

Dealing with Fusarium (Head Scab) Infected Wheat for Seed Use

While rainfall is a blessing, it also brings about potential for disease. One major disease that impacts seed quality is Fusarium Head Blight (Head Scab). When Fusarium infections occur, there are two big challenges to making quality seed, Test Weight and Germination.

I will not spend much time on the causes, infection and potential prevention of the disease, but would refer you to an article by Dr. Erick DeWolf, Extension Plant Pathologist with Kansas State University, for more information.

<https://www.bookstore.ksre.ksu.edu/pubs/MF3458.pdf>

Seed infection may or may not be visible to the naked eye. Various levels of infection may occur, dependent on the time of infection and the environmental conditions. Kernels that are severely infected will appear white, chalky and shriveled and may even have some pink discoloration. These kernels are often times referred to as “tombstones”, which is appropriate, in that they generally have a non-viable embryo due to the fungal infection. If tombstone kernels are present, then it is a safe bet that other kernels, that to the eye appear normal, are also infected but to a lesser degree. The good news in this is that most times, the seed which appears normal will still have a viable embryo and the infection is limited to the seed coat.

There are several key components to achieving acceptable seed quality when a lot has been infected with Fusarium Head Blight.

- **Seed Cleaning**
- **Time**
- **Fungicide Seed Treatment**
- **Testing**



Seed Cleaning: Cleaning the seed is the first key step, in that it offers the opportunity to remove a significant amount of the tombstone (non-viable) kernels. Due to their lighter density, many of these kernels can be removed from the seedlot. Air screen cleaners and gravity tables have proven to be beneficial to improving both test weight and germination. *It is **important** to note that in seed testing, though the tombstone kernels do not appear “normal” and are suspected to be non-viable, they meet the definition of pure seed and are to be included in the germination test. That is, they will NOT be removed before a germination test is conducted and will most certainly lower the germination result.

Time: Time is on your side. While the disease has killed the embryo of the severely infected seeds, the remaining viable seeds, with only a seed coat level of infection, have potential to grow into a normal, healthy plant, given time. My experience indicates that the viability of the fungus itself drops off rather quickly and as we draw closer to planting time, some of the fungus may have died off and will no longer kill the seedling as it begins to grow. Seed tested early, in July, for example, will often times have a lower germination than when tested in September (Table 1). The rate at which the fungus dies off is mostly dependent on the storage temperature of the seed and it is likely that not all fungal infection will be gone by planting time.

Table 1. Improvement in germination of a 2008 lab sample, due to time.

Test Date	Germination (%)
July 21, 2008	76
September 8, 2008	91

Fungicide Seed Treatment: There are a number of fungicide seed treatments on the market which are effective in controlling Fusarium on infected seed, given the seed is otherwise viable. Obviously it will not resurrect those seed which have been killed by the infection, but in most cases, should improve the germination result, sometimes dramatically (Table 2). Of the samples received in 2008, in which a treated germination test was requested along with an untreated germination and moderate to severe Fusarium infection was present, fungicide treatment provided an average germination increase of 10 percentage points.

Table 2. Improvement in germination of a 2008 lab sample, due to fungicide seed treatment.

	Germination (%)
Untreated	77
Treated (in lab)	97

For a list of current fungicide treatments which are effective in controlling seed-borne Fusarium (as well as other seed-borne diseases such as Loose Smut, Common Bunt and Flag Smut), please visit the following link to the KSU Research and Extension publication MF2955. <http://www.bookstore.ksre.ksu.edu/pubs/MF2955.pdf>

Testing: Seed testing will be the final component to determining seed quality. The KCIA laboratory provides professional testing to let you know what level of quality your seed has. In addition to the standard warm germination, we also offer a Treated Germination and an Accelerated Aging (AA) test, which can be beneficial in dealing with Fusarium infected lots.

- **Treated Germination:** We will apply a fungicide seed treatment a portion of the raw seed submitted to the lab, prior to conducting a warm germination. This will give you an idea on the potential response you should see, should you choose to apply a treatment to the entire lot. * IMPORTANT, for certification purposes, if a lot must be treated to achieve the 85% germination standard, you will be required to submit a treated sample, applied at your location, to the KCIA laboratory for testing and final certification of that lot.
- **AA:** While not a common test done on wheat, the AA actually has some utility in predicting how much potential loss of fungal viability one might expect in a seedlot. Test results in 2008 showed several instances where the AA result was 5 to 10 percentage points higher than the warm germination; this difference can be attributed to the loss of fungal viability during the high temperature, high moisture stress period of the test. (Typically, the AA should be near or something less than the warm germination) It is critical to understand that this only applies when there are no other vigor issues with the seedlot.

Seed germination testing should be a routine step for any seed crop. Home tests are sometimes done on non-certified seed; however I would issue caution with home testing, in that the evaluation of diseased seedlings can be a challenge and is best left to a professional laboratory. A \$17.00 germination test is well worth insuring the seed you are planting is of adequate quality. For more information on the KCIA Seed Laboratory, seed testing fees and sample submittal forms, please visit our website. <http://www.kscrop.org/seed-lab.html>

Wheat which has been infected with Fusarium definitely has potential to be used for seed purposes but will require a little extra care and preparation. Kansas Certified Seed will have received the professional cleaning and testing described above and is the best bet for planting your next crop.

