Brome, wild-oats and other grass-weeds: control strategies

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Bromes: which species?



Bromes: which species?





Soft brome Bromus hordeaceus







Meadow brome Bromus commutatus Rye brome Bromus secalinus



Identification of Brome grasses

In the UK, there are five main species which frequently occur as weeds of arable crops. Their relative frequencies, as reported in the Atlas of the British Flora (2002), are given as the (%) of the 2852 10 x 10 km grid squares surveyed in which the species was detected. See maps. Blue = Native species; Red = Introduced species.



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Bromus sterilis – sterile or barren brome Very common throughout England and Wales, more scattered in Scotland. (63%). Very common in field margins and hedgerows as well as within arable fields.



Bromus hordeoceus – soft brome Very common throughout the UK. (85%). Most commonly found in grassland, field margins, waste ground and roadside verges, but does occur in arable fields too.



Bromus diandrus – great brome Mainly recorded in East Anglia but scattered throughout the rest of England. (11%). Probably underrecorded due to confusion with 8. sterilis.



Why does identification of species matter?

- Different post-harvest control measures apply to Bromus sterifs & B. diandrus compared with Bromus hordeoceus, B. commutatus & B. seculinus. Early post-harvest cultivations are advisable for the first two species but not for the other three species.
- Brome species differ in their sensitivity to herbicides and label claims for control vary. Knowing which species is present can help in herbicide decision-making.
- Bromus diandrus and Bromus secolinus are generally considered more challenging species to control than the other brome species, requiring more robust strategies.



Bromus secolinus – rye brome Mainly recorded at scattered locations in the southern half of England. (14%). Largely confined to arable fields, field margins and waste ground. Probably underrecorded due to confusion with 8. commutatus.



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Identification of brome grasses

By

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A new 4 page identification leaflet

Available now: http://www.rothamsted.ac.uk/tools (under 'Resources' on home page)

and from 2016: <u>http://croprotect.com</u>

Bromus hordeaceus & Bromus commutatus





This is by far the most reliable test for identifying Bromus secolinus. Note that this feature is not particularly obvious in intact seeds - cutting the seeds definitely helps.

Sterile brome: agro-ecology

- Competitive similar competitive ability to wild-oats and rye-grass. 5 plants/m² causes a 5% yield loss.
- 2. Autumn seedling emergence predominates as seeds have only short dormancy - germination of freshly shed seeds encouraged by seed burial.
- **3.** Emergence only from seeds within 10 cm soil surface
- Non-persistent seeds in soil annual seed decline is about 85 – 90% compared with 70 – 80 % for rye-grass and black-grass.
- 5. Effective herbicides available in range of crops and no herbicide resistance (resistance has been recorded in France and Germany).
- 6. Very common in hedgerows often a dominant species. Ready source of reinfection?

Sterile brome: key control options

- Shallow post-harvest cultivations
- Ploughing
- Delayed autumn sowing
- Spring cropping
- Herbicides
- Field margin management
- Avoiding spread
- Fallow/grass ley break

Do shallow stubble cultivations help? Yes!



Optimum stubble management strategy for <u>freshly shed</u> weed seeds

Weed species	Cultivate soon after harvest	Do <u>not</u> cultivate soon after harvest
Volunteer cereals	\checkmark	-
Sterile brome	\checkmark	-
Soft brome	\checkmark	-
Black-grass	-	\checkmark
Wild-oats	-	\checkmark
Rye-grass	-	\checkmark
Meadow brome	-	\checkmark
Oilseed rape	-	\checkmark
Cleavers	-	\checkmark
3 other grass + 3 other BLW	-	\checkmark

From review paper by Melander et al (2013) Weed Technology 27:231-240



Black-grass (and brome) emergence

Q. What happens if you sow here?



% of winter wheat crop in England sown in September, and before 20th September, 1970 – 2014 harvest years



Ensure all brome plants are destroyed prior to sowing autumn or spring crops – if using glyphosate avoid reducing doses



Glyphosate-resistant sterile brome?



Herbicides – may not be equally effective on all brome species



Glasshouse expt. March 2012 – updated following brome ID by Cope

• There was considerable variation in response between populations

• Meadow brome (mean 82%) *tended* to be controlled better than rye brome (mean 63%)







Field margin management – prevent reinfection from plants in hedgerow

- Spraying margin/hedge bottom with glyphosate (even if allowed) often makes situation worse
- Sown grass margins can be a good option if managed well
- Spraying one bout around field perimeters (if allowed) can be a good option if brome is restricted to headlands
- Hand rogueing or spraying off brome patches at edge of field can help prevent contamination at harvest
- Careful combining can help too

Is a grass ley an option?



Sterile brome: key control options

- Shallow post-harvest cultivations good for sterile brome as burial of seeds increases germination
- Ploughing good inversion essential as freshly shed seeds must be buried > 10 cm deep
- **Delayed autumn sowing** allows more brome plants to emerge at a time when they can be easily killed
- **Spring cropping** even better provided all bromes are killed effectively prior to sowing
- Herbicides ALS inhibitors (e.g. Broadway Star) in wheat and ACCase inhibitors (e.g. Laser) in rape can be effective – but don't reduce rates
- Field perimeter management avoid seeds moving from hedgerow into field
- Avoid spread in crop seed, combines, straw, & equipment
- Fallow/grass leys ideally for 2 years or more, but prevention of new seeding essential





Somewhere in Essex: 2014 The most resistant wild-oats we have every tested

Somewhere in Essex: 2015 Field fallowed for ? years





Italian rye-grass (Lolium multiflorum)

Herbicide resistance on >450 farms in 33 counties





- Flufenacet pre-ems work well
- 'Atlantis' gives good control
- 'fops' 'dims' & 'dens' give no control
- Ploughing gives very good control
- A major problem in herbage seed
- Often seems to appears from nowhere





Counties with herbicide-resistant <u>Black-grass</u> (by 2013)



- 20,000 farms have black-grass
- 20,000 farms have resistance

Resistance is present on virtually <u>every</u> farm where herbicides are used regularly for its control

- Resistance to ACCase herbicides (fops/dims/dens) widespread
- Resistance to ALS herbicides (e.g. Atlantis) increasing fast
- Pre-emergence herbicides now the main means of chemical control



Avoid high risk situations:
Continuous autumn cropping
Early autumn sowing
Shallow tillage
Resistant populations

This field had: 360 g flufenacet/ha,120 g DFF/ha, 600 g pendimethalin/ha and 12+2.4 g mesosulfuron+iodosulfuron/ha Cost: > £100/ha Control: 20%



Herbicide-resistant weeds in the UK



