

Safe Storage of Grain

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For safe storage, grain must be stored below 11 percent. An isolated pocket of damp grain will support mold and/or insect growth which can spread to the rest of the bin.

Causes for moisture to occur in grain storage are leaks and condensation. Roofs or tops of grain bins should be inspected for possible cracks that will allow rain to enter. Growers should make periodic inspections of the top of grain for saturated areas. Leaks should be stopped and wet grain removed.

Grain harvested in the summer or fall placed in storage produce air currents within the bin which produce moisture condensation. The process can occur within a completely enclosed and sealed bin and is caused by temperature differences within the grain. As the outside air temperature decreases, the bin walls cool which cools the grain layer near the walls and roof. Air next to the wall cools and becomes dense, settling toward the bottom of the bin. The interior holds heat and warms the air making it expand and become light which causes this air to rise. As this warm moist air rises it passes through the cooler top layer of grain causing the warm air to cool and produce condensation. As this warm moist air continues to rise, it comes in contact with a cold roof and further condensation occurs. This condition known as "moisture migration" (creates a wet zone in the top of the bin). Mold and insects thrive in the warm moist areas.

Moisture migration is usually first evident when a crust begins to form on the grain surface. The crust is seen as a thin surface layer of kernels that are slightly wet, slimy or tacky. The kernels tend to stick or even freeze together. Crusting forecasts a potentially severe spoilage process.

If crusting occurs, the surface should be stirred or, in extreme cases removed, and aeration started immediately. If the top surface is permitted to seal over, severe spoilage is imminent.

Aeration for Temperature Control

Moisture migration can be prevented in grain bins by forcing low volumes of air through the bin contents producing uniform temperatures throughout the mass. This process is called aeration and requires from $\frac{1}{10}$ to $\frac{1}{4}$ cubic feet of air per minute per bushel of grain.

Aeration fans should be installed to draw the cold air down through grain reversing the natural trend of warm air to rise. Drawing the cold air down discharges the warm moist air outside and prevents condensation on the top surface of the grain.

Fan operation should begin as soon as grain is placed in storage and should be operated whenever the warmest grain is 10°F warmer than the outside air. Fans should not be operated when fog, rain and high humidity exist. **In late fall and winter, the fans should be operated during daylight hours when humidity is near or below 60 percent. A grain temperature of 50°F, is generally satisfactory.** Grain stored more than one year should be cooled below 50°F if possible giving better insect and mold control.

High volume drying fans can be used to aerate grain by operating two or three hours several times a week when the relative humidity is as discussed above. Air forced upward through grain in high volumes usually does not cause moisture to accumulate in the top layers. Of course, no heat should be added when aerating.

Regular inspection of grain contents is a must for successful management. Inspect the grain for moisture, insects and spoilage at least every 30 days.

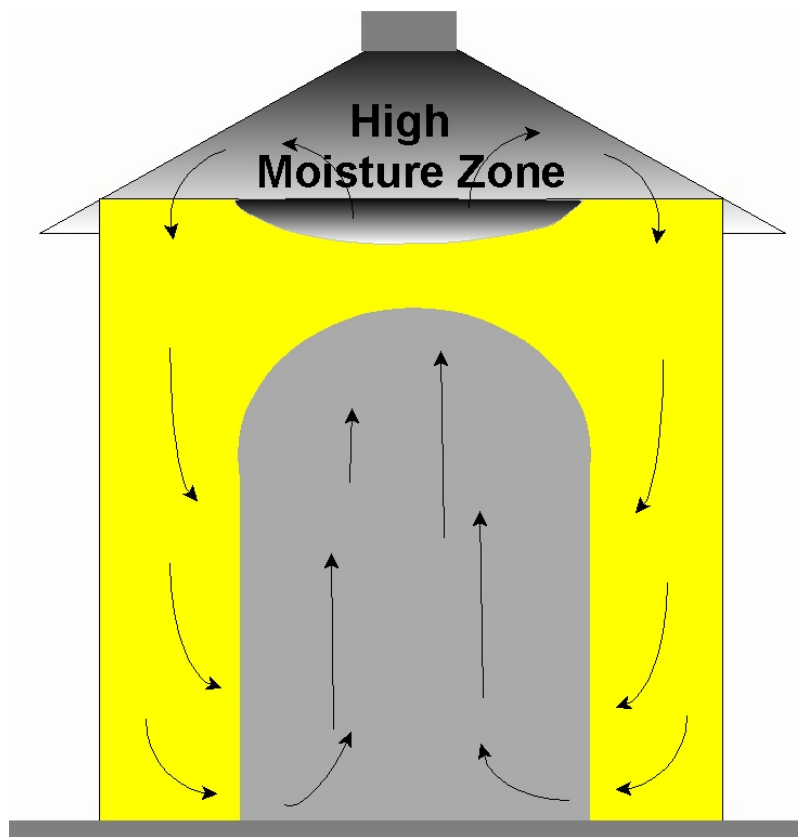


Figure 1 Convection air currents caused by differences in temperature produce moisture condensation in top layers of grain.

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