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Premature Corn Kernel Sprouting (aka Vivipary)

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Vivipary, the premature germination or sprouting of corn kernels on the cob prior to harvest, is not a common problem in Indiana but sometimes can be serious enough to warrant attention from growers. Technically, the fact that corn kernels have the ability to germinate and develop into seedlings is not odd. Yet, when such sprouting occurs while immature or mature kernels are still attached to the cob, we consider it odd and assign a fancy name to it to reinforce the fact that we consider it odd. On the rare occasion when viviparous germination occurs throughout a field to a large enough degree, overall grain quality can deteriorate enough to cause problems with drying and storage of grain. Another consequence of the increase in the percentage of "broken corn and foreign material" in affected grain delivered to the elevator is that it may result in significant grain price discounts to the grower.

Germination of mature corn kernels on the cob prior to harvest is most likely to occur when reasonably dry kernels (less than about 20 percent grain moisture content) are re-wetted, especially when temperatures are warm. Consequently, the common situation for vivipary to occur is the combination of dry grain, upright ears on the plants, and rainfall that is "captured" by the husk leaves of the upright ears. The result can be sprouted kernels near the butt of the ear. The likelihood of viviparous germination occurring on upright ears with grain at higher moisture contents is typically much less than for dryer grain.

Another common situation where vivipary occurs is when ears are lying on or near the soil surface due to severe stalk breakage or lodging. That proximity of the ears to moist soil allows a similar re-wetting of the kernels and dramatic germination of kernels on the cob much like we would typically see the following spring..... at which point we no longer use the fancy "vivipary" term, but simply refer to it as "volunteer corn".

It is generally accepted that germination of kernels typically does not occur prior to physiological maturity (aka black layer). The reasons for this are related to hormonal balances within the kernels; apparently the balance between gibberellin and abscisic acid in particular. In fact, this balance seems to determine whether seed development and maturation continues or seed germination is enabled (White et al., 2000).

The concept of a balance among hormones playing a vital role in determining whether seed will continue developing or whether it germinates may also help explain why vivipary often occurs in immature kernels on ears physically damaged by hail, birds, or ear molds. The speculation is that the physical damage to immature kernels may disrupt the normal balance among the regulatory

hormones and allows for the germination of the damaged kernels. Some ear molds also produce gibberellic acid that can also disrupt the balance of hormones and stimulate germination.

Considerations for reducing the consequences of poor quality grain that can result from significant levels of vivipary include timely harvest of severely-affected fields, drying grain at higher temperatures to prevent further growth of the young seedlings, screening the grain prior to storage to reduce the amount of damaged grain and seedling tissue, and removing several loads from a full bin (aka "coring" the bin) to reduce the high concentration of broken corn and foreign material that typically accumulates in the center of a bin during filling.

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Related references

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