

MESSENGER-INQUIRER



Are More Nodes the Key to Higher Soybean Yields?

Dr. Dennis Egli is a Professor Emeritus of the College of Agriculture Department of Plant and Soil Sciences. His career as a plant physiologist for corn and soybeans led to multiple research discoveries, authored books on the subject, and countless students educated. The fundamentals of soybean yield is a constant conversation which Dr. Egli explains in the following article he recently wrote.

A common belief among soybean producers is that more nodes are the key to higher yields. Since flowers and pods are produced at nodes, it's obvious that more nodes will result in more pods and higher yield, or so the story goes. This story, however, is not entirely true. Why doesn't this simple relationship, that seems so obvious, always work?

We know that the number of nodes produced by a soybean plant is quite variable. Some of the variation results from the capacity of the soybean plant to add nodes by branching in favorable environments. Early planting will increase the number of nodes while late planting will decrease them. Late-maturing varieties produce more nodes than early-maturing varieties. Node number in these two examples is related to the length of the vegetative growth period; the longer the period, the more nodes are produced. Taller plants usually have more nodes and increasing population will increase nodes per acre. It's clear that management practices can affect the nodes

MESSENGER-INQUIRER

on a soybean plant or the nodes per acre, making it tempting to assume more nodes results in greater yield.

Rather than nodes, it's the growth capacity of a soybean field that ultimately determines the number of pods, seeds, and finally the yield. So the key to understanding the node – flower - pod – yield relationship lies in the growth of the soybean field. Green plants use energy from the sun to fix carbon dioxide into simple sugars via photosynthesis and these simple sugars are the building blocks for all plant and seed tissues. Adequate supplies of sunlight, nutrients, and soil moisture, the absence of disease and insect damage, and optimum temperatures coupled with enough leaf canopy to intercept most of the sunlight ensure rapid photosynthesis and growth, resulting in maximum yield. Any restrictions of these inputs and conditions during pod set and seed fill stages will reduce yield. Simply adding more nodes without an increase in photosynthesis will probably not increase yield.

The number of pods and seeds produced by a soybean field is determined by the supply of simple sugars from the leaves during flowering and pod set. Whether or not a flower or small pod will survive or abort is determined by the supply of these simple sugars from flower opening until the pod reaches its maximum length. This mechanism allows the pod load to adjust to environmental conditions so it matches the productivity of the environment resulting in maximum yield for that environment. A highly productive environment with plenty of sunshine, nutrients, and water results in rapid growth, a large supply of sugars, and many pods, while a poor environment such as drought stress, produces fewer pods because the supply of sugars is limited.

MESSENGER-INQUIRER

Adjusting the pod load to environmental conditions creates a balance between the pod load and the ability of the plant to fill the pods and seeds which usually results in normal-sized seeds at maturity. Seed filling occurs after the pod load is established, and can be affected if environmental conditions change. Improving weather conditions result in larger than normal seed, while deteriorating conditions could result in smaller than normal seeds. The soybean plant cannot predict future weather when it's setting the pod load any better than the National Weather Service, so sometimes it doesn't get the balance right.

Low-yield environments are situations when increased nodes can result in increased yield. Very short plants such as when very early maturing varieties are used, drought stress during early vegetative growth, or when the crop is planted very late in the growing season are situations when the number of nodes can limit pod set and yield. Higher populations are often recommended for early maturing varieties or double-cropping systems to increase the number of nodes and pods per acre resulting in higher yield. But remember, the exception does not disprove the rule. Managing your soybean crop to simply maximize node numbers is not necessarily the path to high yields.

Last Private Pesticide Applicator Training

The last 2023 private pesticide applicator training is this Monday, February 20 at 6:00 p.m. at the Extension office.

Educational programs of Kentucky Cooperative Extension serve all people regardless of economic or social status and will not discriminate based on race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, gender identity, gender expression, pregnancy, marital status, genetic information, age, veteran status, or physical or mental disability. UNIVERSITY OF KENTUCKY, KENTUCKY STATE UNIVERSITY, U.S. DEPARTMENT OF AGRICULTURE, AND KENTUCKY COUNTIES, COOPERATING

MESSENGER-INQUIRER