Take-all control in winter wheat: I planning

Disease incidence
Take-all is a serious soil-borne disease. Half of UK wheat crops suffer 5-20% yield losses, costing farmers up to £60 million yearly.

Gaeumannomyces graminis var. tritici, the take-all fungus, infects winter wheat roots (also barley, rye and triticale, but not oats) in the autumn. Symptoms are coal-black lesions on roots. Early and severe infections can lead to uneven growth, reduced tillering and occasionally plant death in spring or early summer. Later infections and premature ripening (whiteheads) usually occur in patches, reducing yield and grain quality. Another strain of take-all, which affects oats as well as other cereals, occurs in some western areas of Britain. This is currently very rare.

Effects of rotation
Rotation plays a major part in reducing take-all. First wheat crops following a good break are generally highest yielding, partly because they are free of significant take-all, which is usually worst on second, third or fourth wheats. Suitable break crops include oats (except where the oat strain is present) and non-cereals. Couch and other perennial grass weeds must be controlled as they can carry take-all through a break. However, a two-year ryegrass ley can provide an effective break crop in a sequence of cereals.

Take-all can sometimes be more severe in second wheats after some break crops, e.g. oilseed rape, due to very early drilling of the first wheat which can increase disease build-up in the second wheat. Cereal volunteers may also carry the disease over between cereal crops.

When long runs of wheat are grown, yields may recover somewhat after a take-all peak, usually from about the fourth crop (Figure 1). This phenomenon - take-all decline - occurs because fungi antagonistic to take-all build up in soil and on roots.

New seed treatments
Two new seed treatments are now available for take-all:

- ‘Latitude’ (silthiofam)
- ‘Jockey’ (fluquinconazole + prochloraz)

![Figure 1. Typical progress of a take-all epidemic and schematic effect on yield](image_url)
Recent HGCA-funded research has shown that yield response to seed treatment depends on disease severity during the growing season. Yield benefit can be maximised by targeting use of a seed treatment where there is a significant risk.

In trials to date, both seed treatments have reduced epidemic development. Neither has any effect on antagonists. Ongoing work at IACR Rothamsted and ADAS Rosemaund aims to understand indirect effects on the onset of take-all decline.

**Drilling date and weather**

Take-all does not survive well in the soil in the absence of a host plant. Increasing the interval between harvesting one crop and planting the next reduces disease severity (Figure 2).

Generally warm and wet conditions in autumn and spring encourage higher take-all levels. Summer drought further reduces yields, as the damaged root systems of infected plants cannot absorb sufficient moisture. This was verified in trials using irrigation and crop shelters to alter soil moisture (Figure 3).