

Black-grass: solutions to the problem



Figure 1. Black-grass in winter wheat

Action points

- Combine non-chemical control methods with herbicides to improve overall control and protect efficacy
- Monitor weed populations to inform short-, medium- and long-term management
- Conduct resistance tests (on weed seeds or plants) to establish which herbicides are likely to be the most effective
- Consider the relative control cost of herbicides and non-chemical methods (herbicides may not be the cheapest option)
- Avoid over-reliance on glyphosate to reduce resistance risks
- Tailor control to each field (there is no blueprint for the best strategy)

Why has black-grass become such a problem?

Most black-grass emerges within crops, rather than before drilling:

- 80% of black-grass emergence occurs in early autumn (August to October)
- Virtually all oilseed rape and usually more than 50% of winter cereals are sown before the end of September

Selective post-emergence herbicides no longer offer reliable control:

- Multiple herbicide resistance now occurs on virtually all farms where used against black-grass
- Control has relied increasingly on weather-dependent pre-emerge herbicides
- Additionally, high-risk management could drive the selection of resistance to the non-selective herbicide glyphosate

Herbicide resistance

Regular use of black-grass herbicides is associated with some degree of resistance. In fact, resistance has been detected in almost every county in England and at a low frequency in Wales and Scotland. Predicting the impact of resistance on an individual field is difficult because:

- The proportion of plants affected is different
- The type of resistance varies
- Some herbicides are more affected than others

Glyphosate use

Dependence on glyphosate has increased, partly due to the increase in resistance to selective herbicides.

Glyphosate-resistant grass-weed populations have been identified in Europe, although

there have been no confirmed cases in the UK. To prevent resistance and retain the efficacy of glyphosate, avoid over-reliance on

glyphosate. The Weed Resistance Action Group (WRAG) has produced clear management guidelines for low-risk glyphosate use: ahdb.org.uk/glyphosate



Integrated management

About 95–100% control of black-grass is required to prevent populations increasing. In the short term, ‘stacking’ several pre-emergence herbicides may allow adequate overall control. However, success is weather-dependent. As post-emergence herbicide efficacy falls, and resistance to pre-emergence herbicides increases, it is unlikely that the high levels of control needed from pre-emergence herbicides will be achieved routinely, especially in dry years.

The key to long-term control is to combine non-chemical control methods with herbicides. Such integrated strategies require a good understanding of black-grass weed biology:

- Most plants (about 80%) emerge in early autumn
- Seed dormancy and soil moisture affect emergence patterns
- Most black-grass emerges from seeds within 5 cm of the soil surface
- Average seed decline in the soil is 75% per year
- 95–100% control is required to prevent weed populations increasing
- Aim for fewer than five surviving plants/m²
- Use of a balanced rotation, and appropriate cultural control can even control significant black-grass populations

Non-chemical methods: average control levels

There are many non-chemical control methods available. In isolation, none provides complete control. The average levels of control cited are based on a comprehensive review of more than 50 field experiments: P J W Lutman, S R Moss, S Cook and S J Welham (2013), *Weed Research*, 53: 299–313.

Spring cropping (90% control)

About 80% of black-grass emergence occurs in autumn. A spring-sown crop provides a wider window for control during the between-crop period. Some spring-sown crops offer more control than others. For example, spring barley is more competitive than spring wheat, and spring beans and linseed are not as competitive as spring cereals. Note: establishing crops in spring can be difficult, especially on heavy soils, and herbicide choice is more limited.



Figure 2. A spring crop provides a wider window for black-grass control

Fallowing/grass ley breaks (70–80% reduction of the seed bank per year)

Average black-grass seed decline in the soil is about 75% per year. Seed persistence data and farm experience both support the view that a one-year fallow or grass ley is not long enough to reduce high black-grass infestations to acceptable levels. After two years, less than 10% of seeds are likely to remain. This could still be a large number and a longer break may be required. Failure to prevent seed return greatly undermines the value of a fallow or grass ley break. The cultivation strategy at the end of any fallow or grass ley break is important. Sufficient time needs to elapse between cultivating and sowing the next crop to allow the destruction of black-grass seedlings emerging from residual seeds.



Figure 3. Consider a two-year grass ley break

Ploughing (70% control)

High-quality ploughing, with good inversion of the furrow, buries seeds to a depth from which seedlings are unlikely to emerge (>5 cm). Black-grass seeds are relatively non-persistent in the seed bank, so ploughing brings few viable seeds to the surface. This is especially true for rotational ploughing (e.g. ploughed once every 3–6 years). No-till and particularly shallow non-inversion tillage tend to favour black-grass, because freshly shed seeds stay near the soil surface. Failure to control black-grass effectively in such systems can result in a much more rapid increase in infestation (more than tenfold per year) than occurs in systems based on annual ploughing.



Figure 4. Consider ploughing to bury black-grass seeds

Delayed autumn drilling (>30% control)

Delayed drilling (until after mid-October) of winter cereals has three main benefits:

1. More weed seedlings emerge before sowing for control with cultivations and/or glyphosate
2. Residual pre-emergence herbicides are often 25–30% more effective when applied in later-drilled crops (because soil conditions are more likely to be optimal)
3. Late-emerging black-grass tends to be less competitive and produces fewer seeds per plant

Adequate drilling capacity, including drills for suboptimal soil conditions, is required to minimise the risks associated with delayed drilling. Always aim to drill fields with the heaviest black-grass infestations last.



Figure 5. Drill after mid-October to make best use of herbicides

Competitive crops (<25% control)

Crops can compete with weeds to varying degrees. The following factors can make a crop better able to suppress weeds:

- The right species (e.g. barley is more competitive than wheat)
- High seed rates of winter cereals (e.g. >300 plants/m²)
- Narrow row spacing
- Good seedbeds and agronomy to favour strong, uniform crops

Preventing seed return and spread of resistant seeds

Destroying (spraying with glyphosate or cutting) patches of black-grass in winter wheat in the first week of June will reduce viable seed return. Cutting or spraying earlier or later is likely to be less effective. Destroying crop in the same areas for 2–3 years maximises reductions. Hand roguing is also feasible at low weed populations.

Minimise spread of seeds and plants in combine harvesters, balers, cultivation equipment, straw or manure. Harvest weed control systems are being tested in UK conditions. Such systems include chaff decks/carts, which deposit seeds in a limited area of the field or use seed crushers to destroy weed seeds (over 90% of them) before residues are returned to the soil.



Figure 6. Glyphosate can kill off badly infested crop areas

Whether buying or selling straw, it is important to understand the quality of the product. Distribution of weed seeds, in particular, can be associated with straw use. Be sure you are aware of the risks. Search 'weeds' at ahdb.org.uk/knowledge-library

Integrated control levels

Combine non-chemical control methods with herbicides to improve overall control and protect efficacy. About 95–100% control is required to prevent weed populations increasing.

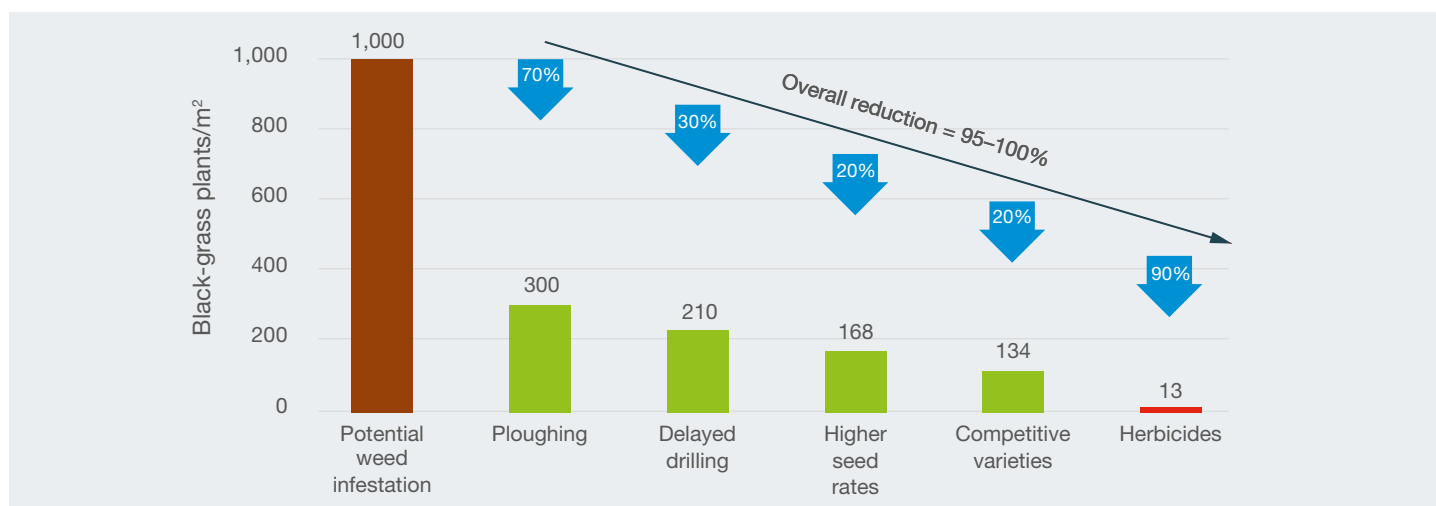


Figure 7. Potential black-grass control levels associated with an integrated approach based on non-chemical (green bars) and chemical (red bar) control

Further information

ahdb.org.uk/blackgrass

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