

## **Overview of the potential impact the withdrawal of azoles as a result of an inappropriate endocrine disruption definition may have upon wheat disease control programmes and production in Ireland**

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Currently wheat disease control programmes in Ireland are heavily reliant upon azole fungicides (commonly referred to as triazole fungicides). Most wheat crops now receive between three or four fungicide applications to prevent yield reductions mainly caused by disease. Although the main target of these applications is often STB, additional diseases are also targeted at the different timings (e.g. FHB at the ear application) (see Table 1 for activity of various fungicide groups against primary diseases on wheat). The broad spectrum of activity of the triazoles, coupled with their ability to provide protection and eradication have meant their inclusion in three of these applications (those timed to provide best protection of the upper canopy and the ear which contribute most to yield) has become relied upon.

As STB is the principal target, in the absence of triazoles, fungicide programmes will become heavily reliant on the SDHIs, with specific fungicides included to target the other pathogens. Unfortunately due to the development of resistance the availability of alternative fungicides is limited, e.g. control of FHB is almost entirely dependent upon the triazole fungicides, and wet summers such as 2012 can cause significant yield losses of 1.5 t/ha.

Due to their mode of action the SDHI fungicides are very susceptible to resistance development. Resistance prevention is mainly achieved through mixing active ingredients and in the case of STB the most useful combinations are triazoles and SDHIs. The loss of triazoles is therefore likely to hasten resistance to SDHI's, which may provide useful control for only a couple of years once mixing ceases. When resistance develops to SDHI's there will be no useful chemical control of Eyespot which will become reliant on long non-cereal breaks between cereal crops and STB fungicide programmes would become entirely protectant in nature built upon multisite fungicides (e.g. chlorothalonil). Under normal Irish climatic and cropping practises a drop in productivity would be expected of 20% or more from reliance on multisites for STB control (Table 2).

Whilst a yield loss of 20% sounds bad enough, in some wet years of severe disease pressure the yield loss would be closer to 40%. The Teagasc costs and returns show a gross margin for winter wheat of €504 for a 10t/ha crop, not including land rental costs. A yield loss of 20% would reduce this to €144 and a 40% yield loss would reduce it to €-216. The likely outcome of such a drop in profitability and increased risk is that wheat production in Ireland would all but cease resulting in a 100% drop in production, unless there was a reliable price increase of a minimum of 25% and in order to cope with bad years of 66%.

**Table 1.** Overview of the activity of available fungicide groups against the primary diseases of wheat in Ireland

<b>Fungicide Group</b>	<b>Septoria tritici blotch</b>	<b>Eyespot</b>	<b>Rusts</b>	<b>Mildew</b>	<b>Fusarium Head Blight</b>
<b>Triazoles</b>	Excellent (Mixtures) Moderate (solo)	Good (fungicide dependent)	Excellent	Limited	Excellent
<b>SDHIs</b>	Excellent	Good (fungicide dependent)	Good	Limited	Poor
<b>QoIs</b>	Limited (fungicide dependent)	Limited - Poor	Good	Poor	Poor
<b>MBC</b>	Limited (Resistance)	Limited (Resistance)		Poor	Poor
<b>Morpholines</b>	Limited - Poor	Moderate	Moderate	Excellent	Limited
<b>Multi-sites (Chlorothalonil)</b>	Good (but protection only)	Poor	Poor	Poor	Poor

**Table 2.** Yield of protectant only Bravo (Chlorothalonil applied 3 times) and eradicant and protectant (Triazoles plus chlorothalonil) fungicide programmes at 2 Irish sites Knockbeg Co. Laois, and Duleek Co. Meath in 2009

	<b>Knockbeg</b>	<b>Duleek</b>
<b>Untreated</b>	6.19	7.68
<b>Bravo*3</b>	7.55	8.26
<b>Proline + Bravo (0.8 l/ha + 1.0 l/ha)</b>	9.58	10.35
<b>Opus + Bravo (1.0 l/ha + 1.0 l/ha)</b>		
<b>Caramba (1.6 l/ha)</b>		

