

Determining Corn Leaf Stages

*R.L. (Bob) Nielsen
Agronomy Department
Purdue Univ., West Lafayette, IN
Email: rnielsen@purdue.edu*

Many of us remember standing against the doorframe in our early years and our parents marking our height with a pencil to measure how much we had grown. Maybe some of you spent more time standing in the corner in your youth, but I won't comment on that.

Because it is difficult to transport corn plants from the field to that doorframe to measure their growth, agronomists developed other means to measure the phenology or development of corn. Counting the number of leaves would seem to be a simple way to document corn development, but folks still tend to become confused over this simple strategy. There are two basic methods for leaf staging corn in use today.

Leaf Collar Method. This method determines leaf stage in corn by counting the number of leaves on a plant with visible leaf collars, beginning with the lowermost, short, rounded-tip true leaf and ending with the uppermost leaf with a visible leaf collar. The leaf collar is the light-colored collar-like "band" located at the base of an exposed leaf blade, near the spot where the leaf blade comes in contact with the stem of the plant.

Leaves within the whorl, not yet fully expanded and with no visible leaf collar are not included in this leaf staging method. The exception to this statement may be that leaves with barely visible leaf collars can be counted when you are staging plants early in the day, recognizing that the leaf collar may become completely visible by the end of the day.

Leaf stages are usually described as "V" stages, e.g., V2 = two leaves with visible leaf collars. The leaf collar method is generally the most widely used method by university and industry agronomists in the U.S.

"Droopy" Leaf Method. Crop insurance adjusters, when assessing damage to a corn crop from weather events such as hailstorms, use this leaf staging method. Like the leaf collar method, this method of leaf staging begins with the short first leaf. Leaf counting then differs, though, by ending not with the uppermost leaf with a visible collar, but at that leaf that is at least 40 to 50 percent exposed from the whorl. In knee-high corn or older, the tip of this "indicator" leaf typically also "droops" or hangs down, hence the name "droopy" leaf method.

The Two Methods Compared. Both methods assign a leaf stage to a field on the basis of the leaf stage common to the majority of the plants in the field. Up to the 5- or 6-leaf collar stage, the leaf collar method will typically result in a leaf stage value that is one

less than the “droopy” leaf method. After corn reaches 18 to 24 inches in height, the leaf collar method will typically result in a leaf stage value that is two less than the “droopy” leaf method.

The usefulness in understanding the differences between these two leaf staging methods lies in the fact that the defoliation/yield loss chart used by hail insurance adjusters is based on the “droopy” leaf method. That chart is reproduced in the Purdue Extension publication ID-179, *Corn & Soybean Field Guide*. Identifying true “droopy” leaves on shredded, hail-damaged corn plants can be quite difficult, whereas leaf collars are often still identifiable. Thus, you can usually stage a damaged crop by the leaf collar method and then add one or two more leaves to the count in order to use the defoliation chart.

What About Herbicide Labels? Growers’ confusion with leaf staging often originates with poorly described growth stage restrictions listed on herbicide labels. Label restrictions of older post-emergence herbicides typically ignored the short first leaf with the rounded tip and ended with the uppermost leaf that was at least 50% exposed from whorl. In essence, this was a bastardized “droopy leaf” method that resulted in roughly the same numerical leaf stage as the leaf collar method. Newer labels purport to define leaf stages according to the leaf collar method, but there is still some question about whether the short first leaf with the rounded tip is included. If in doubt with these newer herbicides, check with your chemical technical representative to verify which leaf staging method is appropriate for the herbicide you intend to use.

Staging Older Plants. As corn plants develop, the lower few leaves typically die or rip away from the stem by expansion of the stalk or by developing roots. Consequently, growth stage identification can be difficult on older plants when you aren't sure which leaves to begin counting first. But, not to worry, growth staging can still be accomplished!

First, dig or pull a plant without breaking the stalk. With a knife, carefully split the stalk down the middle, completely through the root ball. Look for the lowermost obvious internode (the whitish area between the “woody” horizontal stalk nodes) above the triangular “woody” base of the stalk. This first internode's length is typically only 1/2 to 3/4 inch.

Determine which leaf corresponds with the node immediately above the first noticeable internode by carefully identifying which leaf sheath attaches to the node. This leaf is usually Leaf #5. Once Leaf #5 is identified, then stage the plant by continuing to count the remainder of the leaves with visible leaf collars above Leaf #5. For example, assume you’ve identified Leaf #5 and there are six more leaves above that one with visible leaf collars, then the plant is at leaf stage V11 (11 leaves with visible leaf collars).

Related References

- Nielsen, R.L. (Bob). 2004a. **Heat Unit Concepts Related to Corn Development.** Corny News Network, Purdue Univ. Online at <http://www.kingcorn.org/news/articles.04/HeatUnits-0515.html>. [URL verified 5/15/04].
- Nielsen, R.L. (Bob). 2004b. **Use Thermal Time to Predict Leaf Stage Development in Corn.** Corny News Network, Purdue Univ. Online at

- <http://www.kingcorn.org/news/articles.04/VStagePrediction-0515.html>. [URL verified 5/15/04].
- Purdue University. 2004. **Corn & Soybean Field Guide (ID-179)**. To order, call Purdue Extension toll-free at (888) 398-4636 and ask for the Media Distribution Center or call them direct at (765) 494-6794. You can also download an order form online at <http://www.agry.purdue.edu/dtc/guide.html>. [URL verified 5/15/04].
 - Ritchie, S.W., J.J. Hanway, and G.O. Benson. 1992. **How a Corn Plant Develops (SP-48)**. Iowa State Univ. Online at <http://maize.agron.iastate.edu/corntitle.html>. [URL verified 5/20/03].

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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