

FUNGICIDES RESISTANCES in France

CEREAL DISEASES

Guidelines 2007

(INRA, SPV, ARVALIS-Institut du végétal)

MAIN EVOLUTIONS in 2006

SEPTORIA LEAF BLOTCH (*S. tritici*)

Resistance to Qols (strobilurins, famoxadone) affects nowadays all of the French regions producing cereals. . This resistance is especially widespread in the North of a line linking Bordeaux to Valence. In the Southern regions, frequencies of less than 50 % are still often detected, but they are likely to increase in 2007. In this context, the efficacy of all the strobilurins is strongly compromised.

Concerning triazoles (main class of DMIs), the current *S. tritici* strains show a low or moderate resistance to these compounds; those two types of strains respectively and successively emerged at the beginning of the 1990s and 2000s. In 2006, in France, the strains moderately resistant to DMIs were dominant in all regions. Despite the efficacy of triazoles in the field is decreasing, the most efficient ones are still interesting. Furthermore, the efficacy of triazoles can be reinforced by some multisite fungicides, boscalid or prochloraz for example.

POWDERY MILDEW (*B. graminis f. sp tritici*)

Resistance to strobilurins is deeply established in France, remaining however limited in the South. This family of Qol can no longer be considered as efficient on powdery mildew in most French regions.

Even if resistance to both IBS classes (DMIs and “amines”) is widespread in France, many of these molecules are still quite effective.

Some strains strongly resistant to quinoxifen are still detected in France ; in 2006, as in the past few years, these strains are mainly located in Champagne. In this area, the efficacy of this fungicide is often affected.

The cyprodinil performance is especially low in the Northern regions. It remains to be checked that this loss of efficiency results from resistance to this anilinopyrimidine.

With the recent registration of metrafenone , a new mode of action is available to control powdery mildew.

EYESPOT (*Oculimacula spp.*)

The main species is *Oculimacula (ex Tapesia) yallundae* and the strains now encountered are often resistant to most DMIs, and especially to prochloraz. They remain nevertheless sensitive to prothioconazole. The prochloraz remains useful when it is associated with an another active ingredient efficient on eyespot.

Some strains resistant to cyprodinil can still be detected in France within the two species of *Oculimacula* spp. They have, however, no impact in practice because their frequencies remain low.

With the recent registration of boscalid and metrafenone, three new molecules and two new modes of action are available to control eyespot.

HELMINTHOSPORIUM on BARLEY (*H. teres*) and on WHEAT (*H. tritici-repentis*):

In France, the resistance of *Helminthosporium teres* to Qol fungicides is well established. Unlike powdery mildew or septoria leaf blotch, for which a mutation in position 143 of the cytochrome b (the Qols target) leads to a strong resistance, the modification is located in position 129 for *Helminthosporium* and leads to low to moderate resistance. Most strobilurins remain keep good efficacies in the field. Nevertheless, these are variable, some being judged disappointing, without any proven relation with the presence of resistant strains.

For *Helminthosporium tritici-repentis*, the observations carried out in Northern Europe show the presence of mutations, either in position 129, or in position 143, depending on the geographical origin of the tested populations. Efficacy of strobilurins can be severely affected. In 2006, no results were made available, neither for European, or for the weakly sampled French populations.

Based on this updated view of the situation, we renew our practical recommendations to :

- Promote non chemical means that could reduce disease risks
- Reduce the fungicides selective pressure toward rising resistances
- Manage the efficacy of fungicides in situations of practical resistance.

GENERAL RECOMMENDATIONS FOR 2007

- Give preference to disease tolerant varieties, especially to septoria leaf blotch, and to avoid using sensitive wheat or barley cultivars over wide areas.
 - Prefer field practices that reduce the disease risk, in particular those that can limit primary inoculums (for example rotation, ploughing, sowing date...) or the progression of the disease (density, nitrogen).
 - **Treat only if necessary**, according to the climate, cultivation conditions, models and observations.
 - Reflect and decide treatment times according to the disease development, using reliable observation methods and symptoms monitoring.
 - Limit the amount of seasonal applications active ingredients from the same chemical family (usually characterized by a positive cross resistance).
- programs, to minimize the risk of resistance development or to deal with a practical resistance problem for a given family.
- Strobilurins are not useful any longer on wheat for septoria leaf blotch and powdery mildew, but remain efficient on rust and *Microdochium nivale*. They are to be applied not more than once a season.
 - A single application of strobilurins is also recommended for spring and winter barley.
 - The most efficient DMI active ingredients have to be used to treat cereals leaf diseases in a resistance context ; their performances will be improved if they are associated with some other modes of actions. In the case eyespot, the only useful DMI in all circumstances is prothioconazole.

For further information, see

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