Rain and warm weather have caused loss of soil nitrogen (N) this season. In addition, nubbin ear and zipper ear have been spotted in the same fields. These ear abnormalities may be caused by stresses such as drought or nutrient deficiencies. These occurrences appear to be caused by different environmental conditions; however, periods of excessive rain followed by hot, humid and dry conditions, have resulted in a loss of soil N and made nubbin ears, and zipper ears a concern this season.

**Loss of Soil Nitrogen**

Soil N that has been converted to nitrate (NO$_3^-$), can be lost from the soil in two ways. First, NO$_3^-$ can be leached through the soil profile by rain and second, denitrification may take place. Denitrification occurs when microbes convert NO$_3^-$ into nitrogen gas (N$_2$), which is released into the air. Although there are many factors that can affect denitrification, this season two factors that have increased denitrification are increased soil moisture and soil temperature.

As one of the macronutrients, N is vital to plant growth. Insufficient N availability can affect development at each growth stage and may decrease yield potential. Corn plants exhibiting N deficiency may appear to be stunted, spindly plants with a yellowish green color. The older, lower leaves will have a v-shaped yellowing that starts at the leaf tip. Plants that have an inadequate supply of N can be less vigorous and may put all of their energy into producing grain. This can create weak stalks that are vulnerable to stalk rot and may lead to stalk lodging. The largest reduction in potential yield can occur due to stress during silking and can continue through the dough stage. Nitrogen and phosphorus uptake are rapid at this time. Nutrient concentrations in the plant are highly correlated with final grain yield and response to previously applied fertilizer can be seen. Nutrient deficiencies at this time can result in unfilled kernels or chaffy ears.

**Nubbin and Zipper Ears**

Nubbin ears are small and misshapen with poor kernel set, especially at the ear tip (Figure 1). Nubbin ears can be caused by N deficiency or severe drought starting in the mid-vegetative growth stages through early to mid grain fill. A more common occurrence this season has been zipper ear.

Corn ears exhibiting symptoms of zipper ear may have an entire or partial row of corn kernels missing on one side of the ear (Figure 2). Due to differential kernel formation along the ear, zipper ears may also have a bend like a banana. Consequently, zipper ear may also be known as banana ear. The zippering effect is often associated with drought stress during grain fill or defoliation injury following pollination. Hybrids vary in the degree of zippering that can occur. Ohio State provides possible explanations as to why the zippering effect appears to be consistently on the outside of the ear.

• Silks associated with the missing kernels were covered up by other silks and did not get pollinated or were pollinated late and were therefore more prone to abortion.
• Corn rootworm beetles are below the ear during the daytime. Therefore, it is possible the beetles preferentially clip silks of kernels with an orientation closer to them.
• Under drought stress silk emergence may be slower than pollen shed. It is possible that the silks on the outside or underside of the ear emerge more slowly than those facing the stalk. Consequently, those silks may be pollinated later or emerge after pollen shed is complete. If the kernels are pollinated late, they may lose the competition for limited photosynthates to other larger kernels that are further along in development.
• If the corn plant has small and/or short ear shanks, under drought conditions, they may collapse or pinch which could impair the vascular tissue which transports nutrients to the kernel rows on the outside or underside of the ear.


**Individual results may vary,** and performance may vary from location to location and from year to year. This result may not be an indicator of results you may obtain as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible. **ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS.** Technology Development by Monsanto and Design(SM) is a servicemark of Monsanto Technology LLC. All other trademarks are the property of their respective owners. ©2010 Monsanto Company. AMB080110