All crop growth depends upon photosynthesis. Sunlight is the driver of photosynthesis but it is rarely given much thought other than "why does it have to be so hot?". How important is sunlight? Dr. Emerson Nafziger, University of Illinois Agronomist, recently wrote this article discussing the role of this free fuel necessary for corn production.

Warm temperatures have helped bring the corn crop along nicely in Illinois, at least in fields and parts of fields where the plants have stayed above water. As we pass the longest day of the year in the northern hemisphere (June 21), with its maximum amount of sunlight, it's a good time to think about sunlight and its effect on the crop.

If we think of the crop as a yield-producing factory, sunlight is the fuel that powers it. But this is a factory that has to build itself. As leaves emerge from the whorls and green up as they open to the sunlight, they start to photosynthesize, producing the sugars that fuel all crop growth and yield. This in turn helps leaves and the rest of the plant to grow (add dry matter), helping the factory pick up speed. The factory needs to be at full speed, with a full light-gathering "roof" (crop canopy) by pollination time in order to produce maximum grain yields.

So the development of leaf area, collectively called the crop canopy, is critical to the growth process. We often say that the canopy "closes" at the time when we can't see soil anymore as we look down the rows from the end; the canopy seems to form a solid surface that covers the field. In 30-inch rows, this happens when the crop is about waist-high, generally at about stage V10. Fields planted in April or early May are at or nearing this stage now.

Though canopy closure would seem to be the point at which the crop begins to intercept all of the sunlight; that is not the case: a single leaf lets some of the light pass through, and leaves are not evenly distributed, so some amount of sunlight is still reaching the ground. Plants need to develop a "leaf area index"—square feet of leaf per square foot of ground area—of 3 or more before the crop intercepts more than 95% of sunlight. In corn, this happens only when the crop is tasseled, at which time its exposed leaf area is close to the maximum.

Because the crop is growing so rapidly by stage V8 to V9, corn in narrow or twin rows does not have a very large or lasting advantage over 30-inch rows in the rate at which they increase leaf area and sunlight interception. While any such advantage is often positive, the difference in total
sunlight intercepted by wide and narrow rows by the time plants reach full canopy is relatively minor—less than 10 percent. Pollination success and yield are determined after full canopy, and by then there is often no difference in light interception between wide-row and narrow-row corn. Because sunlight is the driving force for all crop growth, there is considerable concern about the amount of sunlight and whether it may limit yields. The Water and Atmospheric Monitoring (WARM) program of the Illinois State Water Survey publishes monthly data on sunlight at a number of Illinois locations. The sunlight data are reported as "Total Solar Rad" with units of megajoules per square meter.

A megajoule (MJ) is a unit of energy equal to about 240 kilocalories or 0.28 kilowatt-hours. The maximum sunlight received during a summer is about 32 MJ/square meter, and daily averages are typically about 3/4 of the maximum. In more familiar units, 30 MJ/square meter received on a sunny day is about 670 kcal/square foot or about 3/4 of a kilowatt-hour per square foot. That amount of sunlight energy is the equivalent of 33 megawatt-hours of electrical power per acre; in terms of chemical energy, it is the equivalent of some 14 tons of sugar per acre.

Only about half the energy in sunlight is in the visible wavelengths; most of the rest is infrared (heat) or ultraviolet and is "invisible" to both our eye and to plants. Plants intercept more red and blue light than green light; they reflect or transmit much of the green light and so appear green. For a variety of reasons, the plant cannot convert sunlight to sugars with high efficiency. In fact, on a good day the plant will typically convert only about 2% of the sunlight energy into dry matter. But with so much energy falling on an acre in a season, very high yields are still possible.

Of the three most recent crop seasons, 2008 and 2010 had high sunlight and 2009 had low sunlight, with the total over three months in 2009 about 10% less than the totals in the two high-sunlight years. In these three years, yields were highest in 2008 and lowest in 2010. In 2004, the highest average yield on record in Illinois came with only 1,987 MJ/square meter of sunlight over these three months, about the same as in 2009. So it's clear that while sunlight has an effect on productivity, it appears to be less important in yield determination than temperature and rainfall. These factors are all correlated to some extent, making it difficult to single out the most important factor in determining yield. However, there is no need to worry that there will not be enough sunlight to produce the crop.

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**Hot, Dry Weather and Crop Insurance**

**Dr. Gary Schnitkey, Extension Farm Management Specialist, University of Illinois**

Recent hot, dry weather brings concerns about yield losses. While it is too early to estimate 2011 yields with any degree of certainty, it is likely that crops have been under stress and yield losses may occur. In this post, yield protection offered by crop insurance is illustrated. Given current price levels that have harvest prices higher than those used to set crop insurance prices, farmers will need to have yield losses before crop insurance payments. Changes in market prices could occur.

In the following three sections, crop insurance payments for corn are shown under the three plans in the COMBO product: Revenue Protection (RP), Revenue Protection with the Harvest Price Exclusion (RPwExcl), and Yield Protection (YP). Using history as a guide, more acres are insured with RP than with either RPwExcl or YP by a large margin.

The following sections show payments generated from the What-If section of the Crop Insurance Decision Tool, a Microsoft Excel spreadsheet available for free download from the FAST section of www.farmdoc.illinois.edu. Use of the spreadsheet allows generation of payments for different APH yields, coverage levels, and crop insurance products than those shown in the following sections.

**Revenue Protection:**

RP is a farm-level revenue product that contains a provision causing the guarantee to increase if the harvest price is above the projected price. The guarantee increase provision likely will come into play as the December Chicago Mercantile Exchange (CME) corn contract currently is trading at $6.80 per bushel, well above the $6.01 projected price. When the harvest price is above the projected price, RP makes a payment when actual yield is below the Actual Protection History (APH) yield times the coverage level.

Take, for example, an APH yield of 180 bushels. When harvest price is above projected price, payments will occur when yields are below:

- 153 bushels for an 85 percent coverage level (180 bushels x .85),
- 144 bushels for an 80 percent coverage level (180 bushels x .80),
- 135 bushels for a 75 percent coverage level (180 bushels x .75), and
- 126 bushels for a 70 percent coverage level (180 bushels x .70).

Figure 1 shows RP insurance payments for different yields and harvest prices. As can be seen in Figure 1, insurance payments occur at harvest prices above the $6.01
projected price for yields below 135 bushels. These yields are below the APH yield times the coverage level (144 bushels = 180 bushels x 80 percent coverage level).

**Revenue Protection with Exclusion:**

Unlike RP, RPwExcl does not have the guarantee increase. As a result, RPwExcl's payments will be less than RP's payments when the harvest price is above the projected price (see Figure 2). At a $6.80 harvest price and a 120 bushel yield, RPwExcl makes a $49 per acre payment compared to $163 per acre payment under RP.

**Yield Protection:** YP will make payments when yields are below a yield guarantee.

For our 180 bushel APH example, payments will occur at yields below:

- 153 bushels for an 85 percent coverage level (180 bushels x .85),
- 144 bushels for an 80 percent coverage level (180 bushels x .80),
- 135 bushels for a 75 percent coverage level (180 bushels x .75), and
- 126 bushels for a 70 percent coverage level (180 bushels x .70).

Figure 3 shows insurance payments. Note that they do not change with harvest price. YP makes payments on yield losses at $6.01, the projected price for 2011. At harvest prices above the projected price, YP will make higher payments than RPwExcl, but lower payments than RP.

**Summary**

Crop insurance will provide protection against yield losses. At harvest prices above projected prices, RP will make higher payment than YP which will make higher payments than RPwExcl, given the same yield and coverage level. Most policies sold under the COMBO product likely are RP.

Whether yield losses will cause widespread insurance payments is an open question. Weather over the next several weeks will determine yields, which will go a long way to determining crop insurance payments.
Figure 2. Insurance Payments for Revenue Protection with Harvest Price Exclusion (RPwExcl) Given an 180 Bushel AHP Yield and 80 Percent Coverage Level.

<table>
<thead>
<tr>
<th>Harvest Yield</th>
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<tbody>
<tr>
<td>80</td>
<td>481 465 449 433 417 401 385 369 353 337 321 305 289 273</td>
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<td>90</td>
<td>438 415 397 379 361 343 325 307 289 271 253 235 217 199</td>
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<td>386 365 345 325 305 285 265 245 225 205 185 165 145 125</td>
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<td>120</td>
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<td>130</td>
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Developed from "What-If" section of Crop Insurance Decision Tool, a Microsoft Excel Spreadsheet available for download from the FAST section of farmdoc.

Figure 3. Insurance Payments for Yield Protection (YP) Given an 180 Bushel AHP Yield and 80 Percent Coverage Level.

<table>
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<td>325 325 325 325 325 325 325 325 325 325 325 325 325 325</td>
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Developed from "What-If" section of Crop Insurance Decision Tool, a Microsoft Excel Spreadsheet available for download from the FAST section of farmdoc.
Crop Reports

Western
Garrett County weather has been warmer this past week. We have had an occasional thunderstorm which has kept crops growing very well. Field corn is tasseling. Farmers are busy harvesting second cutting hay which is better than average in yield, with the cool wet weather that we had in late June and early July. Some pastures are starting to get a little short. In Washington county, high heat and humidity coupled with widely scattered showers are putting stress on crops, livestock and people. The corn and beans are still looking good but will need rain soon. Brown Marmorated Stink Bugs are starting to enter the fields. Diligent monitoring will need to be employed to implement control measures in corn and soybeans. Raspberries were hit hard by these pests. While apples have seen less predation to date a recent hail storm did some damage. Peach harvest has begun and yes, they too received some spotty hail damage. Third cutting alfalfa and second cutting grass hay is in the barn and corn silage harvest will be gearing up in the next two to three weeks.

Central
Spotty thunderstorms across the area provided much needed relief (although temporary) from the record heat last week. But, for the areas that did not receive storms, conditions are dire. Full season corn is mostly pollinated and much of the double crop corn is just sitting there waiting for moisture. Full-season soybeans are beginning to bloom and like the double crop corn, the double crop soybeans are in need of moisture. Brown Marmorated Stink Bugs (BMSB) are now in field corn, sweet corn, and attacking tomatoes in gardens. Movement into soybeans will be very soon if they have not already done so by the time you read this. Potato leafhoppers have been high in late second and third cutting alfalfa. Grass hay and pastures are in desperate need of moisture.

Northeast
Some heavy thunderstorms moved through the area over the past weekend which brought some relief to some areas; unfortunately it was spotty. So, those areas that got two inches or more have seen corn and soybeans respond, whereas those areas that got less than a half an inch are experiencing serious drought stress. Some growers have indicated that they have expectations for a noticeable reduction in yield for corn since the really hot, dry weather was at silking. Hay and pastures are a lot slower to respond, so many livestock operators have been feeding hay. Hopefully the showers will set things up for a decent late summer cutting of hay.

Southern
Area storms are bringing some localized relief, but crops still remain stressed in most areas. Most all corn is in grain fill. Soybeans have benefited from the showers. Full season beans are setting pods. Double crop beans are struggling to canopy. Pest issues have been low so far, with some spider mite outbreaks reported.

BMSB damage has been reported in localized areas in Anne Arundel County, but there have been no reports of damage to grain crops in the lower counties. Tobacco harvest will begin next week-budworm and horn worm activity have been high in tobacco. Cool season grasses are suffering in the dry, hot conditions.

Upper Eastern Shore
The recent heat took its toll on both corn and soybeans, especially the areas that missed the thunderstorms. Rainfall has been extremely variable with some areas receiving 4 inches in the past 2 weeks and others receiving nothing. In some cases, the extremes are only a mile apart! Some of the full season beans are setting pods and some are aborting. Gray leaf spot is increasing in corn with the recent humid weather. Stink bug populations are very high in corn and increasing in soybeans. Some hay is dormant due to drought while other fields are producing low yields.

Lower Eastern Shore
Many areas have received much needed rainfall since the last report. Some areas received up to 3 inches of rain. Double crop soybeans rated fair to good and improving in most areas. Scout carefully for spider mites, isolated damage has been reported. Pasture conditions still are rated fair to poor, but improving. Outdoor burning bans are now in effect in all Lower Shore counties due to dry conditions. Disease and insect pressure is light at this time.

Announcements

Information Regarding Soil Phosphorus Research Project
University of MarylandExtension, in conjunction with the Laboratory for Agriculture and Environmental Studies at the University of Maryland, is recruiting local Maryland farmers to participate in a study aimed at updating and improving Maryland’s Phosphorus Site Index. The goal of the study is to update and improve this useful site-assessment tool.

The University of Maryland research team will be partnering with county nutrient management advisors and Extension educators to identify farmer participants, gather information about farm operations, and arrange to visit farms. Participation in the study is completely voluntary and all information collected will remain

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Watermelon & Pumpkin Twilight on August 16th
Attend Watermelon and Pumpkin Twilight Meeting on Tuesday, August 16, at the Lower Eastern Shore Research & Education Center, 27664 Nanticoke Road, Salisbury, MD 21801 from 5:30pm - 7:00pm.

Learn about watermelon weed control trials, and pumpkin insect and disease management practices. Tour the fields, discuss and interact with University of Maryland extension specialists.

Dinner will be served and there is no cost for this program. Please register by August 10 with Jeri Cook at 410 742-1178, or jcook2@umd.edu.

For more information and details about this project, feel free to contact Dr. Frank Coale at the University of Maryland by email (fjcoale@umd.edu) or by phone at (301) 405-0505. Anyone interested in participating in this study should contact Nicole Fiorellino, University of Maryland project coordinator, by email (nfiorell@umd.edu) or by phone at (301) 405-3998 or your University of Maryland Extension nutrient management advisor. Farm visits will be taking place during the summer and fall of 2011, so please sign up to participate as soon as possible! Without the help of Maryland farmers, this critical research cannot be completed.

Participate in Buy Local Challenge
All Maryland residents are encouraged to participate in buy local week, which is the last week in July, buying at least one thing from local farm everyday during the week. The aim of this campaign is to raise awareness about local farms and foods to help the Maryland rural economy and environment. This program will also promote the development of healthy eating across Maryland utilizing fresher, better tasting locally grown Maryland produce. To pledge your active participation please visit www.buy-local-challenge.com.

Aronia Twilight Tour on August 23rd
Aronia (Chokeberry) is a new alternative crop which has high concentrations of flavonoids and several nutraceutical qualities. University of Maryland Extension will conduct a Twilight Tour of the Aronia research orchard on August 23rd, 5:30 pm at Wye Research and Education Center, 211 Farm Lane, Queenstown MD, 21658. Participants will learn about highly nutritious Aronia berries; varieties and yield; plant densities and propagation; cultural and production methods; fertility practices; and experience ripe Aronia fruit. The event is free, however, registration is requested. Please contact Debby Dant: 410-827-8056 X 115, ddant@umd.edu, if you need any additional information and/or to register.

Mid-Atlantic Precision Agriculture Equipment Day
Please join us and learn how to make precision agriculture pay in your operation. Among the practical and informative presentations that will be given are sprayer and planter section control, variable rate seeding, the economics and practical implementation of RTK and GPS, soil mapping, using technology for on-farm research, and developing variable rate prescriptions.

Tuesday, August 30, 2011
8:30 a.m. - 4:30 p.m.
Caroline County 4-H Park
8230 Detour Road
Denton, MD 21629

Speakers include:
- Dr. Randy Taylor, Oklahoma State University
- Dr. John Fulton, Auburn University
- Dr. Mike Buschermole, University of Tennessee
- Dr. Matt Darr, Iowa State University
- Dr. Bobby Grisso, Virginia Tech

DE and MD Nutrient Management Credits & CCA credits will be available

For more information please contact: 410-228-8800 or 410-758-0166
www.mdcrops.umd.edu

Farm Estate Planning Workshop on September 7th
This workshop is for farmers and owners of rural land. In addition, individuals involved in farm estate planning, businesses that provide services to farmers, and state and local government employees will all find this workshop helpful.

Cost: $10 per person (includes lunch and materials)
Date: Wednesday, September 7
8:30 am Registration
9 am - 1 pm Workshop
Chesapeake College, Wye Mills, MD
Higher Education Center - Room 110
To register contact 410-758-0166 or email jrhodes@umd.edu
A Big Thank You!!

Maryland Grain Producers’ Utilization Board and Maryland Soybean Board are both recognized for their financial contributions that support the publication and distribution of this newsletter. This is another example of the “checkoff dollars” at work.

Agronomy News QR

Shannon Dill

Want to see agronomy news on your smartphone or view the pictures in color?

A QR code (Quick Response) is a specific code that is readable by QR readers and camera phones. The code includes black graphics arranged in a square pattern on a white background. The information encoded may be text, website or other data.

How to use:
You will need a smart phone with Internet access and an application that reads QR Codes.

1. Download a code reader to your smart phone. There are lots to choose from. Just search your app marketplace for “bar code reader” or “QR code scanner.” Most are free.
2. Once it is downloaded go to that app and select the scan feature. Point the camera at the code and click. For the QR code above, it will take you to the Agronomy News website.
3. Tour the site on your phone.

Did You Know

Fewer than 2% of the U.S. population live or work on a farm.
SIGN-UP TO RECEIVE “AGRONOMY NEWS”

If you would like to receive this newsletter via email please contact Rhonda Barnhart at rbarnhar@umd.edu. The subject line should be: Subscribe Agronomy News 2011.

If you would like a hard copy please contact your local county extension office to sign-up for the mailing list. The list of local county offices can be found at www.extension.umd.edu.

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Sudeep Mathew, Editor

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