

Managing the Fusarium mycotoxin risk in wheat



Mycotoxins - in growing crops and in store

Mycotoxins are toxic compounds produced by certain fungi under specific conditions. Grain is susceptible to mycotoxins produced either whilst the crop is growing by *Fusarium* species or during storage by *Penicillium* species.

This Topic Sheet concerns the Fusarium mycotoxins which are produced in the growing crop as a result of Fusarium ear blight. Infection occurs during warm, wet weather during flowering. In contrast, storage mycotoxins, such as ochratoxin A, are only produced during storage if grain over 18% moisture content is not dried quickly. Project Progress 13 concerns storage mycotoxins.

New legislation

From July 2006, new legal EU limits for mycotoxins produced by various *Fusarium* species infecting the ear apply to grain intended for human consumption (Table 1). The mycotoxins covered by these new limits are deoxynivalenol (DON) and zearalenone (ZEAR). A small proportion of the UK wheat crop has exceeded these limits in recent seasons.

Fusarium mycotoxins are remarkably stable during processing and can be found in foods containing flour from wheat. Concentration may even increase during processing.

FSA and Defra, with support from HGCA and commercial companies, are funding projects to trace DON and ZEAR mycotoxins during processing. Some processors may set limits for grain used in specific products.

Table 1. EU limits for Fusarium mycotoxins in unprocessed wheat and wheat products intended for human consumption

	Legal limit (parts per billion - ppb)	
	DON	ZEAR
Unprocessed wheat	1,250	100
Flour	750	75
Finished products	500	50
Infant food	200	20

Action

Avoid growing wheat intended for human consumption immediately after maize.

Avoid minimum tillage after maize, wheat or potatoes.

Use T3 fungicides recommended to control Fusarium ear blight, especially if weather during flowering is expected to be wet.

Choose varieties with higher Fusarium resistance.

Assess overall risk of mycotoxins in your grain and test if necessary before transporting it off-farm.

Always consider your local conditions and consult a professional agronomist if necessary.

At present there are no EU limits for Fusarium mycotoxins in animal feed but proposed guideline limits for wheat intended for feed are 8,000ppb for DON and 2,000ppb for ZEAR. Lower guideline limits will be set for finished feedstuffs intended for specific livestock.

Assessing risk factors

Since 2001, 300 grain samples have been collected annually from conventional and organic crops. Concentrations of 11 mycotoxins were determined and were related to data on region and crop agronomy.

DON was the most frequently occurring mycotoxin and therefore was likely to be of most concern. However, limits for ZEAR are considerably lower than those for DON, so in some years there may be a greater risk of exceeding ZEAR limits.

Risk varied from year to year but was greatest in the warmest areas (south and east England) and lowest in cooler, more northerly regions (northern England and Scotland).

Pink grains

The project also assessed the incidence of 'pink grains', a common symptom of Fusarium infection. Number of pink grain in samples related poorly to mycotoxin concentration.

Agronomic guidelines

Analysis of agronomic practices showed that several factors had an effect on DON concentration. Previous crop was important with maize presenting by far the greatest risk. In general, risk increased when land was minimally cultivated rather than ploughed (Figure 1).

Variety had limited effect on mycotoxin levels, but varieties with greater resistance to Fusarium should be selected wherever practical.

T3 triazole sprays significantly reduced DON concentration (Figure 2). HGCA-funded field trials clearly indicated that using tebuconazole, metconazole or prothioconazole at T3 (early to mid-flowering) at half to full rate significantly reduced DON concentration in harvested grain.

Figure 3 shows how combinations of factors lead to higher overall risk of mycotoxin contamination. An assessment of overall risk should be undertaken for all wheat intended for human consumption.

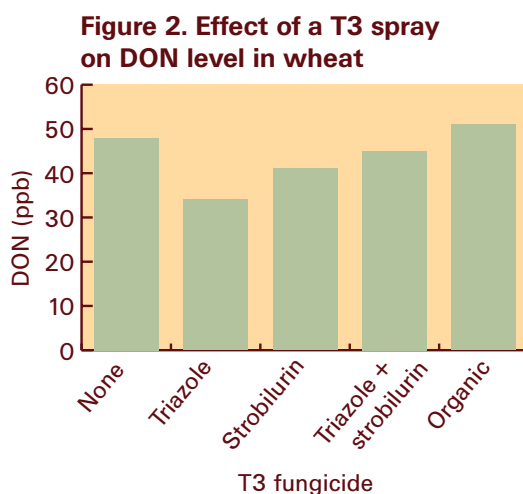
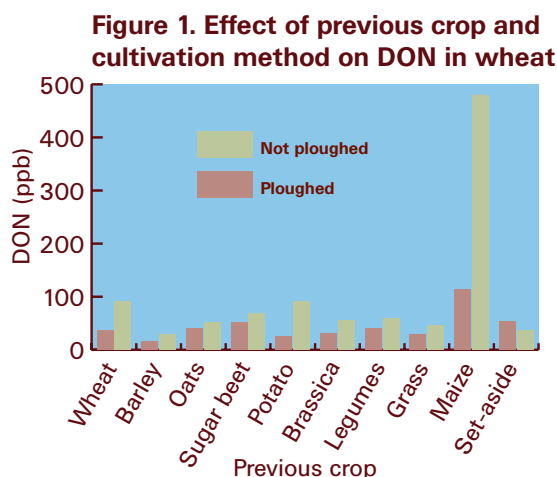
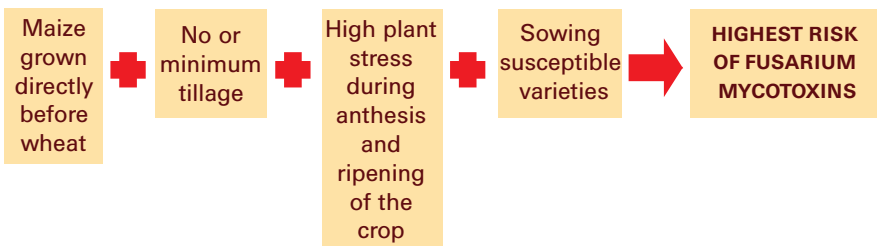


Figure 3. Combinations of risk factors increase overall mycotoxin risk



Mycotoxin test kits

Mycotoxin testing could be considered where risk is high. HGCA Project Report 394 evaluated eight commercially available test kits for Fusarium mycotoxins. Their main potential use is at intake points in the grain chain.

All kits detected DON in ground wheat samples, but some gave more accurate results than others.

Background

HGCA and FSA-funded projects have investigated the incidence of Fusarium mycotoxins in commercial wheat crops (2001-2005). The findings are particularly relevant as new legislation is now in force regarding DON and ZEAR levels.

Risk of DON or ZEAR in commercial crops around Britain was related to various factors. Location, rotation, method of cultivation, variety choice and fungicide application were all significant risk factors. This Topic Sheet assesses the results in terms of 'good agricultural practice' to minimise mycotoxin contamination.

Results indicate how you can reduce, but not eliminate, this risk by modifying your agronomic practices.

Further information

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Project Progress 10

Ongoing project 2452

Project Reports 297, 394

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