

Wheat Seed Germination Alert: *Fusarium* Seed Scab

**UNDERGROUND
SECURITY**
Syngenta Seed Care

Dividend Extreme and Maxim 4FS greatly enhance seed germination

Worldwide, *Fusarium* head blight (FHB), or head scab, devastates wheat crops. More specifically, it's estimated that FHB epidemics from 1993 to 2001 caused economic losses of more than \$5.2 billion in Minnesota and North Dakota alone¹. Since then, weather conditions have continued to favor high levels of FHB incidence throughout Minnesota, North Dakota and much of the central and eastern U.S. winter wheat belt. As a result, more precautions are being taken to minimize its impact at various stages of wheat growth and development. Research and field experience show that seed treatment fungicides such as Dividend Extreme[®] and Maxim[®] 4FS help minimize seed-borne scab infection.

Impacts of *Fusarium*

Fusarium affects wheat plants in several stages — from the seed and seedling stage to flowering and grain fill. The most visible symptoms occur on grain heads.

- FHB on overwintered crop residue can splash onto the plant or travel on air currents and transmit the disease to flowering wheat heads during warm, moist weather
- A pink to salmon-orange spore mass appears on the infected spikelet and glume
- Kernels and the stem below the head appear bleached
- Infection causes lightweight, shriveled kernels

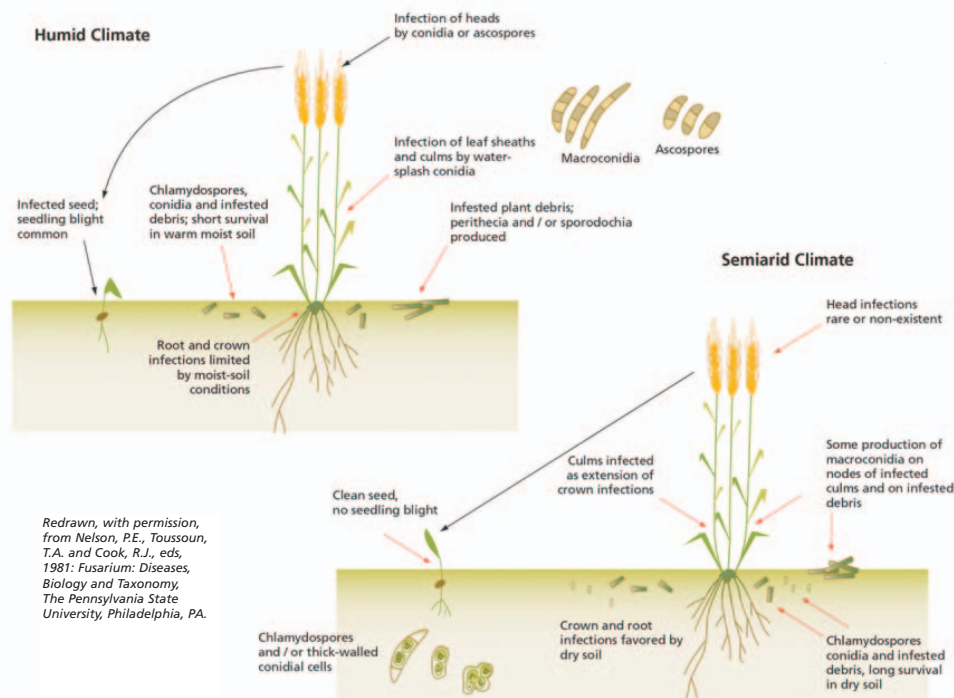
The less visible part of the *Fusarium* life cycle occurs on wheat seed as seed scab. *Fusarium* not only affects the outside of the seed, but also attacks the seed embryo. Both points of infection can effectively act

as inoculum for a new round of infection in the next crop if conditions become favorable.

Seed infected with *Fusarium* may be dead, germinate poorly or encounter seedling blight as it germinates. The result — fewer seeds germinate, seedlings frequently die before becoming established and stands are spotty and uneven. The destructive force of *Fusarium* seed scab was evident in Kentucky in 2003.

- Germination levels ranged from 25 percent to 70 percent, a dramatic drop from the industry-recommended minimum of 85 percent
- From harvest through the end of August, almost 80 percent of samples sent to the University of Kentucky Seed Testing Laboratory were below the standard 85 percent germination
- More than half of the samples ranged from 60 percent to 79 percent germination

Disease Cycle of *Fusarium* spp. (*F. graminearum*, *F. culmorum*, *F. avenaceum*)



¹Nganje, W.E., S. Kaitibie, W.W. Wilson, F.L. Leistritz, and D.A. Bangsund. 2004. Economic impacts of *Fusarium* head blight in wheat and barley: 1993-2001. NDSU AES Report No. 538.

Management Options

Because *Fusarium* can have such a devastating impact on seed germination, measures must be taken to minimize the effect this disease has on the seed portion of the wheat life cycle. Researchers point to several cultural options, and more are recommending use of seed treatments, such as Dividend Extreme and Maxim 4FS, to maximize seedling germination. Seed treatments also reduce the primary inoculant and decrease the potential for infection later in the season. However, foliar infection levels are largely dependant on weather conditions, and seed treatment alone will not completely control the *Fusarium* problem.

Cultural Recommendations:

- Plant certified seed: Seed companies thoroughly clean and treat seed to deliver the highest quality seed to the grower
- Select varieties with resistance to FHB: while there aren't any varieties

with complete resistance, several show moderate levels of resistance

- Rotate with non-host crops: FHB appears to be more prevalent when planting wheat into corn, wheat or sorghum stubble
- Alter tillage practices: FHB appears to be more prevalent in reduced-tillage fields, so bury infected residue through tillage

Chemical Recommendations:

Fungicide seed treatments serve as a first line of defense against *Fusarium* in its seedling stage by reducing the probability of seed scab infection and seedling blight. As a result, disease risk is lowered, germination and stand establishment are greatly improved and yield potential is protected. Seed treatments defend the seed against inoculum in the soil and reduce the chances of new infection that may affect the seedling. However, seed treatments will not protect wheat plants from

wind-borne inoculum that may affect the plant later in the season.

In a trial conducted by the Nebraska Crop Improvement Association (see photos below), untreated seed showed only 38 percent germination when infected with seed scab, while 93 percent of seed treated with Dividend Extreme plus Maxim 4FS germinated. This dramatic increase in germination demonstrates the value of investing in seed treatments to ensure the crop gets out of the ground.

Dividend Extreme has shown excellent activity against several *Fusarium* species, including seed scab, root rot and crown rot; thus, making it an integral part of an overall management program for seed scab reduction in wheat. Protecting against 16 early season seed-borne, soil-borne and fall foliar diseases, Dividend Extreme aids in the development of strong, uniform stands and helps enhance yield performance.

Benefits of a Dividend Extreme and Maxim 4FS Program:

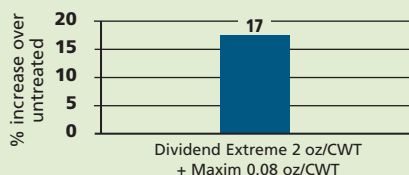
- Delivers excellent seed germination by protecting against seed scab and seedling blight
- Excellent seed safety and disease protection results in optimal seedling development and root growth
- Adding 0.08 oz/CWT of Maxim 4FS to 2-4 oz/CWT of Dividend Extreme boosts seed germination

Benefits of Dividend Extreme:

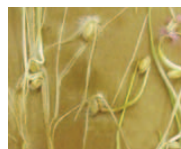
- Protects against 16 early season seed-borne and soil-borne diseases, including unsurpassed protection against dwarf bunt
- Contains Apron XL® for excellent built-in protection against *Pythium* damping off
- Offers excellent seed safety for optimal seedling development and root growth
- Potential for good return on investment vs. untreated and competitors
- Fully compatible with Cruiser® seed treatment insecticide to protect wheat seedlings from diseases and insects at the same time

Seed-borne Scab: Yield

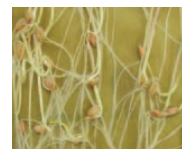
Spring Wheat, North Dakota, 2004



Seed-borne Scab: Seed Germination



Untreated
Germination = 38%



Dividend Extreme
Germination = 78%



Dividend Extreme + Maxim 4FS
Germination = 93%

Germs completed by Nebraska Crop Improvement Association.

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Cruiser® insecticide is protected by several pending patent applications and granted patents in the US and worldwide, including US Patent Nos. 5852012 and 6844339.

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Maxim 4FS

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