

## Top Leaf Death in Corn

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If you have been watching corn or popcorn fields lately as you drive through the countryside, you may have noticed what seems like an unusual pattern of leaf senescence (the natural age-related deterioration and ultimately death of plant tissue) as this year's crop nears the end of the season. Leaves in these fields are dying from both the top and the bottom of the plants, with green leaves remaining in the middle. In some fields, the death of the upper leaves prior to lower ones is very striking and gives the fields an unusual golden "glow" against the morning or evening sun.

Some of the guys down at the Chat 'n Chew Café say they remember that corn usually "dies" or "matures" beginning at the bottom of the plant and moving to the top, not both ends progressing toward the middle. What gives?

Death of top leaves may occur from one or more of several factors and may be partially distinguished by whether all plants are affected or only random plants throughout a field. The ultimate effect on grain yield obviously depends on how early in the grain-filling period the death of the upper leaves occurs.

- Interestingly, the pattern of simultaneous upper and lower leaf senescence may not be that unusual from a physiological perspective. Canadian researchers (Tollenaar & Daynard, 1978) documented this same pattern of senescence among ten adapted dent corn hybrids in trials conducted in the mid-1970's. Furthermore, a faster rate of leaf senescence during one of the years of the study was attributed to a warmer, drier weather pattern during the grain fill period that accelerated the rate of grain filling (sound familiar in 2005?). More recent research (Valentinuz & Tollenaar, 2004) suggested that this pattern was particularly evident in good grain yield growing conditions. For many Indiana cornfields in 2005, the top-bottom pattern seems to occur most frequently in fields experiencing moderate to severe drought stress since pollination. This "natural" pattern of upper leaf senescence usually affects all plants within a field or within areas of fields.
- Death of top leaves can also be a direct result of severe drought stress as plants struggle to maintain leaf health during periods of soil moisture deficits and high transpiration during the grain-filling period. Such leaf death is usually preceded by a gray-green color and wilting of the upper leaves. This drought-related pattern of upper leaf senescence often affects all plants within the drought-stressed areas of affected fields.

- Death of upper leaves and stalks can be the result of infection by anthracnose (Lipp & Mills, 2001; Munkvold, 2002). With anthracnose “die-back” or “top-kill”, black lesions are visible on the outer stalk tissue behind the leaf sheaths (Munkvold, 2002). This fungal disease can be particularly damaging if it significantly shortens the grain-filling period resulting in premature kernel black layer development . Such disease-related pattern of upper leaf senescence usually occurs more randomly from plant to plant rather than affecting all plants within a field or area of field.
- Finally, death of top leaves can be the result of European corn borer (ECB) or Southwestern corn borer (SWCB) tunneling damage to the upper stalk itself or girdling of the leaf sheath attachments at the stalk nodes. Such damage to the upper corn plant from ECB is fairly common in many fields throughout the state. I’ve also seen SWCB damage in the upper corn stalk this year in my field research at the Southeast-Purdue Ag Center near Butlerville. Such insect-related pattern of upper leaf senescence usually occurs more randomly from plant to plant rather than affecting all plants within a field or area of field.

### 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>.

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