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G76-301 How to Tell Corn, Sorghum Maturity

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How to Tell Corn, Sorghum Maturity

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Researchers have discovered a way to tell when corn and grain sorghum have stopped filling—when they are physiologically mature.

A layer of cells near the point where the kernel is attached to the plant turns dark brown as the kernel nears maturity and, finally, black when the kernel is mature.

How Useful?

A black layer forms in the kernel at the time when maximum kernel dry weight is reached. At physiological maturity the phloem tubes, which carry food to the grain, are cut off. Consequently, the kernel can no longer increase in dry weight. Black layer formation can be used to determine when to stop irrigating, thus saving water, fuel and time. Also, it can tell a farmer putting up silage or high moisture corn when he has reached maximum grain dry weight. Seed producers can use this method to determine when seed has completed development.

Dark layer determinations may help farmers time harvest preparations in relation to other pressing labor requirements such as large livestock programs. However, all corn and sorghum hybrids do not reach physiological maturity at the same moisture level. Consequently, black layer date does not provide an exact or precise index to harvest time in commercial grain production fields.

Reading Black Layer in Corn

You can find the black layer by splitting a kernel with your knife. When the black layer is present, it becomes visible at the base of the kernel. There the cells through which the kernel is fed connect the kernel to the cob. The black layer starts forming in kernels in the tip portion of the ear first and kernels in the butt last. Any stress situation can cause the black layer to form, including 5 or more days with the temperature below 50 degrees, even without a frost.

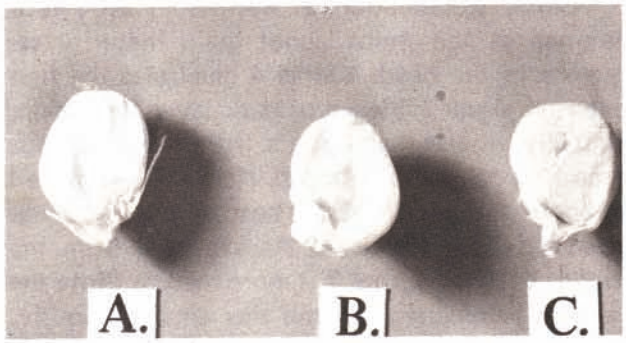

Figure 1. Three stages of corn development. The black layer is first evident in B and can be clearly seen in C. (William Hopkins photo, courtesy Dr. Baker, Pioneer Hybrid Co.)

When about 3 or 4 kernels in the middle of the ear show the black layer in 9 out of 12 ears selected at random, moisture should be close to 30 percent. However, run a moisture test. If the moisture is too high, wait until 95 percent of the kernels in the butt end of greener plants have developed black layers, then test again for moisture.

If this procedure is too time consuming, there is another way to keep a check on maturity progress. This is to break an ear in the middle and look for undented kernels and a starch line. The starch line forms on the back of the kernel soon after denting. It then moves down to the tip. When it reaches the tip, the black layer forms.

Reading Black Layer in Sorghum

Fortunately, it is easy to read the black layer or darkened area in sorghum. The dark layer is visible in the intact sorghum kernel, as illustrated in the photo. Several sorghum kernels can be pinched out and examined in the time it takes to examine a single corn kernel.

Sorghum pollinates or blooms first at the tip of the head. A steady downward progression of blooming reaches the base usually 4 to 7 days later. Grain in the head matures in the same direction and usually requires more than a week for the dark layer to move from tip to base kernels. A fairly uniform progression from mature to immature kernels may be found in the same head over a period of about 7 to 14 days, depending on how hot the weather is.

Closer examination of kernels in the photo emphasizes the point about grain maturity sequence in the head. Kernel 4 illustrates the first external visual evidence of dark layer formation. Actually, the darkening is a little more obvious than it appears in the photo. Kernel 4 was picked at about the middle of the head and kernel 3 was selected above kernel 4. As expected from the bloom pattern, kernel 3 is more mature. Note the kernel is "pinched" in the tips area. Obviously, water lost from the kernel is no longer being replaced, since the vascular connection has been cut off between the plant and the seed. Kernel 2 was picked still higher in the head and drying is even more obvious. Kernel 1 was selected from the head tip. It matured first and is visibly shrunken from greater water loss, compared to the other kernels.

A bit of practice is needed to accurately determine the earliest appearance of the functional dark layer (the point reached by kernel 4) because of seed color differences in different sorghums. However, by the time the kernel reaches the stage of kernel 3, it can easily be recognized. Since drying has already become obvious, color problems no longer give trouble in making accurate relative maturity determinations. The kernel 3 stage is only about a day later than the kernel 4 stage. A little practice will permit the alert farmer to determine physiological maturity in sorghum.

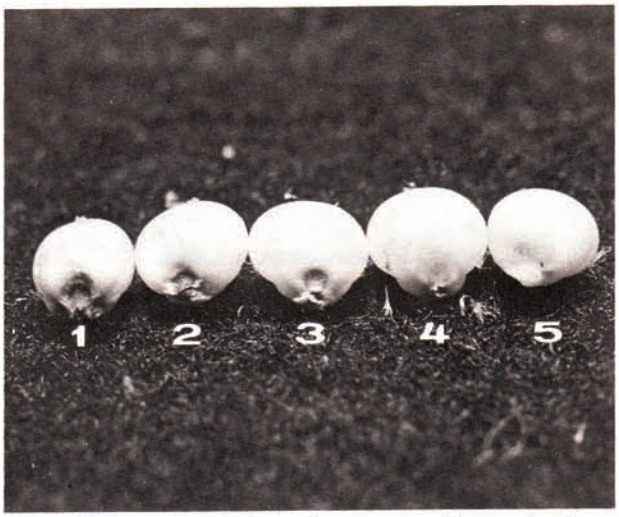

Figure 2. Milo kernels in various stages of maturity from most mature (1) to least mature (5). The black layer is first visible in 4 and shows clearly in 3, 2, and 1.

File Under: FIELD CROPS
G-2, Cropping Practices

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