

change with moisture content and temperature for a given grain type. Generally, more expensive moisture meters measure moisture content more accurately and many make automatic adjustments for grain temperatures. Less expensive moisture meters usually require some adjustments for temperature. At least 250 grams of grain are needed to test moisture with most meters.

It is advisable that the less expensive meters be occasionally compared periodically to known standards to minimize errors. For example, if a meter is known to "read 1 point high" consistently, corrective actions can be taken. Likewise, several readings should be taken for each sample so as to reduce the risk of error.

Electrical moisture meters operate under the assumption that the moisture content of the grain is uniformly distributed throughout the sample. This is not the case especially when grain is first removed from a drier. Once the moisture in the grain has equilibrated within the kernel, a more accurate moisture reading may be obtained. As indicated above, when a bin of grain is examined, it is important that the grain has cooled and that it has been a few days since drying. Farmers sometimes associate this apparent change in moisture with operation of the aeration fan. However, aeration does not generally produce any significant changes in the moisture content of the grain.

Insects, test weight and dockage

The grain sample should be placed in the top hopper of a Boerner divider and allowed to pour down the sides of the cone located directly under the opening. The sample should be divided into two equal streams just before reaching the bottom pans. To arrive at the 1-1/2 quart working sample required for analysis, the large samples must be divided two or three times. The test weight of the grain can be determined with a Boerner weight per bushel tester. The grain must be allowed to flow freely from a filling device into a 1-quart dry measure bucket. Excess grain will flow over on all sides into an overflow pan. The bucket can then be carefully leveled by three quick, even strokes of a hardwood strike-off stick held upright across the bucket top. The bucket can then be weighed on the associated balance. Care should be exercised not to shake this apparatus during this procedure since this will cause compaction of the grain and result in inaccurate readings. The test weight is the density of the grain in pounds per unit volume (1 bushel).

Two sieves are needed for the separation of whole kernels from dockage, insects and broken pieces. These are the 3/16-inch round sieve and the 1/12-inch fine seed sieve. The working sample should be separated into four equal batches and each batch screened separately. The sieve and bottom pan should be shaken in a side to side direction (about 10-inch movements) 30 times. Different portions will be collected as dockage or whole clean kernels depending on the type of grain. Kernels stuck in the sieve will remain with the retained portion.

Various types of balances are needed to weigh whole grain, dockage and portions for moisture testing. For damage determination, a scale with 0.01 g accuracy is recommended, while a scale with 0.1 g accuracy is adequate for other tests.

Sample pans are also required for collecting dockage portions, subdividing samples for sieving, and so on. Triangular sample pans are convenient for pouring the grain into containers and testing equipment.

Pathogens

Samples of stored grain collected for pathogen identification should contain at least 100 seeds. Seeds should be selected that show the full range of variability from normal in appearance to the extremely moldy condition (if present). Samples should be appropriately marked with grower name, bin number, location of sample from within the bin, date and degree of problem. Place the seeds in paper sacks and deliver them to a preassigned laboratory for identification. Samples kept in completely saturated atmosphere become colonized by saprophytes (plants that live on dead or decaying organic matter) that "outgrow" the causal organism. This is the reason for requesting the full range of variability of seed selected and the placement in paper bags rather than sealed plastic bags.

Samples received at the laboratory, depending on their condition, may be examined directly under the microscope, placed on culture media, or placed in a moisture chamber for a few days. Once fungal identification is made, additional tests may be desired if the fungus is one that is likely to have produced mycotoxins. The tests for mycotoxin determination vary in their qualitative and quantitative abilities. These range from the black light test (ultraviolet light) to minicolumn to thin layer chromatography. Some of the tests may be rather time consuming and costly, and not performed by all laboratories.