



# Extension FactSheet

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## Fusarium Head Blight Severity Scale for Winter Wheat

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**F**usarium head blight (FHB), or head scab, of wheat has increased in the United States Corn Belt with the near universal use of reduced tillage practices. FHB is caused by the residue borne fungus *Fusarium graminearum*. Disease results in excessive yield loss and mycotoxin contamination of affected grain. Diseased kernels are often shriveled, lower in weight, and frequently lost with the chaff during combining. Mycotoxins such as vomitoxin (deoxynivalenol or DON) produced by the fungus in grain and straw are harmful to animal and human health.

Currently, there are no wheat varieties with a high level of resistance to *F. graminearum*. Some varieties have useable levels of partial resistance that limit yield loss and vomitoxin accumulation. Assessing the level of head scab in fields or research plots is difficult and tedious due to the variation in the level of disease from one wheat head to another. Researchers agree that disease incidence and severity data should be taken to adequately document the level of FHB. Disease incidence is calculated as the proportion of wheat heads with symptoms out of a predetermined number of heads in a randomly chosen sample. Disease severity is determined by visually estimating the percentage of diseased spikelets on each head in the sample and is calculated by averaging (including zero scores) the severities of all heads (Stack and McMullen, 1995).



Figure 1. Heads of winter wheat with disease symptoms; A) FHB affected head with white chaff, B) FHB affected head with red chaff, C) Head with red chaff affected by FHB (bottom three spikelets) and *Stagonospora glume blotch* (tips of top spikelets), D) Head with white chaff affected by *Stagonospora glume blotch*, E) Close-up of spikelets with brown lesions of *Stagonospora glume blotch*.

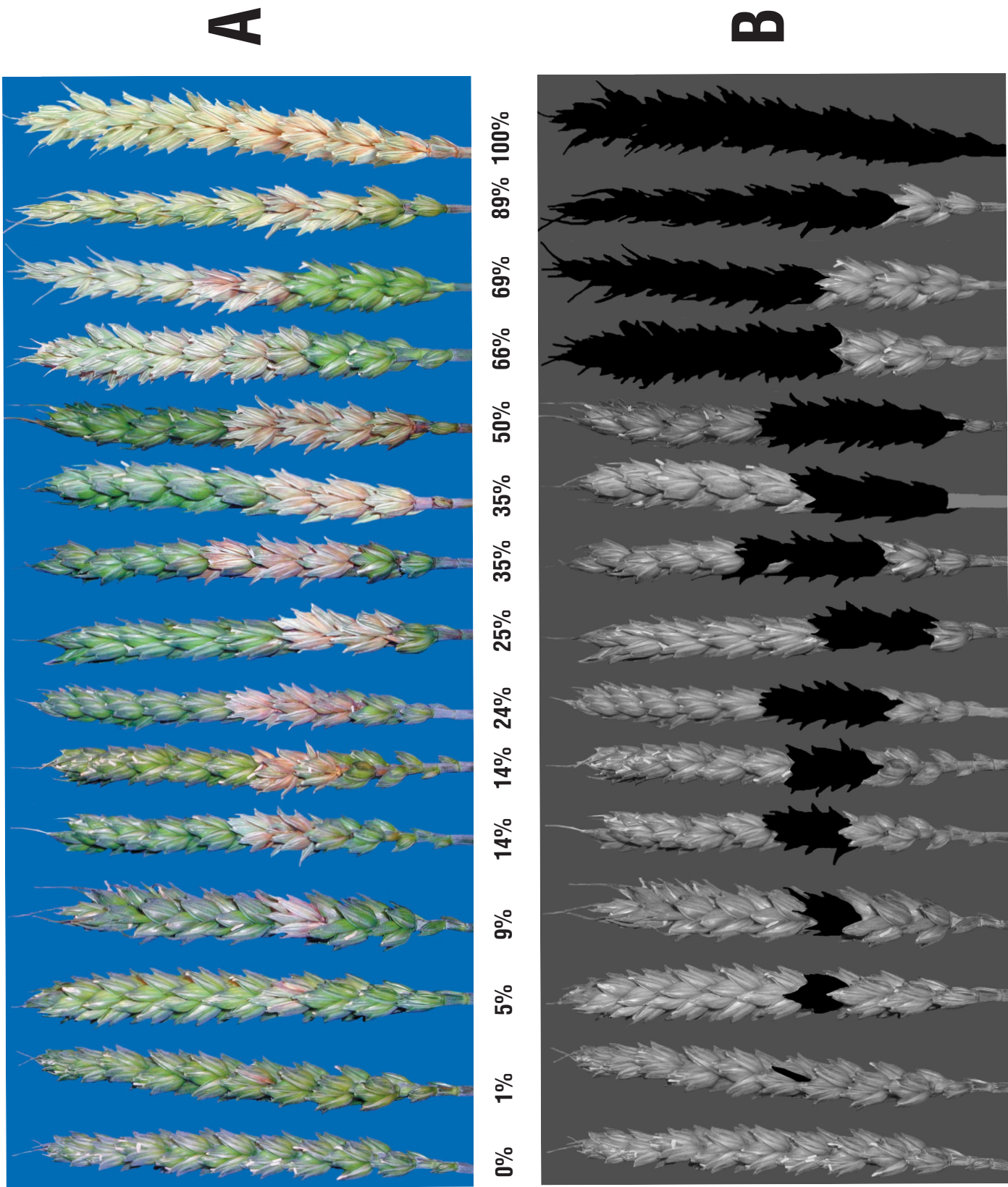


Figure 2. Fusarium head blight severity scale showing color (A) and negative (B) images of heads with varying percentages of diseased spikelets.

A frequently used scale for visually assessing the percentage of diseased spikelets per head was developed using illustrations of a spring wheat variety with long awns and 13-14 spikelets per head (Stack and McMullen, 1995). A spikelet is a discrete group of 3 to 5 flowers (florets) arranged on either side of the head and an awn is a needle-like projection at the tip of the glumes of the spikelet. In the mid-west Corn Belt, winter wheat varieties generally have 15 to 19 spikelets per head and heads either do not have awns or awn length varies depending on the variety.

Differences in the number of spikelets per head and between awned varieties and varieties without awns can lead to inaccurate disease assessment. When an awned variety has premature spikelet death due to FHB, the awn also dies and the appearance of the diseased tissue may lead the rater to overestimate disease severity as compared to varieties without awns. A wheat head without awns will usually appear more linear in shape compared to similar awned varieties. The following visual scale was developed to help individuals better assess disease severity on varieties without awns.

Difficulty in evaluating FHB severity also can be complicated by differences in chaff color of the head, white or red. On varieties with white chaff, diseased spikelets with white glumes create a stark contrast in the field compared to the uninfected spikelets with green

glumes (Figure 1-A). Diseased heads of varieties with red chaff appear much darker than those with white chaff (Figure 1-B). Other diseases, such as *Stagonospora glume blotch*, can also be present on FHB affected heads causing similar discoloring on red chaffed varieties (Figure 1-C). *Stagonospora glume blotch* can be distinguished by the darker, brown-colored lesions usually present near the tips of the glumes (Figure 1-D and 1-E).

The assessment scale presented here uses heads with white chaff to assist in estimating the proportion of diseased spikelets on a head (Figure 2-A and 2-B). When performing evaluations, examine heads individually and match each selected head to a similar representative picture and record the corresponding percentage of disease. Depending on the field or plot size, multiple heads per location should be evaluated at several locations to improve mean disease estimates. Use of this scale should improve consistency of data obtained by multiple individuals conducting disease assessments.

### Acknowledgments

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### References

Stack, R. and McMullen, M. 1995. A visual scale to estimate severity of *Fusarium* head blight of wheat. (<http://www.ext.nodak.edu/extpub/plantsci/smgrains/pp1095w.htm>)

Additional information is available from The Ohio State University  
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