CROPLAN By WINFIELD UNITED

Agronomic Bulletin

Why are corn stalks so weak this year?

Here's the quick answer: **We had a growing season with prime weather conditions for promoting stalk cannibalization in corn!**

What is stalk cannibalization and why it leads to weak stalks?

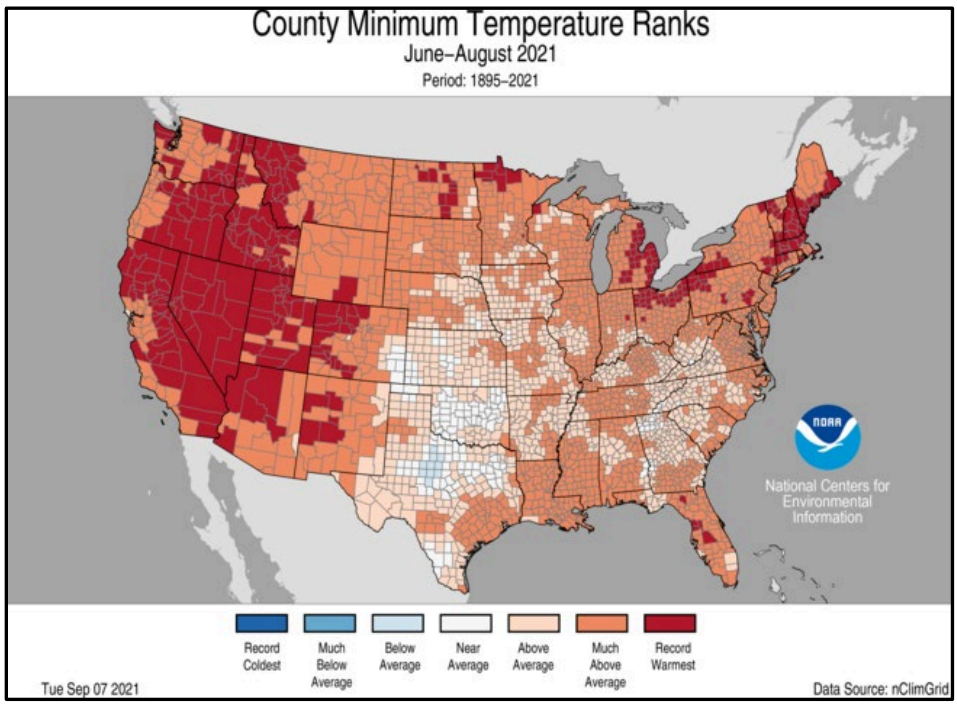
Photosynthesis converts sunlight into carbohydrates and two key areas in a plant for deposition of these carbohydrates are the corn kernels and the stalk. If photosynthetic capacity is reduced enough during the grain fill period, a corn plant responds by removing carbohydrates from the stalk and moving them to the ear.

This process of "cannibalization" of stalk carbohydrates ensures a supply of carbohydrates for the developing kernels; however, this also results in premature death of pith cells in the stalk resulting in a weakened stalk more prone to lodging (this also predisposes the plant to infection of stalk rot diseases but we won't discuss diseases in this article).

What weather conditions lead to stalk cannibalization?

Weather conditions that reduce photosynthetic efficiency, especially during grain fill, can lead to situations of high corn stalk cannibalization. Many different conditions can negatively impact photosynthesis but this year in the Dakota's and Minnesota high temperatures and drought were the key drivers.

The Dakota's and Minnesota had significantly higher than average temperatures during the growing season this year with several counties recording record high temperature rankings during the June-August period according the National Centers for Environmental information (see graphic). These high temperatures paired with many areas receiving well below adequate rainfall led to significant stress in corn that significantly reduces the crop's photosynthetic capacity and ultimately leading corn crops with weaker than normal stalks.



WINFIELD UNITED
Jamie Kloster | Technical Seed Agronomist

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If my crop got rain or was irrigated, then my corn should have good stalks…right?

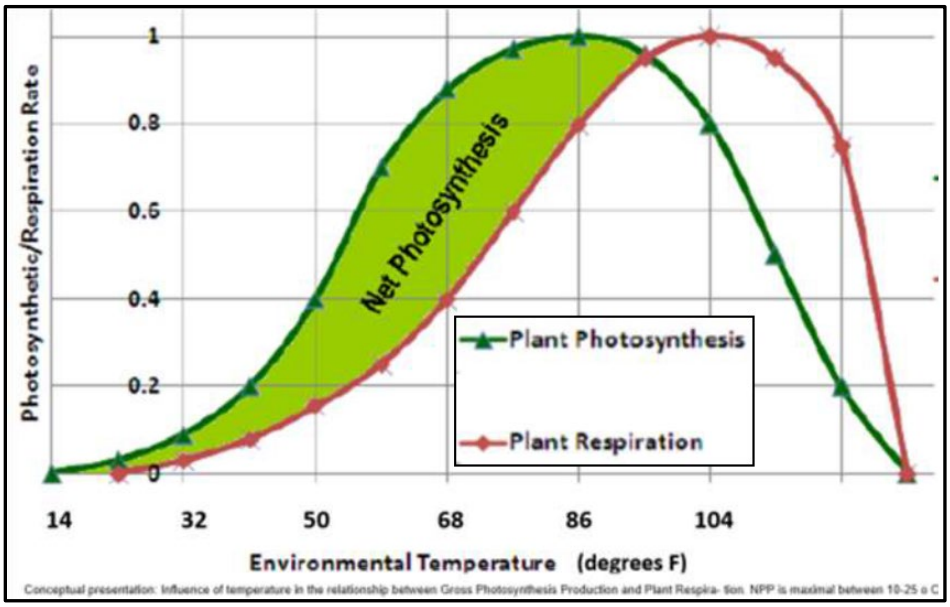
Even with adequate water, the heat stress corn experienced this year is still conducive to significant stalk cannibalization and high potential for weak corn stalks. To understand why this is, read below.

Why high temperatures can lead to weak stalks?

Photosynthesis harvests sunlight and converts sunlight energy into carbohydrates. Respiration uses those carbohydrates as an energy source for plant growth processes. Understanding how these two processes interact with temperature can help us understand both what is the ideal temperature for corn growth and why high temperature stress can lead to stalk cannibalization.

Most literature suggests the ideal temperature for corn growth during grain fill is somewhere in the low 70's F because this is the temperature a corn plant is most efficient at producing and storing carbohydrates (highest net photosynthesis).

In general, as temperature increases so does the rate at which photosynthesis produces carbohydrates. However, as temperature increases so does the rate of consumption of carbohydrates via plant respiration. Looking at the graph, compare 68-degrees to 86-degrees: the highest rate of photosynthesis is at 86-degrees, however the rate of consumption of carbohydrates via plant respiration is quite high at 86-degrees resulting in less net carbohydrates (net photosynthesis) available for deposition in the grain kernels and/or stalks than if the temperature were 68-degrees. This illustrates why extended periods of high temperature result in low net photosynthesis leading the plant to cannibalize stalk carbohydrates.



Furthermore, corn maturity is driven by temperature so the warmer it is the faster the crop progresses to maturity. Extended periods of high temperatures will push a crop towards maturity faster resulting in a fewer days of harvesting sunlight via photosynthesis. Fewer days of photosynthesis results in less total carbohydrate production further contributing to a crop needing to cannibalize stalk carbohydrates for movement to the developing kernels.

So what can I do about this now?

Be ready to harvest earlier than you normally would! To help prioritize which corn fields to harvest first, the "push" test can performed. Push the stalks at ear level over 6 to 8 inches, if the stalk breaks or kinks it is highly susceptible to lodging; if the majority of plants are like this in a field, then that corn field might be one windy day away from a major lodging event. If majority of stalks spring back without kinking the stalk quality is probably pretty good for the time being.

Jamie Kloster | Technical Seed Agronomist