

## Deoxynivalenol (DON; also called vomitoxin)

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Numerous reports in the western part of the state, where the majority of the wheat has been harvested, indicate problems with DON levels exceeding industry allowances. There are several reports that DON levels are so high that loads are being rejected. Even loads with low or moderate levels of DON are being penalized with price reductions in some counties. In some of these cases, high DON is associated with areas that also had significant head scab (*Fusarium* head blight caused by *Fusarium graminearum*). However, some cases of high DON levels are occurring despite lack of visual symptoms in the wheat and good test weights and average yields (~70 bu/A). For producers that did not observe significant head scab, likely they have done everything right. Unfortunately, the environmental conditions favored DON accumulation with little or no visible symptoms of head scab. There are laboratories that can test for DON levels in grain samples if a producer is interested in knowing this information before transporting grain for sale. For detailed information on DON and/or DON testing, contact your local University of Kentucky Cooperative extension agent.

One final consideration for wheat grain containing DON relates to seed quality. When significant DON is detected in grain, then the fungus *F. graminearum* is also present at some level. *F. graminearum* can reduce seed germination and seedling vigor/survival within the first month of planting. Wheat saved for seed ("brown bagged") from high DON grain lots may or may not be suitable for planting, depending on the extent of infection/infestation by *F. graminearum*. Wheat seed lots with less than 75% germination should probably not be sown no matter what; the quality is just too low. However, if germination is in the 75 to 85% range, performance can often be substantially improved by applying a fungicide seed treatment. If you are considering brown bagging and suspect or know you have a DON/*F. graminearum* problem, I encourage you to send seed samples off to a certified laboratory for germination testing. If requested, many labs can also test seed for germination, both before and after treating seed with a fungicide. This can provide an estimate of whether treating the seed with a fungicide will increase seed germination to an acceptable level. Your local University of Kentucky Cooperative extension agent can provide detailed information on steps to submit samples for germination testing.

Typically, the amount of *Fusarium* head blight (head scab) visible in a field, the level of visually scabby kernels evident in harvested grain, and the extent of contamination of grain by the fungal toxin, deoxynivalenol (DON; also called vomitoxin) are highly correlated. DON is produced by the head scab causal fungus, *Fusarium graminearum*, as part of the infection/disease development process. Thus, you would never expect to have significant head scab levels in a field and very low or no DON. It just does not happen, albeit DON levels may vary considerably. This said, we sometimes have situations where grain has moderate to high levels of DON, but head scab symptom expression in the field was minimal. How could this happen?

Low head scab symptoms and moderate to high DON usually occurs when conditions during the onset of flowering (anthesis) – the most common susceptibility period for head scab in wheat- is not favorable for infection, but late infections are favored during late flowering and/or grain fill. When late infections occur, head scab symptoms may exist, but are not nearly as visible to the naked eye compared to earlier infections. Or, visual symptoms (in field or in harvested grain) may barely develop at all. Regardless, the fungus is still active and this can translate into elevated DON and low (or apparently low) head scab symptom expression.

The above is not an extremely common scenario, but when it does occur, it is usually associated with cool, wet weather during grain fill. These are exactly the conditions experienced during much of the grain fill period for many fields throughout west Kentucky this spring.

I am also aware that some farmers have experienced moderate to high head scab and DON this year, and feel betrayed because they "did everything right". To these folks I would say, you probably did, but events were not working in your favor. For example, the wheat crop was extremely uneven this year. When this occurs, the period of head emergence is lengthened because the emergence of heads on secondary tillers

is slow compared to primary tillers. This lengthened period of head emergence (thus crop flowering) may have exceeded the effective period for foliar fungicides to control head scab. Another possibility is based on when fungicide applications were made. For example, if a fungicide application was made at the appropriate time for early tillers (i.e., early anthesis); heads associated with secondary tillers may have been only partially emerged. Because current head scab fungicides have very limited mobility in leaf and head tissue following application, partially emerged heads would be only partially protected. Conversely, if applications were made at early anthesis for secondary tillers, older first-emerged heads on primary tillers would be unprotected when they were most susceptible to infection. So, if early conditions were somewhat favorable for infection, the crop might show significant head scab on primary tillers and almost none on secondary tillers.

So as you can see, the uniformity of the crop can have a very significant impact on head scab (and DON), even if fungicides were applied. Also, I cannot stress enough that the current fungicides labeled for use in managing head scab and DON are average compared to how those same fungicides perform against other fungal diseases, such as leaf rust and the various fungal blotch diseases. Efficacy of fungicides against head scab and DON can approach 75% control compared to a non-treated susceptible cultivar. However, control is much lower (40-55%) when fungicides are applied to cultivars that are susceptible to head scab (and DON). Unfortunately, many, many acres last fall were planted to scab-susceptible cultivars because of availability issues for the best resistant cultivars or because farmers did not seek out resistant cultivars. Fields that were planted to a scab-susceptible cultivar were automatically compromised in terms of the potential for fungicides to suppress head scab and DON.

Lastly, I need to add that the weather conditions made it very difficult for some farmers to spray their wheat at the best time to achieve optimal scab/DON control. This is a very common conundrum: the very conditions which favor head scab and demand a fungicide application are the same conditions that make it difficult or even impossible to spray. Sometimes switching from ground to aerial application can fill the need, but sometimes it is not even possible to spray aerially. In those cases, head scab and DON might still occur in spite of your best efforts to do the "right thing".

Head scab and DON management can be very complicated as should be evident by the above text. Sometimes the head scab/DON results experienced for a field defy understanding. Usually, however, one can figure out where things went wrong. Fortunately, a great many acres of wheat in Kentucky yielded well and had low head scab and DON. I realize this is no consolation for producers who are now dealing with moderate to high DON in their grain.