

Blunt Ear Syndrome in Corn

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Blunt Ear Syndrome (BES) in corn, sometimes also referred to as “Beer Can Ear” Syndrome, is a curious oddity that occurs from time to time throughout the corn growing areas of the U.S. The major symptom of BES, unusually short ears, is the consequence of arrested ear development that likely occurs during the ear size determination period prior to pollination. Researchers at Colorado State University have devoted the most energy to investigating this problem, but the causes of the arrested ear development have not been conclusively identified (Pearson, 1998; Pearson & Brown, 1999; Pearson, 2000).

Symptom Details

Interestingly, the symptoms of BES appear to be restricted primarily to the development the ear. Other aspects of plant appearance (stalks, leaves, husks) are normal in every respect until later in the season when plants with severely arrested ears turn shades of red and purple in response to an overabundance of plant sugars in the leaf and stalk tissues.

The cob of a “beer can” ear is remarkably short and the tip inch or so is often barren. Interestingly, kernel row number at the butt end of these ears appears to be reasonably normal. Part way up the ear, however, cob and kernel row development simply cease. Compared to a fairly typical 35 to 40 kernels per row, BES ears exhibit about half that length in terms of ovule number per row and often only 12 to 16 developed kernels per row. Silk balling, that occurs when the final silks do not successfully elongate through the remainder of the normal length husk leaves, causes the lack of kernels at the tips of BES cobs. More severe forms of BES occur from time to time, leaving one with what looks like a corn hand grenade.

The tip of a BES cob sometimes exhibits a tassel branch-like appendage, while other ears exhibit an apparent remnant ear initial similar to that visible by dissection of ear shoots at about leaf stage V9 (nine visible leaf collars). The latter symptom suggests that development of the ear initial was interrupted or arrested between the time ear initiation occurred (about V5) and kernel row number was finalized (about V12). The half-length size of the cobs suggests that ear development was stopped at approximately leaf stages V8 to V9.

Possible Causes of BES

Because ear development is arrested or stopped completely and suddenly (normal row numbers, then nothing), the cause of the problem would appear to be a single triggering event, not a lingering stress like nutrient deficiency or soil pH. One possible cause of BES could be the application of certain post-emergence herbicides (growth regulators or ALS-type) during the period of row number determination (V5 – V12). While possible, this cause can be ruled out because of the diversity of herbicide programs encountered in documented cases of BES.

Another possible cause of such a dramatic termination of ear development is chilling injury. Indeed, research reported from Belgium (Bechoux et al., 2000; Lejeune and Bernier, 1996; Lejeune et al., 1998) documented that chilling injury at the time of ear and tassel initiation (about V5) could prevent ear initiation altogether or reduce tassel branch and spikelet formation. Perhaps chilling injury to the developing ear at somewhat later leaf stages could similarly arrest further ear development?

The term “chilling injury” does not necessarily translate simply to frost events. Temperatures in the high 40’s to low 50’s may be sufficient to injure meristematic regions of the corn plant, especially if temperatures during the days preceding the chilling injury were warm to excessively warm.

Why the Interest in BES in 2003?

The purpose of this article is two-fold. First of all, I’ve received three reports of suspected BES occurrences in recent weeks; one from Michigan (dent corn), one from Ohio (dent corn), and one from Nebraska (popcorn). If true, it suggests that this may be one of those years conducive to the development of BES. The existence of BES is not evident from the road unless or until severely affected (nearly barren) plants turn bright red or purple later in August or early September.

Secondly, a new Ph.D. student working with me has begun a research project to investigate the possible link of chilling injury with the development of BES symptoms in corn. Briefly, the project involves the use of controlled environment growth chambers to “cold shock” young corn plants at several selected pre-pollination leaf stages. The plants will subsequently be evaluated for evidence of arrested ear development. Needless to say, this student is also very much interested in documenting background information about “real world” occurrences of this phenomenon if they arise this year.

Toward that end, we would appreciate hearing about any instances of BES that are discovered this growing season. If our calendars permit, we would love to visit fields where BES is reported in order to document the background information associated with the field and cultural practices. If we cannot visit the field(s) ourselves, we would appreciate anyone who identifies fields with BES symptoms to send us digital images and/or complete a brief field information form that is downloadable at <http://www.kingcorn.org/research/beercan/FieldInfoform.pdf>.

Related References:

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Don't forget, this and other timely information about corn can be viewed at the Chat 'n Chew Café on the Web at <http://www.kingcorn.org/cafe>. For other information about corn, take a look at the Corn Growers' Guidebook on the Web at <http://www.kingcorn.org>.