Managing ergot in cereal crops

The disease
Ergot is a disease caused by the fungus Claviceps purpurea. The word also describes the black fungal body that replaces the grain in the ear. Ergots are highly poisonous to man and animals, although they have some medicinal uses. Buyers reject infested grain or offer a reduced price. UKASTA standards for ergot are 0.001% ergot by weight for feed grain and a zero tolerance for all other grain.

Ergot is a serious, albeit occasional, problem. All cereal crops are at risk of infection for a few days during flowering, particularly ones with open flowers, eg triticale, rye and hybrid wheat, and some wheat varieties, eg Rialto.

Ergot is relatively common in wild grasses throughout the UK. The disease is spread by spores, which infect the ovaries of grass and cereal flowers. Susceptibility decreases rapidly after pollination.

Initial infection by air-borne ascospores produced by ergots in soil results in a sticky exudate known as ‘honeydew’, which contains numerous spores. These are spread by physical contact between infected and healthy ears, and possibly by insects, and are responsible for secondary infection (Figure 1).

Ergot development normally ceases as the crop approaches maturity and the grain dries out. Occasionally, on crops with late secondary tillering ergot continues to develop up to harvest, resulting in higher incidence along tramlines.

Fungicide screening tests
HGCA initially funded a review and laboratory tests of effects of fungicides on ergot growth.

A further three-year project carried out by ADAS, IACR-Rothamsted and Imperial College tested a wider range of fungicides, including MBCs, morpholines, azoles and strobilurins in laboratory and field trials.

Some field sites had a history of ergot so naturally-occurring fungal spores were probably present. However, to ensure that ergot developed, groups of ears in each plot were inoculated at late boot/early ear emergence (GS 47-55).

**Action:**
- Do not sow contaminated seed. Clean farm-saved seed thoroughly to remove ergot.
- Where ergot is often a problem, avoid growing susceptible crops and varieties.
- Rotate cereal and non-cereal crops.
- Control grass weeds that may act as hosts, eg black-grass, annual meadow-grass.
- Use herbicides to control susceptible grass weeds in set-aside before they flower and can become infected with ergot.
- Harvest heavily infested areas, eg headlands or tramlines, separately to avoid contaminating large bulks of grain.

*If you are unsure about any of the suggested actions, or want them interpreted for your local conditions, consult a professional agronomist.*
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Fungicide sprays were applied to winter rye, and to winter and spring wheat at various growth stages from late boot to early flowering. Although some fungicides showed activity against ergot in glasshouse and laboratory tests, they were ineffective in field trials. Limited uptake and negligible movement of fungicides to the ovaries is probably the explanation.

Integrated control measures
As it is not possible to achieve reliable control of ergot with fungicide sprays, and none are registered for this use, it is essential to integrate a range of other hygiene and cultural measures to avoid the disease. UK higher voluntary seed standards demand no ergots for basic seed and no more than one ergot in certified seed in a 1 kg sample of wheat, oats or barley.

Some seed treatments (eg Baytan, Sibutol) may reduce ergot by delaying or preventing germination of ergots in seed.

Ergots survive only one season in soil. A break from cereals should give good control provided grass weeds are controlled. Careful ploughing to bury ergots (at least 5 cm) also helps in cereal rotations.

Summary
Grain contaminated with ergot must not be fed to livestock or sold.

HGCA-funded R&D has demonstrated that fungicides can not control ergot so a range of cultural and hygiene measures have to be used instead. Their effective application, to avoid rather than control disease, depends upon understanding the life cycle of the fungus.

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Figure 1. The life cycle of ergot

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