

Guidelines for protecting the quality and yield of malting barley against Fusarium head blight



Fusarium head blight (FHB) in UK malting barley

- FHB is caused by non-toxicogenic *Microdochium* species (predominant in northern UK) and toxicogenic *Fusarium* spp. (predominant in southern UK).
- The main producers of deoxynivalenol and zearalenone are *F. graminearum* and *F. culmorum*, nivalenol is produced by *F. poae* and T2 and HT2 are associated with grain contamination by *F. langsethiae*.

Impact of FHB pathogens on yield and quality of malting barley

- *Microdochium nivale*, *M. majus*, *F. avenaceum* and *F. graminearum* reduce thousand grain weight and specific weight.
- *Microdochium* spp. reduce germinative energy (4mL) whilst water sensitivity can be affected by various *Fusarium* and *Microdochium* species depending on the season and harvest. In brewing usage, wort extract, wort viscosity, filtration time, free amino nitrogen and colour can be affected by *F. poae*, *F. langsethiae* and *Microdochium* spp.

Chemical control of FHB

- FHB is controlled by fungicides applied at T3 (GS 59, anthesis) of barley resulting in 12-14% reductions in disease severity (Fig. 1) and response in yield (Fig. 2).
- Fungicides at T2 (GS 39/45) and T3 (GS 59) alternating in their mode of action are most effective against diverse populations of FHB pathogens, for example strobilurins and succinate dehydrogenase inhibitors should not be used consecutively.

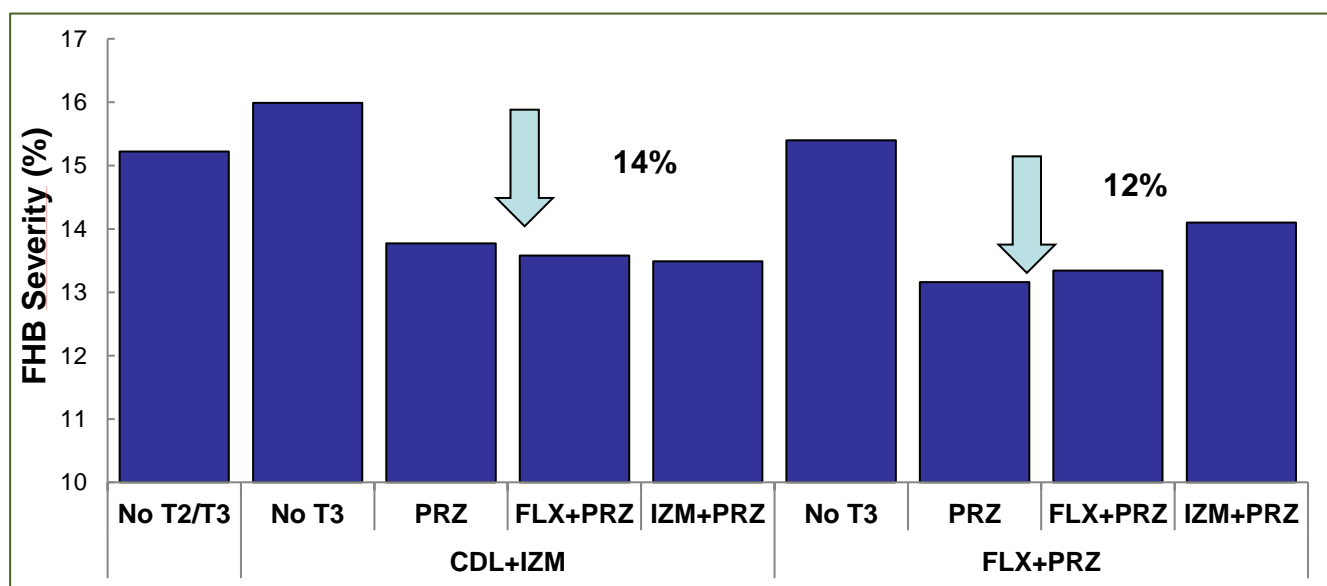


Figure 1. Effect of Cyprodinil+Isopyrazam (CDL+IZM) (Bontima 1.4 l ha⁻¹, Syngenta), Fluoxastrobin+ Prothioconazole (FLX+PRZ) (Fangango 1.0 l ha⁻¹, Bayer Cropscience) at T2 (GS39/45) followed by Prothioconazole (PRZ) (Proline275 0.75 l ha⁻¹, Bayer Cropscience), FLX+PRZ (Fangango 1.0 l ha⁻¹) or Isopyrazam (IZM) (Zulu 0.36 l ha⁻¹, Syngenta) + Prothioconazole (PRZ) (Proline275 0.75 l ha⁻¹) on FHB.

Effect of fungicides on yield and quality of malting barley

- Fungicide application at T3 (GS 59) contributes to thousand grain weight, specific weight and yield increase of 0.36 -0.42 t ha⁻¹ whilst T2 (GS 39/45) and T3 (GS 59) combinations together accounted for 0.8 t ha⁻¹ in response to disease control.
- Fungicide mixtures controlling *F. avenaceum*, *F. graminearum*, *F. poae* positively impacted water sensitivity and wort viscosity.

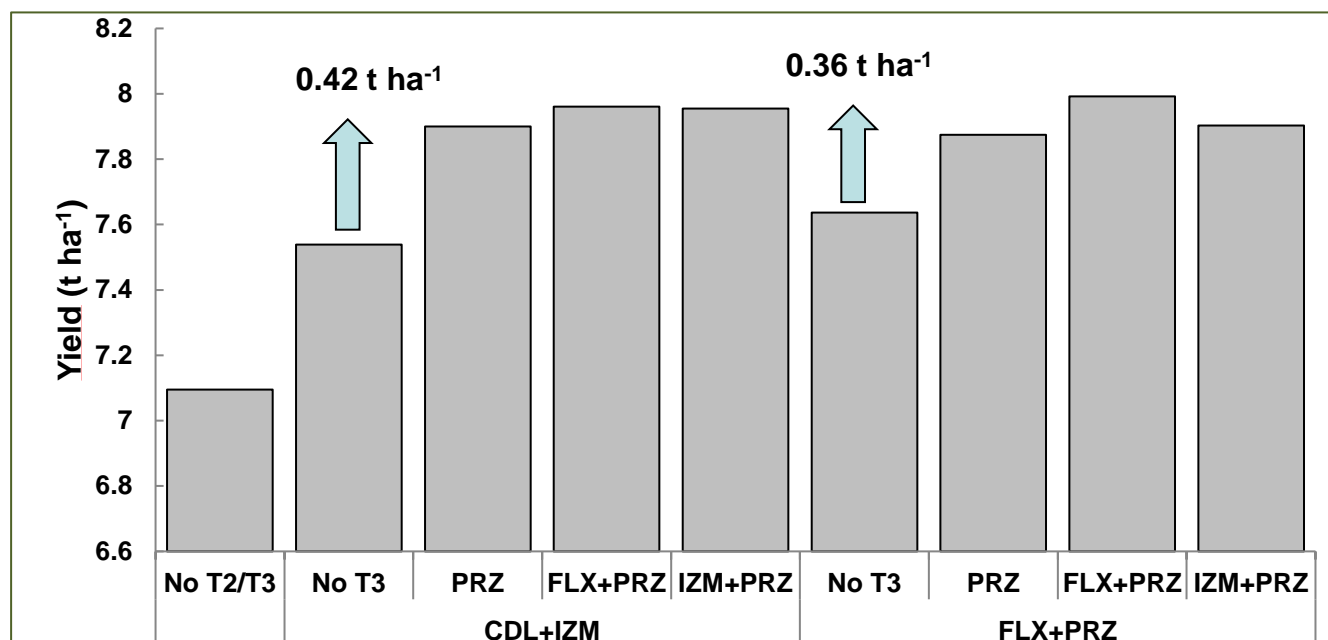


Figure 2. Effect of Cyprodinil+Isopyrazam (CDL+IZM) (Bontima 1.4 l ha⁻¹, Syngenta), Fluoxastrobin+ Prothioconazole (FLX+PRZ) (Fangango 1.0 l ha⁻¹, Bayer Cropscience) at T2 (GS39/45) followed by Prothioconazole (PRZ) (Proline275 0.75 l ha⁻¹, Bayer Cropscience), FLX+PRZ (Fangango 1.0 l ha⁻¹) or Isopyrazam (IZM) (Zulu 0.36 l ha⁻¹, Syngenta) + Prothioconazole (PRZ) (Proline275 0.75 l ha⁻¹) on yield of cv. Quench.

Varietal resistance and harvest delay

- The elite barley cultivars (Shuffle, Propino, Tipple, Quench, Optic, Concerto) tested during the SAFEMalt project have narrow range of variation in their response to FHB indicating moderate to high susceptibility to FHB. Susceptible cultivars are most responsive to fungicide application for the protection of yield and quality of the crop.
- Delayed harvest of up to 4 weeks coinciding with rainfall leads to a significant increase in DNA of *F. graminearum* and *Microdochium nivale* and accumulation of mycotoxins (zearalenone) and therefore grain should be harvested with minimum delay once ripe.
- T3 (GS 59) fungicide application will be most cost-effective in situations where harvest delay of susceptible cultivar is likely to occur.

Further information

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