Do we worry about fungicide resistance?
Yes, because their site of action is very specific, there are resistance concerns. Resistance has occurred on other plant pathogens, even some rusts. Some of the triazoles have disappeared from the marketplace as resistance to them developed and they no longer provided any benefit or advantage in a disease control program.

Recommendations for avoiding fungicide resistance:
- Repeated use of triazoles alone should be avoided, especially under high disease pressure or against rapid cycling diseases such as rust.
- When multiple applications are required, alternate or tank mix triazole fungicides with fungicides with a different mode of action (not just different triazoles). The other fungicide has to provide effective disease control. Refer to label recommendations for rates.
- Apply triazole fungicides according to manufacturers’ recommendations for the target disease at the specific crop growth stage indicated. Use during the critical parts of the growing season or crop growth, especially when alternative fungicides are not available or effective.
- If possible, apply triazole fungicides preventively or as early as possible in the disease cycle. While some triazole fungicides have early-infection activity, do not rely on management of diseases when fungicides are applied well after disease has progressed.
- Reduced rate programs accelerate the development of resistant populations and therefore must not be used.

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To be determined: Ear row numbers and kernels per row in corn
by Roger Elmore and Lori Abendroth, Department of Agronomy

Want to increase corn yield potential? Aim for increasing kernel numbers! Yield is a function of kernel number and kernel weight. The number of kernels per acre will vary based on other components including plants per acre, ears per plant, and kernels per ear. We discussed the proper seeding rates in an April 10 ICM article, “What is the best seeding rate for corn based on seed prices and yield level?” (pages 82–83). The number of ears per plant is primarily influenced by hybrid. Most hybrids grown in Iowa have one dominant ear, although some “prolific” hybrids are available that produce more than one ear per plant at normal seeding rates.

The number of kernels per ear is a function of ear length (kernels per row) and kernel rows per ear. Each of these begins development sometime between V6 and V8 as the ear shoots are formed. Let’s talk for a bit about both of these components of kernels per ear.

Kernels per row: The maximum number of ovules (potential kernels) per row is set a week or so before silks emerge. Some researchers estimate there are up to 1,000 potential ovules per ear. An ovule develops into

A 16-row ear (left) and a 14-row ear (right). Number of rows per ear is influenced mainly by a hybrid’s genetics and some by growing season stresses. (Roger Elmore)

a kernel when its silk receives pollen, is fertilized, and then develops without aborting. Ear length is based on a hybrid’s genetics but can be significantly altered based on stresses. Potential kernels per row are highly dependent on growing conditions prior to silking while actual kernels per ear are determined by conditions during and after silking.
**Rows per ear:** The number of rows on an ear will usually be even, assuming a normal environment. The number is even because of a split of the first kernel initials, thus forming two rows from one. A hybrid's genetics is instrumental in determining the potential number of rows per ear; environmental factors have a lesser influence. Yet, the amount of water received as well as varying plant populations will affect the number of kernels per row.

Research investigating the influence of nitrogen timing shows how early-season stresses can also influence ear development (see figure). A deficiency in nitrogen before V8 clearly caused an irreversible decrease in ear diameter and ear length as well as kernels per ear. By looking at treatment N1, we can see that if nitrogen is not applied until after V8, there is a significant yield reduction. Nitrogen was supplied the rest of the season, but this did not help increase yield because the ear parameters were set earlier.

Many stresses can affect row number and kernels per row. Thus, kernels per ear are affected by stresses beginning at V6 and ending prior to silk emergence. These include:

- Nutrient deficiencies (especially N, see figure)
- Drought
- Insects (e.g., corn rootworm feeding or insect defoliation)
- Hail or frost
- Root pruning by cultivation

Controlling or limiting these stresses when possible during vegetative stages will help maintain yield potential.

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**Effect of different nitrogen treatments on ear diameter, ear length, and number of kernels per ear (averaged over three hybrids).** Nitrogen treatments are as follows: N1 (N supplied from V8 to maturity); N2 (N supplied from emergence to V8); N3 (N supplied from emergence to silking); N4 (N supplied from emergence to 3 weeks after silking); and N5 (N supplied from emergence to maturity). If columns have the same letter within each parameter, they are not significantly different from one another (at $P = 0.05$). Source: Subedi, K.D., and B.L. Ma. 2005. *Crop Sci.* 45:740–747.

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