Integrated grass weed control

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Weed management

Weed control is more than just using herbicides.

Good control can be achieved by integrating a variety of control methods:

– Crop choice and rotation
– Cultivations vs min-till
– Crop establishment
– Chemical control.

Early action is key !

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Stopping it early stops this

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Grass Weeds = Yield Loss

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Grass weed population for 5 % yield loss

	weeds/m2	£ lost /ha @£130/t @ 9t/ha
Blackgrass	12	-£58
Barren brome	6	-£58
AMG	2500 panicles	-£58 + drying costs
Cleavers	4	-£58

250 black grass/m = 50% yield loss

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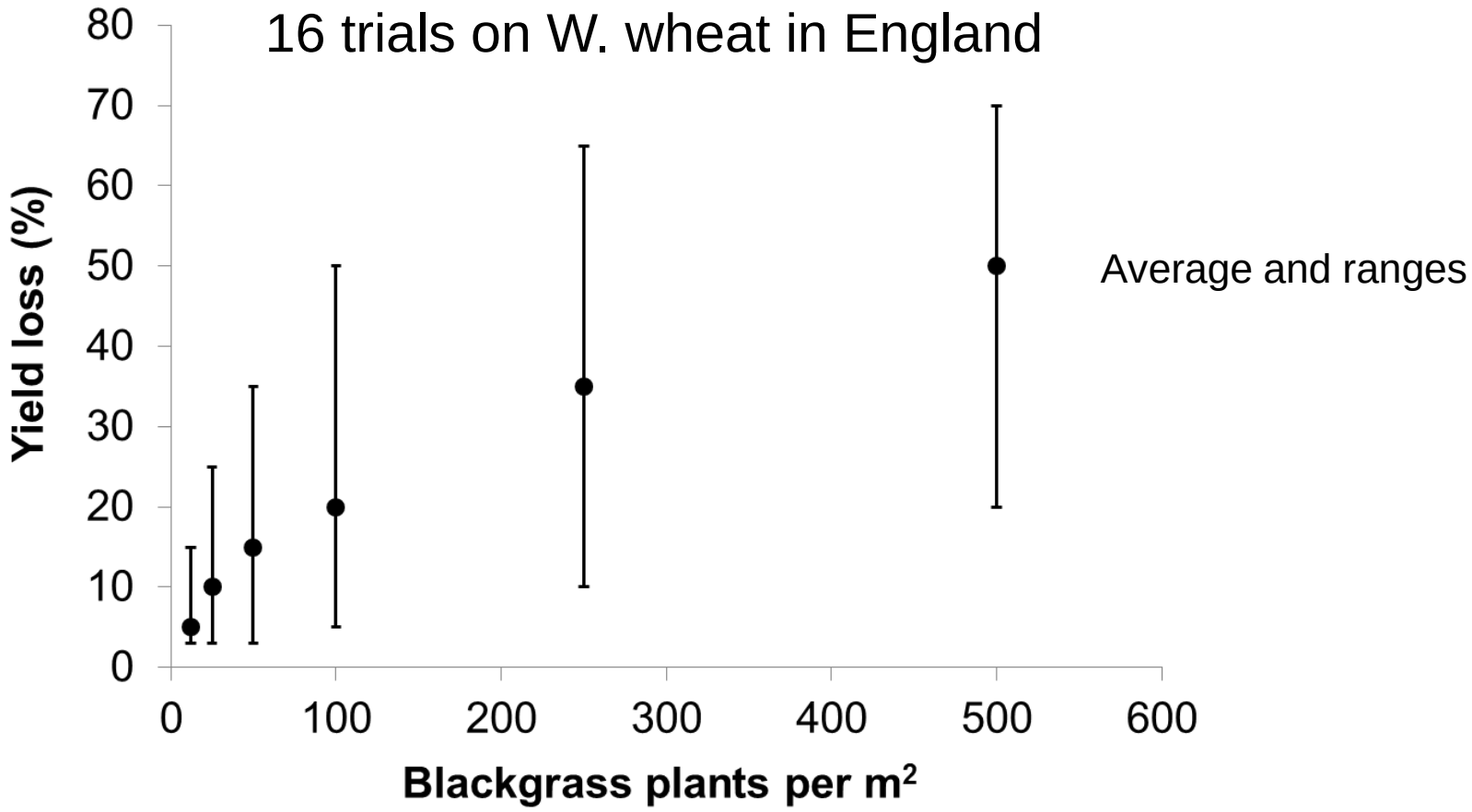
Black grass yield loss



based on Blair, Cussans & Lutman, Proc. 1999 Brighton Conference – Weeds, 753 - 760

Know your enemy

- Understanding the weed biology is essential to be able to gain effective control.
- Crop competition
- Emergence pattern
- Dormancy
- Depth of weed seed germination
- Seeds existing in the seedbank or imported
- High seed production e.g. 100 seeds/hd

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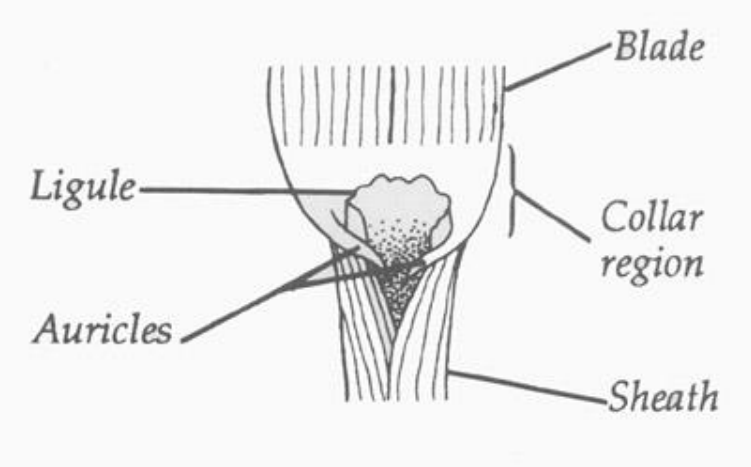
Identifying grass weeds

- Auricles – Small claw or ear-like outgrowths at the junction of the leaf sheath and blade.
- Ligules – Membranous extension at the junction of the leaf sheath and blade.
- Panicles – The compound flowering head or ear of a grass in which each spikelet has a distinct stalk attached to the main stem.



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Quiz Time

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Barren/sterile brome

- Annual tufted grass that can grow to 100cm in height.
- Leaf blades are green, turning purple and are finely pointed and covered in short hairs.
- Long-awned (15-30mm) loose flower head.
- In the young plant, ligule is very pointed.

Soft brome

- Loosely tufted, 10-100cm.
- Feels soft.
- Panicle is large, condensed and erect. Flowers hairy and awned.
- Very common, all cultivated land.
- Problem in cereals.

Image:
http://www.bayercropscience.co.uk/your-crop/crop-diseases-weeds-and-pests/grass-weeds/soft-brome/

Rye Brome

- Loosely tufted or solitary 20-120 cm.
- Flower head is an erect panicle, which droops or nods later.
- Spikelets are oval, many flowered and 1.2-2.4 cm long with short awns.

Black grass

- Annual grass with upright round slender stems.
- Few nodes and fine hairless leaves.
- Grows in tufts or single plants.
- Ligule is present and is finely toothed 2->5mm long.
- Green then dark purple flower head from May to August with multiple single flower spikelets producing 80–150 seeds/head

Annual meadow grass

- Most common grass weed flowering early germinating spring and autumn
- Leaf is folded in the stem, rather than rolled (boat-shaped leaves)
- Leaves light green, curved tip, central ridge underside, no auricles, the ligule is long (2-5mm) roundly pointed and smooth.

Wild oat

- Germinates mainly in the spring but seedlings can be found in autumn
- Looks similar to other cereals when young but leaves twist anticlockwise
- Leaf margins tend to be hairy towards the base, and leaves are broad, flat and blue-green.
- No auricles, the ligule is medium to long and slightly pointed.

Seed numbers/plant

Weed	Potential seed numbers
Blackgrass	100/hd *20 = 2000
Annual Meadow Grass	100-500
Bromes	50-2000
Italian Rye Grass	100/head *3 = 300

Seed Survival

Weed	% Decline	Longevity
Brome	90	< 5 years
Black Grass	75	< 5 years
Annual meadow grass	X	> 5 years
Italian rye grass	X	> 5 years
Wild Oats	X	> 5 years

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Mechanical control (plough)

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Rotational control

- Different crop types e.g. oilseed rape
- Spring crops allows autumn/spring stubble management and or ploughing
- Grass ley 2yrs

Drilling date

Delayed autumn sowing:

- Allows more seeds to emerge and be controlled by glyphosate
- Residual pre-emergence herbicides can be more effective
- Avoid peak emergence
- Black grass in later drilled crops is less competitive

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Cultural methods in Black grass

Method	Number of experiments	% reduction achieved	
		Mean	Range
Ploughing	25	**69%**	**+82%** to -95%
Delayed autumn drilling	19	**31%**	**+71%** to -97%
Higher seed rates	16	**26%**	7% to 63%
Competitive cultivars	5	**22%**	8% to 45%
Spring cropping	6	**90%**	78 to 99%

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Herbicides

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Pre-emergence	Product	Crop	AMG	Brome	Wild Oats	Blackgrass
Chlorotoluron	Tower		***		**	**
Pendimethalin (PDM)	Stomp/Anthem	WW/WB	***		*	**
Flufenacet	Liberator/Crystal	WW/WB	***	**	*	**
Prosulfocarb	Defy	WW/WB	***	*		*
Tri-allate	Avadex Excel	WW/WB	***	*	**	**
Post-emergence						
Flupyrsulphuron -methyl	Lexus SX	WW	**			**
Meso + idosulphuron-methyl	Altlantis/Pacifica	WW	***	**	***	***
Pyroxsulam	Broadway Star	WW		***	***	
Pinoxaden	Axial	WB/SB			***	**
Clodinafop-propargyl	Topik	WW			***	**

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Herbicide Cost

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Pre-emergence	Product	£/ha Full Rate
Chlorotoluron	Tower	24
Pendimethalin (PDM)	Stomp/Anthem	18
Flufenacet	Liberator/Crystal	37
Prosulfocarb	Defy	33
Tri-allate	Avadex Excel	37
Post-emergence		
Flupyrsulphuron -methyl	Lexus SX	14
Meso + Idosulphuron-methyl	Altlantis/Pacifica	35
Pyroxsulam	Broadway Star	31
Pinoxaden	Axial	49
Clodinafop-propargyl	Topik	28

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Brome Trials East Hermiston BASF/SRUC

- Treatments using different herbicides
- Trial sown on 13 October 2015
- Pre em treatments applied on the 14 Oct 15
- Post em (Broadway Star) was applied on GS12-13 treatments applied on the 25 Nov 15
- Head counts recordings 23 Jun 16
- Trial sprayed off 24 Jun 16

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Brome Trials East Hermiston BASF/SRUC

Treatment	No. of Brome Heads/ m2 on 23/06/16
Control No Herbicide	967
Pre – emergence only	533
Post- emergence only	210
Pre and post em	20
Pre-em was Liberator plus Picona Post-em Broadway Star	

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Brome Trials East Hermiston
BASF/SRUC

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Brome key control measures

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- Good ploughing in the rotation
- Spring cropping / break crops
- Delayed drilling and glyphosate pre drilling
- Cleaning machinery
- Shallow cultivation encourages chit.
- Field margins strategy
- Seed zero tolerance
- Appropriate herbicide strategy

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Wild Oats

- High longevity of seeds
- Avoid build up of seed bank
- Wild oats best control timing can be difficult
- Several herbicide options such as Pinoxaden, plus some of the brome/blackgrass sprays in Wheat
- Roguing where populations allow

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Annual Meadow grass

- Reduce seed production by early control
- Good ploughing strategy
- Delay drilling helps but keep the crop competitive
- Rotations
- Good seed beds
- Pre-em herbicides

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Herbicide resistance

*"The majority refer to **black-grass**, but queries have been raised in the last two years on **brome** species and **annual meadow-grass**" (Weed Resistance Action Group June 2015)*

Herbicide Resistance

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Pre-emergence	**Product**	**Mode**	**Blackgrass Resistance**
Chlorotoluron	Tower	Ureas	partial
Pendimethalin (PDM)	Stomp/Anthem		partial
Flufenacet	Liberator/Crystal		partial
Prosulfocarb	Defy	Thiocarb	partial
Tri-allate	Avadex Excel		partial
Post-emergence			
Flupyrsulphuron -methyl	Lexus SX	ALS	Yes
Meso + idosulphuron-methyl	Altlantis/Pacifica	ALS	Yes
Pyroxsulam	Broadway Star	ALS	?
Pinoxaden	Axial	dim/den	?
Clodinafop-propargyl	Topik	fop	Yes

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Jock Willmott

Real cost of resistance

Heavy-land estate E. England - 1100 ha

2006 Effective control of black-grass

- Wheat herbicides £65/ha
- OSR herbicides £72/ha

2015 BG has ALS & enhanced metabolism resistance

- Wheat herbicides £134/ha (£78 pre-ems)
- OSR herbicides £103/ha
- Wheat area reduced by 13% to control BG but wheat herbicide bill has increased by £34k
- New crops lower earning potential

Total cost of BG to business £72k/yr (est.)

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Bromes and BG Common Threads

- Reliance only on herbicides for control is not sustainable
- Resistance is/maybe present and increasing
- Agronomic practices are favouring BG and Br
- Milder winters may be favouring BG and Br
- BG and Br are spreading to new regions and becoming more widespread in ‘core’ regions
- Don’t be in denial

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Seed Standards – Cereals

CS, C1, C2 / kg

- Corncockle - 6
- Wild raddish - 6
- Wild oat – 1
- Total - 14

C1, C2 HVS / kg

- Corncockle - 2
- Wild raddish - 2
- Wild oat – 0
- Sterile brome – 2
- Couch – 2
- Total
  - C1 HVS - 2
  - C2 HVS - 4

Sowing 5ha field @ 175 kg/ha you could also be sowing > 12,000 BG or brome seeds

Application Technology

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Herbicides Sterile Brome

- A minimum of **two spray** programme in WW mixtures of:
  - Pre-em flufenacet, pendimethalin/DFF
  - Prosulfocarb / picolinafen

  Post-em – (ALS inhibitors) **WW ONLY**

  Pyroxsulam (Broadway Star) + PDM

  Pacifica, Attribut, Monitor

  Winter Barley: Pre em only

  WOSR: Kerb

The Ideal Field Margin for Brome Control!

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- Sow a perennial grass mixture
- Not cultivated
- Avoid herbicides/drift
- Mowing before seed has shed
- Plough between the field and the margin if bromes are spreading
- BUT Mowing not allowed under greening rules (until after 31 August)

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Protecting Water and Environment

- Integrated pest management – Think cultural control first then herbicides.
- 6m buffer strips next to watercourses
- Use greening rules / AECS.

Thank You

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