



## **Integrated Weed management to tackle grass weed problems**

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The incidence and proliferation of difficult to control grass weeds, especially sterile brome, wild oats, canary grass and black grass is increasing. Repeated use of the main herbicide actives against these grass species allows resistance to develop, where weeds can survive previously effective full application rates. Resistant weed populations may by-pass the herbicide action by two mechanisms: target-site resistance, where simple mutations prevent the herbicide from binding effectively to its site of action and non-target site resistance where complex multigenic changes, allow the weed to detoxify the herbicides to an extent where they are ineffective. Resistance is further exacerbated by the lack of alternative herbicide types, forcing growers to repeatedly use the same active ingredients.

One key to managing grass weeds and to minimise the selection pressure for resistance, is to diversify or integrate weed management practices beyond using herbicides. Integrated weed management (IWM) combines non-herbicide or cultural techniques, which should be implemented first, with herbicide use when needed. IWM also targets weed seed bank reduction and prevents weed movement to different areas. IWM encourages farmers to: keep fields free of specific weeds; reduce the pressure on herbicides and prevent seed return. Correct weed identification coupled with an understanding of their agro-ecological traits is of paramount importance in devising effective IWM programmes.

### **Identification and agro-ecology of grass weeds**

**Sterile brome** - Around 90 % of brome germinates from Aug to Dec; they flower from May to Jul and shed seeds from Jul to Aug. They require vernalisation to flower and germinate in the dark. Seeds have a short dormancy; annual seed decline is about 85 to 90 % (seeds poorly-persistent in soil) but as each plant can produce over 200 seeds, they can still proliferate. Seed emergence is reduced with increasing seed burial depth (> 10 cm).



**Black grass** - About 80 % of black grass germination occurs from August to October and it flowers from May to Aug. Seed shedding is from the middle of Jun in winter wheat and a slightly later in winter barley, however, most seeds are shed prior to harvest. Black grass is mainly cross pollinated by the wind and light induces germination. While seed decline when buried is relatively rapid (70 to 80 % per year), given the number of seeds shed per plant (400 to 600), the soil seed bank will increase if it is not controlled. Deeper burial (> 5 cm) reduces seed emergence of freshly-shed seeds.



**Wild oats and canary grass** - Wild oats and canary grass both emerge at the same time as spring cereals, and can out-compete the cereal at an early growth stage with a high density of emerging plants. Both spring-germinating weeds have the ability to survive dormant in the soil for a substantial period of time and thus are unaffected by seed burial depth. They flower from Jun to Oct and light promotes germination. Most seeds originate from the top 10 cm soil, but some emerge even from a depth of 15 to 25 cm.



### Practices contributing to increased grass weed pressure on the farm

<sup>1</sup> **Sterile Brome:** Deeply serrated ligule and hairy stem (a); characteristic twist in leaves (b); reddish purple colour panicles, when mature (c)

<sup>2</sup> **Black grass:** Blunt and finely serrated ligule and purpling at the base of the stem (a, b); slender, cylindrical and long spikelet and head colour range from deep purple to green (c)

<sup>3</sup> **Canary grass:** Pointed ligule (a) characteristic red sap at the end of the root tip (b); tufted and dense spike with small dark brown seeds (c)

(a) Repetitive cereal cropping; (b) Earlier sowing of autumn-sown cereal crops; (c) Excessive reliance solely on herbicides; (d) Mechanical spread of weed seeds from contaminated manures, seed source, combines and by movement of straw bales; (e) Lack of field margin or headland conservation to prevent these areas becoming potential sources of weed infestation.

### **IWM programmes**

IWM practices include the use of: crop rotation, stale seedbeds, crop establishment techniques, headland/margin management, hand rogueing, machine hygiene, seed source, sowing date, seed rate, variety choice and use of herbicides. In the future, IWM practices will have to be adopted by Irish farmers to minimise resistance development, to overcome lack of new herbicides, and to abide with the EU mandate on Thematic Strategy on Sustainable Pesticide Use. These practices will be evaluated and developed through the ECT grass weed control project.