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Cooperative Extension Service

Farm Update

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AGRICULTURE & NATURAL RESOURCES EDUCATION
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Photosynthesis – The Ultimate Yield Producer

I have had several conversations in the last couple of weeks about the lack of sunlight and its effect on yield potential. Dr. Dennis B. Egli, a retired Plant Physiologist at the University of Kentucky, explains the importance of sunlight and the power of photosynthesis in the following article.

Centuries ago, scientists pondering how a small seed could produce a large plant concluded that the sustenance for growth must come from the soil. However, when they grew a willow tree in a large, soil-filled pot, they found no decrease in the weight of the soil, so they mistakenly concluded that growth came from water. Finally, in the early 1800s, they demonstrated that the increase in plant weight came from carbon dioxide in the air (with a small contribution from water) in the presence of sunlight – in other words, they discovered photosynthesis.

Photosynthesis in green plant tissues utilizes energy from sunshine to convert carbon dioxide into simple sugars that are the building blocks for all plant tissues. Energy from the respiration of these simple sugars is used to acquire nitrogen and make starch, proteins, oil, cellulose, and all the compounds that make up a plant. We don’t often think about it, but crop

management is all about providing the ideal environment for photosynthesis. We irrigate, fertilize, adjust row spacing, and control weeds, insects, and foliar diseases to maximize photosynthesis. Managing for maximum yield is maximizing photosynthesis.

The rate of photosynthesis – the amount of carbon fixed per acre per day – is directly related to the crop growth rate (pounds of dry matter per acre per day) and to yield – the higher the growth rate, the higher the yield. Research was conducted at UK to simulate reduced photosynthesis due to cloud cover. Soybeans receiving 30% shade treatment reduced yield by 28%, while a 63% treatment reduced yield by 58% (averaged over 2 years and 2 varieties).

Biochemists tell us that there are primarily two types of photosynthesis, C3 and C4. Soybeans and wheat use C3-type photosynthesis (3-carbon sugar) while corn uses the C4 system (4-carbon sugar). C4 crops have higher photosynthesis rates and a greater tolerance to high temperatures. Meanwhile, the photosynthesis rate of C3 crops increases when the carbon dioxide concentration in the air goes up. Carbon dioxide levels in the air increased from 280 ppm at the beginning of the Industrial Revolution to roughly 426 ppm today. This increase contributed to higher yields of C3 crops. C4 crops do not respond to higher carbon dioxide levels.

Photosynthesis, the ability of a green leaf to use energy in sunlight to fix carbon, is the fundamental process that makes agriculture possible. Growing crops is a matter of managing photosynthesis. As long as our food comes directly or indirectly from green plants, we will depend on photosynthesis.

Grain Crop Pest Management Field Day

The University of Kentucky Pest Management Field Day is this Thursday, June 26, at the UK Research and Education Center (UKREC) in Princeton. The event offers valuable insights

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into weed, disease, and insect management for corn and soybeans. The field day will begin at 8:30 a.m. CDT at the Princeton First Baptist Church Christian Life Center and finish at the UKREC field plots for research tours conducted by University of Kentucky Extension Specialists. Certified Crop Advisors can earn 3 CEUs in Integrated Pest Management, and Kentucky Pesticide Applicators can receive 1 CEU in categories 1A, 10, and 11. To pre-register, visit https://tinyurl.com/2j9y33md or contact Jason Travis at (270) 365-7541, EXT. 22569, or jason.travis@uky.edu.

Agriculture Recovery Center

There will be an Agricultural Recovery Center location at the Daviess County Extension Office on Monday, June 23, from noon to 8 p.m. All people impacted by disasters are invited to attend, no matter their location of residence. Learn about disaster assistance programs available for farmers, ranchers, producers, and the farm workforce. Meet with representatives from various federal, state, and local government agencies to assist agricultural workers with their recovery needs. Please bring evidence of ownership, photos of damaged or lost tools and equipment, along with estimated replacement costs to expedite your application.