

## 北海道における耐性菌の発生事例 —テンサイ褐斑病菌の場合—

### ／Occurrence of fungicide-resistant pathogens in Hokkaido prefecture -In the case of *Cercospora* leaf spot on sugar beet-

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Leaf spot caused by *Cercospora beticola* is a major foliar disease of sugar beet, and it can cause serious yield loss without control using fungicides. However, it is known that continuous use of benzimidazole and kasugamycin resulted in the pathogen resistant against these fungicides. In Hokkaido, Demethylation inhibiting fungicides (DMIs) have been widely and commonly used for control of *Cercospora* leaf spot since 1987. Recently, a report has been made on the occurrence of low sensitive strains of the pathogen against DMIs, which poses serious concern about the outbreak of DMI-resistant strains. As a result of DMIs sensitivity investigation conducted on 79 isolates of *C. beticola* collected from field in 2000 and 2002, the presence of several low sensitive isolates were confirmed. Further, cross-sensitivity was found between the five DMIs when log transformed EC50 values of 43 isolates were subjected to linear regression analysis. On the other hand, it was confirmed that the lowering of sensitivity against DMIs has not reached a critical level, and DMIs are still effective for controlling *Cercospora* leaf spot. Thus, it is important to keep density of the disease and the pathogen low with rotation fields method and spraying different fungicides systematically.

## コムギ赤かび病の防除とベンゾイミダゾール系薬剤耐性:

### 大分県におけるチオファネートメチル耐性 *Fusarium graminearum* の発生

#### ／Chemical control against scab of wheat and resistant strains of *Fusarium graminearum* to thiophanate-methyl

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## コムギ赤かび病の防除とベンゾイミダゾール系薬剤耐性:

### 青森県におけるチオファネートメチル耐性小麦赤かび病菌 *Fusarium culmorum* の発生

#### ／Control of *Fusarium* head blight on wheat and benzimidazole resistance of the pathogen. -Occurrence of thiophanate-methyl resistant isolates of *Fusarium culmorum*, one of the causal agents of *Fusarium* head blight on wheat, in Aomori prefecture, northern Japan.

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In 2002 and 2003, sensitivity to thiophanate-methyl (TM) of *Fusarium* spp. and *Microdochium nivale*, the causal agents of *Fusarium* head blight, isolated from wheat in Aomori prefecture was tested *in vitro*. Five out of 74 isolates in 2002 and 1 out of 361 isolates in 2003 were identified to be *F. culmorum* and were highly resistant to TM with minimum inhibitory concentration higher than 1600ppm. In the inoculation tests studies in 2005, TM had no efficacy on disease control when wheat plants were inoculated with TM-resistant isolates of *F. culmorum*. This case is the first on the occurrence of benzimidazole resistance in *F. culmorum*. In addition to the above contents, the actual condition of the control of *Fusarium* head blight on wheat in Aomori prefecture was described.

## 新規殺菌剤「ボスカリド」の作用機作と耐性菌対策

### ／Resistance management and practical application for boscalid - a new broad-spectrum fungicide

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第16回殺菌剤耐性菌研究会シンポジウム講演要旨(2006, P30-40)

## イネいもち病菌の MBI-D 剤耐性菌は less-fit (低環境適応)か? :

### MBI-D 剤耐性イネいもち病菌と感受性菌の諸性質の比較

#### ／Comparison of biological properties of resistant field isolates of *Magnaporthe grisea* with susceptible isolates to melanin biosynthesis inhibitors targeting scytalone dehydratase (MBI-Ds)

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Resistant isolates of *Magnaporthe grisea* to MBI-Ds were first detected in Saga prefecture in Japan in 2001. The mechanism of resistance to MBI-Ds was shown to be derived from a single point mutation of scytalone dehydratase (SCDH) gene (V75M). In this study, we compared biological properties of resistant isolates (three stains isolated in Saga, Nagasaki and Fukuoka prefecture in 2002,

respectively) with those of susceptible isolates to investigate the fitness costs associated with MBI-Ds resistance. There were no differences of pathogenicity, temperature-sensitivity and UV tolerance among susceptible and resistant isolates. However, the SCDH activity of susceptible isolate was higher than that of resistant one. On the other hand, we confirmed that susceptible isolates became dominant after six to seven times successive infection from the diseased potted plants which were first inoculated with the spore mixture of susceptible isolate and resistant isolate at various ratio. In the resistance monitoring study conducted from 2002 to 2005 in Saga prefecture, the frequency of resistant isolates has drastically declined from 100% to 1.2% after completely stopping the MBI-Ds treatment. These results suggest that the fitness costs are associated with the resistance of MBI-Ds. We are studying if the fitness costs are associated with the difference of SCDH activity between a susceptible isolate and a resistant isolate or not.

### イネもち病菌の MBI-D 剤耐性菌は less-fit (低環境適応)か？： 耐性菌の遺伝的多様性と個体群動態

#### ／Genetic diversity and population dynamics of MBI-D resistant isolates of *Pyricularia oryzae* based on rep-PCR fingerprinting and SSR marker analysis

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第 16 回殺菌剤耐性菌研究会シンポジウム講演要旨(2006, P51-60) ／Abstracts of the 16th Symposium of Research Committee on Fungicide Resistance

In 2001, field isolates of *Pyricularia oryzae* resistant to scytalone dehydratase inhibitors of melanin biosynthesis (MBI-D) were reported in Saga prefecture, Kyushu. Subsequently, the resistant isolates spread throughout almost all of Kyushu in 2002-2003. On the basis of rep-PCR fingerprint data, the haplotypes of the resistant isolates appeared to show high genetic diversity, suggesting that the resistance existed in a multi-genetic background. Further, three predominant haplotypes mainly contributed to the widespread resistance in Kyushu. These results suggest that resistance may already have been present in the pathogen population before this fungicide was introduced, and that isolates possessing the SDH mutation would have been selected and then multiplied rapidly in each region of Kyushu as a result of the widespread introduction of MBI-D fungicides in a short period. Fitness of pathogen isolates resistant to fungicides is an important consideration in disease management. If fitness costs are associated with fungicide resistance, the frequency of resistant isolates will decline in the absence of the fungicide. In Saga prefecture, percentage of resistance decreased from 70 to below 20% in 3 years, after treatments with MBI-D were officially discontinued to control rice blast. However, fitness differences between resistant and sensitive isolates may have been due to differences in the genetic background of the isolates rather than fitness costs. It needs further consideration to evaluate the correlations between MBI-D resistance and fitness.

### イネ採取圃における防除実態と今後の対応： 水陸稲種子の生産流通と防除の概略

#### ／The control realities in rice propagation fields and correspondence in the future.

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耐性菌を含む種子伝染性病害の抑制やコメの品質向上を目的として、水陸稲種子の更新率は年々上がっている。水陸稲種子は「主要農作物種子法」をもとに、各都道府県とその種子協会が中心に生産を行っており、種子協会は種子の需給調整も行っている。平成 16 年産種子の全都道府県種子協会での買入実績は約 5 万 2 千 t で、内 5 千 4 百 t が県間で需給調整のために販売された。ほとんどの県は少量でも他県産種子の購入を行っている。採種圃における防除は県によりまちまちだが、通常防除より厳しい防除が指導され、耐性菌問題以降 MBI-D 剤は使用しないように指導している県がほとんどである。

### イネ採種圃における防除実態と今後の対応： 新潟県における防除実態

#### ／Control of rice blast fungus (*Pyricularia oryzae*) in seed farms of Niigata prefecture

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