb' PowerFlex

PowerFlex

**Zidua** 

#### Root Pruning Italian Ryegrass

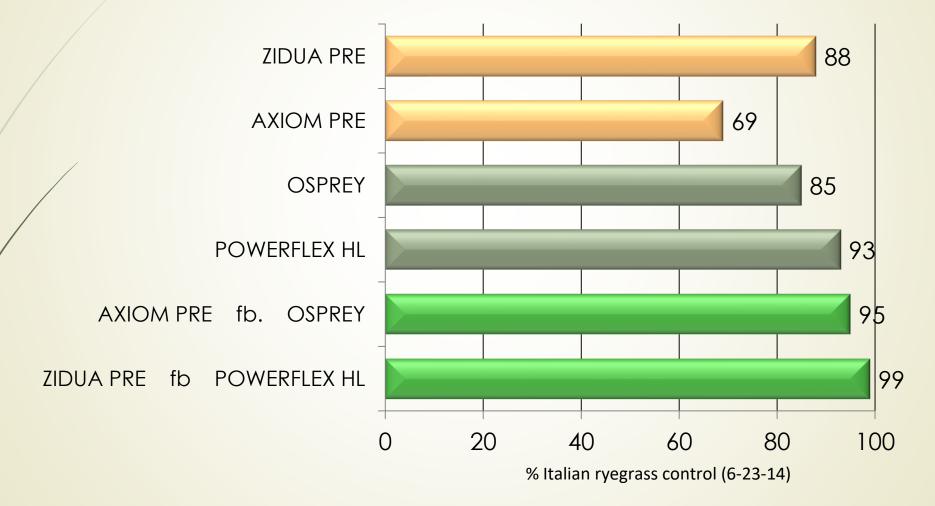
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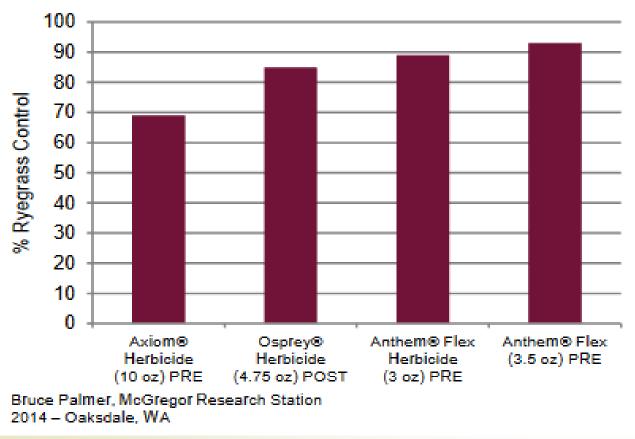
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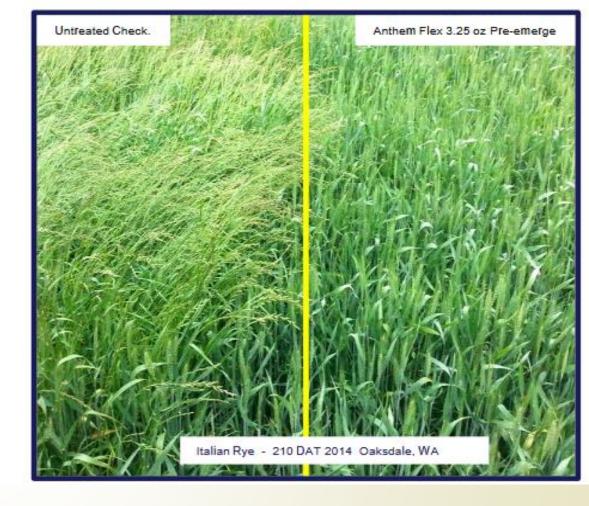
#### Sequential Applications for Italian Ryegrass



2014, 4 reps. Variety: ORCF 102. Planting date: 10/6/13, 1.0-1.25 in. deep, PRE applications made on 10/11/13 (wheat sprouted), POST applications made on 5/7/14 (IR 1 leaf to 5 tiller). Previous crop: lentil.
Courtesy of: The McGregor Company



#### Italian Ryegrass Control in Wheat



#### Anthem Flex is Pyroxysulfone+ carfentrazone (aim) - Group 15, Group 14

#### PRE's followed by Osprey Xtra vs Powerflex HL

- WSU study in 2016-17 by Lyon and Wetzl
- Looking at Osprey Xtra which isn't labeled for wheat yet
- It is a combo of group 2's
- They compared Axiom, Zidua, and Anthem Flex followed by Osprey Xtra vs Powerflex HL
- Best treatment with Osprey Xtra in yellow
- Best treatment with Powerflex HL in Red

				6/14/17	8/7/17
			Application	Italian ryegrass	
Treatment #	Treatment	Rate	Date	control	Yield
		(oz/A)		0-100%	bu/A
1	Nontreated Check				58 e
2	Axiom DF	10	10/4/16	77 b <sup>2</sup>	92 cd
3	Zidua	1.5	10/4/16	89 a	111 ab
4	Anthem Flex	3.5 fl oz	10/4/16	92 a	103 a-c
5	Axiom DF	10	10/4/16	79 b	99 bc
5	Osprey Xtra <sup>1</sup>	4.75	4/11/17		
6	Zidua	1.5	10/4/16	91 a	107 a-c
6	Osprey Xtra <sup>1</sup>	4.75	4/11/17		
7	Anthem Flex	3.5 fl oz	10/4/16	95 a	116 ab
7	Osprey Xtra <sup>1</sup>	4.75	4/11/17		
8	Osprey Xtra <sup>1</sup>	4.75	4/11/17	15 d	66 e
9	Axiom DF	10	10/4/16	80 b	107 a-c
9	$PowerFlex HL^1$	2	4/11/17		
10	Zidua	1.5	10/4/16	94 a	120 a
10	$PowerFlex HL^1$	2	4/11/17		
11	Anthem Flex	3.5 fl oz	10/4/16	95 a	116 ab
11	$PowerFlex HL^1$	2	4/11/17		
12	PowerFlex HL <sup>1</sup>	2	4/11/17	24 c	76 de

#### Pre-Post Grass Weed Control Study

- Evaluate pre-emerge herbicides (rates & ratios) with different modes of action (MoA) on tough annual grassy weeds - Italian Ryegrass
- 21 pre-emerge herbicides
- Three Modes of Actions: Group 3, 15 & 27
- 6 different active ingredients
- 3 Treatments with various MoA herbicides
- Group 1 and Group 2 herbicides will be applied post-emerge over the top of the pre-emerge treatments
- Evaluate combinations of PRE and POST herbicides on the new CoAXium Wheat Production System







# Control in Garbs

- Roundup or tillage to kill early flushes pre-plant
- Use a group 3 "yellow's" such as Sonalan or Prowl pre-plant incorporate
- Both Sonalan and Prowl do have some efficacy on ryegrass
- Pre-plant Group 15's such as Dual II Magnum (pictured)
- Pre-emerge Group 14's such as Valor
- Post-emerge, best results with group 1 clethodim with MSO, UAN or AMS, and non-ionic surfactants



#### Learn from the Aussie's

- Australians have Rigid Ryegrass which is very similar to Italian Ryegrass
- They have resistance to additional modes of action including group 15 and group 9
- They rely heavily on trifluralin Group 3, trade name Treflan
  - This chemistry isn't a good fit for the PNW due to our climate and geography
  - Labeled on winter wheat as pre-plant incorporate or a post-plant incorporate
  - In Australia they are broadcasting pre-plant then seeding into it with narrow hoe opener for incorporation

#### Cultural

#### Planting habits

- Consider higher seeding rates to outcompete the weeds
- Managing seeding dates in order to kill flushes of ryegrass. Delayed plantings
- Use certified weed free seed (From PNW Coop)
- Use treated seed to help with seedling emergence and plant establishments



# Rotation

- The best rotation to reduce Italian ryegrass populations in higher rainfall zones on the Palouse would be a 4 – year rotation with at least 2 years out of wheat
- An example of this would be a WW-SW-SC-(CH,P,L)
- This may not be economically sustainable long term however agronomically, it may make sense
- Growing spring crops allows for killing of fall/ winter emerging ryegrass
  - Use of Roundup ready crops such as canola
  - Perennial crops such as alfalfa
  - Rotation with cover crops
  - Spring Pulse
  - Timothy
  - Fallow
  - Oats

# **Crop Considerations**

- Competition
  - Early seedling vigor is important
  - Narrower row Spacing
  - Canopy closure critical to outcompete Italian rye
  - Italian rye is shade intolerant
  - Apply starter package to give crop an early advantage
  - Sow crops and varieties that have:
    - Canopy closure; Spring Pea vs. Lentil
    - Early emergence and vigor
    - Leafy vegetation characteristics that will shade out competition; Canola
    - Choose varieties with strong tillering characteristics

#### Roundup ready canola

- Excellent rotation option
- Canola is a very good canopy closer
- Roundup ready varieties give you opportunity to spray three times in season
- Guys in the Palouse have had good luck with HyCLASS 930 RR or HyCLASS 955 RR



### Round-up ready and non-GMO Alfalfa

- Gives another chance to spray in season to control flushes
- Varieties such as WL 355RR should be a good fit
- Consider taking out poorly drained areas or waterways that are a problem for several years to reduce seed bank
- Could use non GMO varieties such as Rugged as long as you are haying prior to seed set



#### Drainage Tile

- Italian Ryegrass prefers poorly drained soils
  - Post-emergent chemicals also do not work as well in these soils
  - Install tile lines in these areas
  - Good spot for Alfalfa/Timothy



# Strategic Tillage

Plowing/chiseling

- Use deep burial tillage to reduce seed persistence
  - Integrate Liming on plow years to distribute in profile
    - Better herbicide efficacy in more neutral pH soils



### Strategic Tillage Cont.

Two different Australian studies done:

- Strategic tillage may help manage resistant weeds in no-till systems
- Strategic tillage reduces weed populations and resistance to soil residual herbicides
- Efficacy depends on tillage frequency and seed burial efficacy

#### Strategic Tillage cont.

No-till growers were not able to bring resistance levels back to zero however they were able to get some herbicide efficiency back that they had lost



#### Mow your problem areas to prevent Italian ryegrass from going to seed on stubble and hay ground



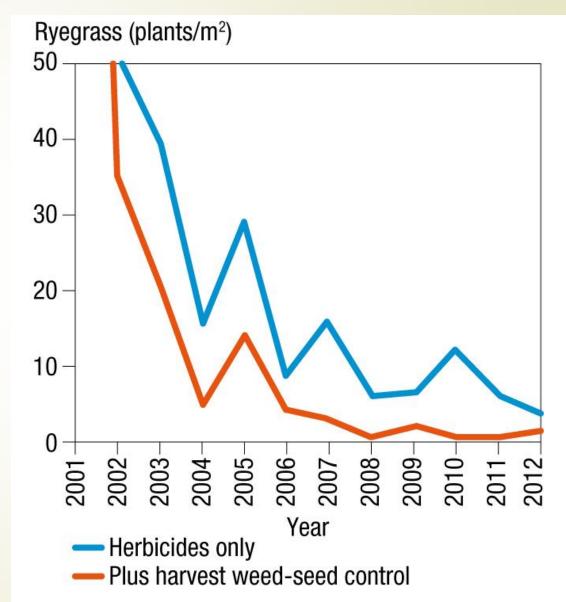
# **Cleaning Equipment**

Clean equipment between fields Combines Tractors/Bank-out Wagons Drills Implements Trucks

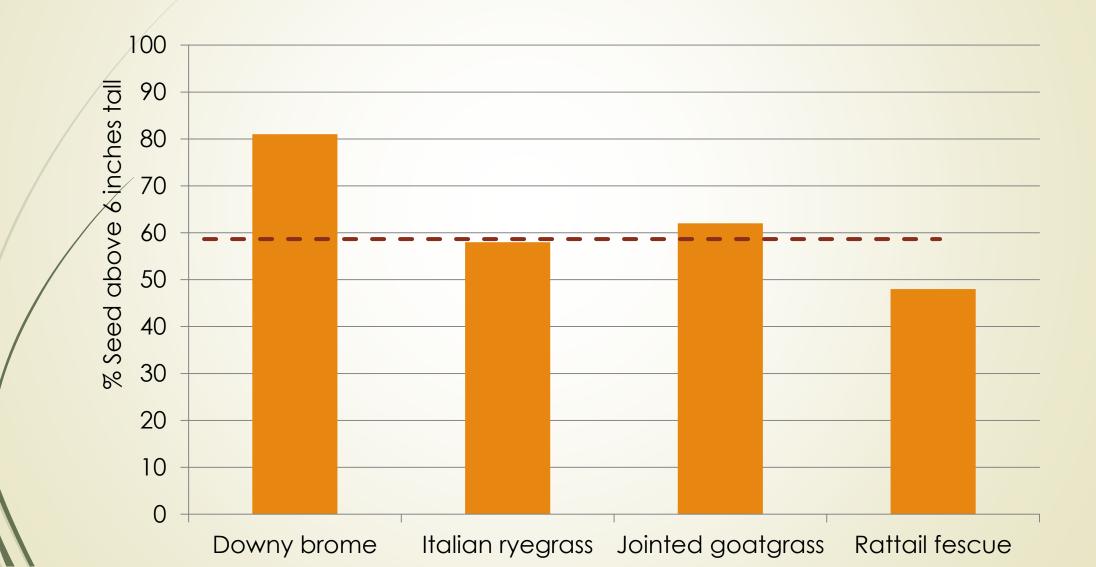


#### Harvest Weed Seed Control

- For harvest weed seed control to work, the weed seed must remain in the head at harvest!
- The Australian Rigid Ryegrass has up to 93% of seed still in the head at harvest
- Italian Ryegrass is closer to 60%



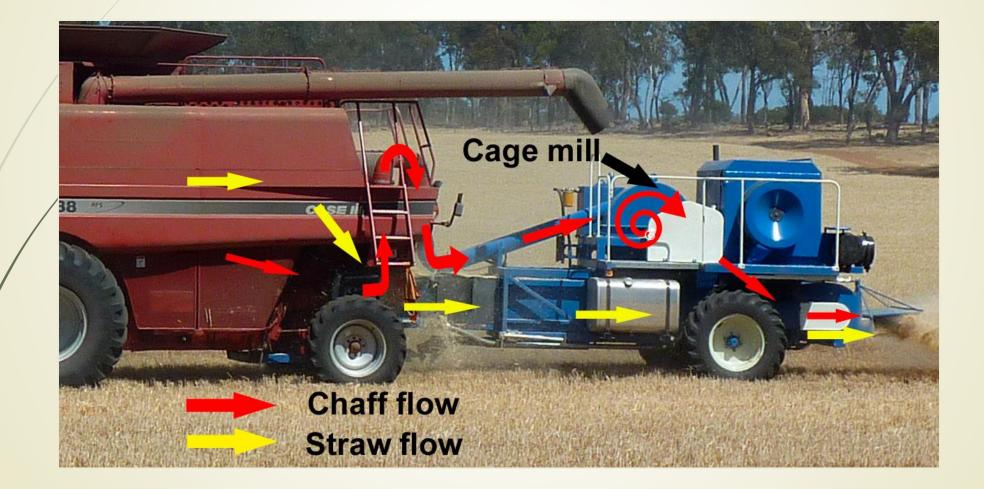
# Seed Retention at Harvest



### Weed Seed Destruction

- Harrington Seed Destructor
  - Integrated into the rear of the combine
    - Using it in Australia
  - Uses hydraulically driven cage mills to pulverize chaff where weeds are concentrated
  - The cage mills will destroy up to 99% of weed seeds that enter them
  - 150K us dollars
  - Works in Australia on Rigid Ryegrass up to 93% of Ryegrass is still in the head at harvest
  - Need to cut the crop low (header down to beer can from ground)
  - Needs higher horsepower combines
- Seed Terminator
  - Lower cost option around 75K
  - Works the same as the Harrington Seed Destructor

#### Harrington Seed Destructor



#### Integrated Harrington Seed Destructor



# Windrow Burning

- Chaff is concentrated into windrows
- When burned fire is hotter than burning standing stubble
- Fire needs to reach temps of 752 F for a minimum of 10 seconds
- Method used extensively in Australia
- Up to 99% of Ryegrass control
- -/Low cost option
- Downside is limited burn days, highly regulated, and public perception
- Drew Lyon did a study in 2013 and 2014 looking at efficacy on the Palouse



# Germinating Italian Ryegrass After Burning



#### Italian Ryegrass Seed Survival



### **Direct** Bailing

Buy attachment from dealer to tow behind baler

- Several currently in use in the PNW
- Weed seed also has to be in the head at harvest
- Does require more horsepower to run baler
- Can be up to 95% effective
- Removal of residue is a downside

#### **Glenvar Bale Direct System**

Up to 95% of Ryegrass seed collected and removed in baled harvest residues



#### Monitoring for resistance

- Send samples into WSU small grains
- Ian Burke's lab runs the herbicide resistance testing program
- It is important to know what the resistance levels are on your farm
- Testing for resistance allows growers to choose herbicides with the knowledge that they will be effective
- Testing is part of the IWM approach for wheat producers in Europe and Australia and should be considered essential for PNW growers as well
- If you need contact information or have questions <u>http://smallgrains.wsu.edu/submit-samples-to-the-wsu-resistance-testing-program/</u>

#### Conclusion

- We do not want to go down the resistance road to where Australia is now
- There are no new chemistries coming to market in the near future
- We need to manage for resistance so we don't loose the tools we have
  - Know your resistance levels get tested
  - Use multiple sites of action
  - Scout fields after spraying to look for weed escapes
  - control the weed escapes
- Rotation is critical
- Don't be afraid of using an IPM approach
- Do not want to use too many GMO crops as we DO NOT want to get glyphosate resistance

# Thank You!

We appreciate your business!!
If you have any questions please feel free to contact us! Eric Smith 509-428-9003 eric@pnw.coop

Jake Gelineau 208-553-8617 Jake.gelineau@pnw.coop