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Long Ears, Blank Tips

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Seems like everybody and their brother is talking about the potential for record or near-record corn yields this year (USDA-NASS, 2004). If the current speculation becomes reality at harvest, one of the factors contributing to the high yield will be unusually long ears (i.e., many kernels per row).

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Potential ear size (ovule number) is determined prior to pollination (Nielsen, 2003a). Of the two ear size components, length (ovules per row) is more easily influenced by growing conditions than is number of ovule rows. Ample moisture and non-stressful temperatures back in June resulted in unusually lengthy potential ears going into pollination. Indeed, reports down at the Chat 'n Chew Cafe indicate actual kernel numbers as high as 40 to 45 kernels per row, with some patrons bragging as high as 50 kernels per row.

A common side effect of unusually lengthy potential ears is delayed or incomplete tip fill. Remember that silk emergence on an ear is sequential. Typically, the butt silks emerge first, followed by the remainder of the silks, and finishing with the tip silks (Nielsen, 2003b).

The final tip silks of unusually lengthy ears often emerge after pollen shed is already complete. Without available pollen, the ovules connected to the final tip silks are not fertilized, therefore kernels never develop, and barren cob tips result. On the other hand, if pollen shed is still occurring when the tip silks of lengthy ears finally emerge, fertilization can occur but the resulting kernels are dramatically "younger" than the remainder of the kernels on the cob. Such late fertilized tip kernels are especially vulnerable to abortion if severe photosynthetic stress develops in the first few weeks after pollination. The consequences of either scenario are incomplete tip fill and grower complaints.

The importance of the distinction between non-pollination or kernel abortion as the cause of barren tips may be moot to the grower, but the symptoms are different. Non-pollinated ovules rarely exhibit any evidence of kernel development. Within the husk leaves, the non-pollinated silks will appear reasonably "fresh" and remain attached to the ovules until they finally wither away. Aborted kernels, on the other hand, are evident by their aborted, shriveled development. In addition, the silks associated with these kernels (as with any developing kernel) will exhibit their expected discolored, deteriorated, detached appearance.

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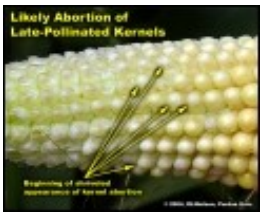
Unusually lengthy ear exhibiting incomplete tip fill due to lack of pollination.

Closer view of non-pollinated tip of lengthy ear.

Unusually lengthy ear whose younger tip kernels are showing signs of abortion.



Closer view of tip kernels showing signs of abortion.

"Fresh" silks associated with non-pollinated barren ear tips.

Discolored, deteriorated silks associated with fertilized, but aborted tip kernels.

Recognize that other possible causes of incomplete tip fill due to pollination failure include severe silk clipping by insects (corn rootworm or Japanese beetles) during the final stages of pollination, delayed silk emergence or deterioration of exposed silks due to excessive heat or drought conditions, silk emergence failure due to silkballing near the tip of ear, and lack of viable pollen due to excessive heat or drought conditions. Diagnosing the exact cause late in the grain fill period can be challenging.

Yield Consequence

Obviously, absent kernels translate to lost yield potential. Mathematically, for every absent kernel per row on 18-row ears of corn (assuming a final ear count of 28,000 ears per acre), the lost yield potential equals about 6 bushels per acre. Yes, yield loss can mount quickly as a consequence of barren tips.

But, it is also important to make sure you put the problem into perspective. Before you complain about barren tips to your seed rep, first evaluate the remainder of the cob. Typical kernel count for harvested ears of many hybrids is approximately 600. Hybrids whose ears are typically 16 rows in girth tend to set about 36 - 40 kernels on each row, while those that typically develop 20 rows of kernels tend to set closer to 30 kernels per row.

The point here is that if potential ear size (number of ovules) was quite large heading into

pollination (favorable pre-pollination conditions) but failed to pollinate the tip silks, the resulting ears may still exhibit 30 – 40 kernels per row even though there may be one to two inches of barren tips on the ears. In other words, harvested ear size will still average about 600 kernels and ultimate grain yield will be average to above average.

On the other hand, if kernel counts show only 20 to 25 kernels per row with lengthy barren cob tips, then that indeed indicates that the crop suffered significant stress conditions probably more than once during the season. Kernel counts per ear will be much less than 600 and ultimate grain yield in this latter example will likely be less than average for that field and/or hybrid.

Related References:

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