Integrated Pest & Crop Management

Mizzou Pest Management Field Day is July 16

by Kevin Bradley and Mandy Bish

The annual Mizzou Pest Management Field Day will be Thursday July 16th at the Bradford Research and Extension Center, approximately 8 miles east of Columbia, Missouri.

Registration will begin at 8:00 a.m. with opening comments by Dr. Bradley at 8:30. The morning will include guided wagon tours with stops that feature presentations of research results by university-trained scientists. Weed management research topics that will be discussed this year include the effects of soybean seed treatments on early season herbicide injury; Palmer amaranth and information related to the spread of this weed throughout the state; a variety of research results and topics pertaining to the management of resistant waterhemp and horseweed; the impact of different tillage systems on weed seed distribution in the soil; a comparison of herbicide programs for the effective termination of cover crops; the effects of common corn and soybean herbicide programs and their carryover on the successful establishment of fall planted cover crops; more research results and discussion pertaining to the new Enlist and Xtend (2,4-D and dicamba-resistant) soybean traits that will be introduced onto the market in 2016; and many other topics and periodic stops along the guided tour.

Lunch will be served at noon after which attendees will have the opportunity to view plots that showcase a variety of herbicide treatments and weed management programs for use in corn, soybean, or grain sorghum. These plots will be clearly labeled and mapped out so that they can be viewed easily.

Registration for the field day will be $10.00 to cover cost associated with lunch and refreshments.

To register call 573-884-7945 or send an e-mail to chismt@missouri.edu by Thursday, July 9th.

For certified crop advisors, 2 CEU credits for this field day are pending.

The Bradford Research and Extension Center is located at 4968 Rangeline Road, Columbia, MO 65201. To learn more about the largest plant sciences' research farm in the state of Missouri visit the Web site: Bradford.cafnr.org

To learn more about Mizzou Weed Science, visit the Web site at www.weedscience.missouri.edu or find us on Facebook and Twitter at Mizzou Weed Science. ■

In This Issue

"Black" Wheat *by Laura Sweets*

Wheat harvest is underway or rapidly approaching in most areas of the state. Foliage diseases such as Septoria leaf blotch did occur in low levels across much of the state. Stripe rust was severe in some areas. Bacterial leaf streak has been showing up the last few weeks. Fusarium head blight or scab was perhaps more widespread and severe than predicted. But now the questions seem to focus on black discoloration on wheat heads, black heads on wheat plants or black wheat plants.

There are several possible explanations for black heads on wheat plants or for a black discoloration on portions of wheat heads and these are described in the following paragraphs. At this point in the season black mold growth on leaves, stems and heads of wheat plants is usually the result of secondary or saprophytic fungi growing on senescing plant tissue. The excessive rainfall and number of overcast days the last three weeks have been very favorable for the development of these black molds or sooty molds on maturing wheat.

The black heads due to loose smut are most obvious as heads emerge from the boot and for several weeks after that. The kernels on infected heads are replaced with masses of powdery black spores. So the heads have a very distinct black, powdery appearance. These spores are eventually dislodged by wind and rain, so later in the season the smutted stems are less evident and only the bare rachis will be left.

Septoria leaf blotch was present in the lower canopy of many fields this year. It didn't seemed to move up in the canopy to the flag leaf in many fields but with the continued precipitation and high humidity in some areas if may have developed on wheat heads. On the heads dark brown to black blotches may develop. Stagonospora nodorum may also cause leaf lesions but is usually more common on heads- again causing dark blotches on glumes of part or all of the head.

Bacterial streak or black chaff is a bacterial disease that produces symptoms on both leaves and heads. Water-soaked lesions may develop on young leaves. These expand into reddish-brown to brownish-black streaks on the leaves. Glumes and awns show brown-black blotches or streaks. Fungicides are not effective against bacterial streak or black chaff so the use of resistant or tolerant varieties and crop rotation are the main management options. Again, wind driven rains, rain in association with hail and heavy rains can spread this bacterial disease through a wheat field quite rapidly.

Another likely cause of black wheat heads or black discoloration of wheat heads and plants is sooty molds. Sooty molds are a number of saprophytic or weakly parasitic fungi which grow on senescing or dying plant tissue. Alternaria, Cladosporium, Aureobasidium and other species are frequently found on these discolored or black plants.

Black wheat plants

Black wheat heads due to sooty molds

Since the affected plants may have a sooty appearance these fungi are sometimes called sooty molds. These sooty molds or secondary fungi tend to develop on plants when wet or humid weather occurs as the crop is maturing or if harvest is delayed because of wet weather. Typically these fungi come in on plants that are shaded, undersized, weakened or prematurely ripened and on senescing foliage. Plants that are lodged or that have been stressed by nutrient deficiencies, plant diseases (ex. portions of wheat heads damaged by Fusarium head blight or plants weakened by stripe rust) or environmental conditions may be more severely affected. Although many of these fungi produce dark or black mold growth, the color of the mold growth can range for dark or black to olive green or even pink to white.

On wheat these secondary fungi tend to develop the heads or portions of the heads but may also occur on leaves and stems of wheat plants. These black molds also tend to produce large quantities of spores. It is not uncommon to see dark clouds of spores around combines moving through fields with high levels of black mold or sooty molds. At this time there is nothing that can be done except to harvest fields as soon as practical and store grain under proper storage conditions. ■

Make the Most from Late Planted Soybean

by Bill Wiebold

The most recent NASS report indicates that 58% of Missouri's intended soybean acreage are yet to be planted. In a companion article, I included a figure that presents soybean yield response to planting date averaged over 12 experiments conducted in central Missouri. Average yield for soybean planted in the third week of June is at least 25% less than when soybean is planted in early May.

There are several management practices that may add a little extra yield to late planted soybean. Yield results from captured sunlight. Late planted soybean is at a disadvantage because daylight periods are shorter during seed filling, the length of the seed-filling period is shorter, and plants are often smaller with fewer nodes. So, managing soybean to increase light capture may improve yield potential.

Planting in narrow rows allows plants to capture available sunlight sooner in the shortened growing season. I have a limited data set in which I tested both row width and planting date. This experiment was conducted for two years in central Missouri. Yield response to 15-inch rows compared to 30-inch row was 8% when soybean was planted in mid-May, but 14% when planted in the third week of June. For full season soybean we have found no difference for soybean yield between 15-inch row spacing and drilled soybean in 7.5-inch rows. However, as planting date gets pushed later into June, one might consider using a drill.

Late planted soybean plants produce fewer main stem nodes and smaller or fewer branches. Nodes are important because that is where pods form, so yield can be related to the number of nodes. If plants produce fewer nodes, we need to increase the number of plants. For soybean planted in early May we have found almost no increase in yield above 120,000 plants per acre. But, for late planted soybean stand density should be at least 150,000 plants/acre. So, increasing seeding rate is highly recommended.

Soil conditions are likely to be less than optimal for planter operation. Patience is difficult as calendar days slip away, so what I write next is far easier to say than to do. Carefully monitor soil conditions and try to balance possible yield loss from additional planting delay with potential yield effects from soil compaction. Careful planter adjustment to reduce compaction near the seed will provide the best possible environment for early root growth. Seed treatments, especially fungicides that protect against Pythium, will also aid stand establishment and early vigor. Because of a shortened season, rapid root growth and leaf production will help improve yield potential.

I do not recommend changing Maturity Group unless planting is delayed into July. I will discuss this in more detail in another article. As I wrote, late planted soybean plants may be reduced in size and that reduces sunlight capture. Early maturing varieties that are not adapted to your location are less likely than adapted varieties to produce the number and nodes and leaf area to maximize yield potential.

Key management options include:

- Plant in narrow rows
- Increase seeding rate at least 30,000 seeds/acre
- Limit soil compaction as much as possible
- Treat seeds with a fungicide
- Keep "normal", adapted Maturity Group ■

Slow Soybean Planting Progress in Missouri and Impact on Yield

by Bill Wiebold

Misery may love company, but there is not much company and far too much misery for Missouri soybean farmers. Figure 1 provides planting progress information for nine states including Missouri. As of June 14 only 42% of intended soybean acres had been planted in Missouri. This is the lowest number of all 9 states. Farmers in states to the north and east of Missouri have planted more than 90% of their planned acres.

The weather forecast does not bode well for Missouri farmers. As much as 5 inches of rain are predicted for the next several days. Then, tropical storm Bill will move from Texas into Missouri with additional heavy precipitation. The Missouri Climate Center has a list of links that allow you to view river/stream flooding possibilities (http://agebb.missouri.edu/weather/river.htm). Unfortunately, flood stage levels of our rivers are likely to stay with us for the foreseeable future.

Figure 2 provides soybean planting progress within the 9 MASS reporting districts. Over the past month there have been differences within Missouri for frequency of rain events. The eastern side of Missouri has had a few (very few) more days of planting opportunity than the western side. The "best" progress is in the SE, E, and NE districts. But, regardless of location, soybean planting lags behind normal and yield potential surely has been reduced.

Figure 3 presents soybean yield response to planting date averaged over 12 experiments conducted in central Missouri. Soybean yield is highly related to weather conditions during August, and yield variability among years for June planted soybean was large. Average yield for soybean planted in the third week of June is at least 25% less than when soybean was planted in early May. Intended soybean acreage in Missouri was estimated to be 5.65 million acres. Over 3 million acres are yet to be planted. Missouri farmers are experiencing a triple whammy of prevented corn planting, delayed soybean planting, and poor crop vigor because of cloudy skies and wet soil. ■

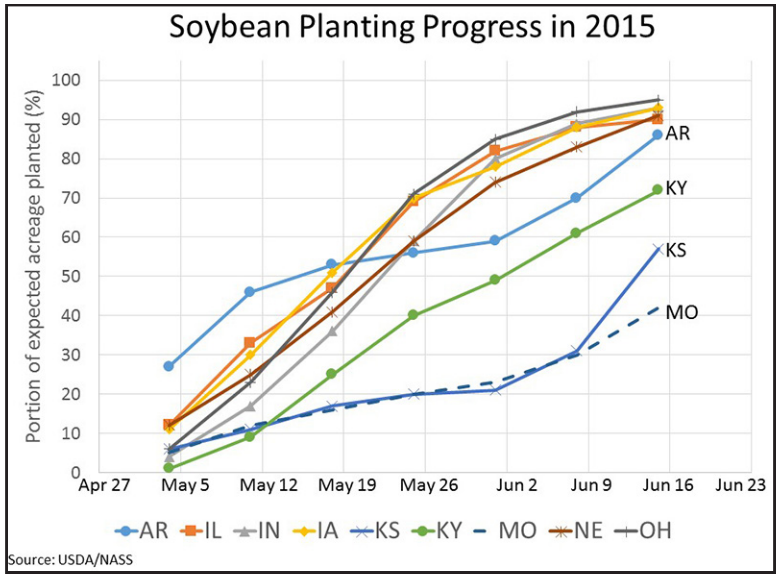

Figure 1.

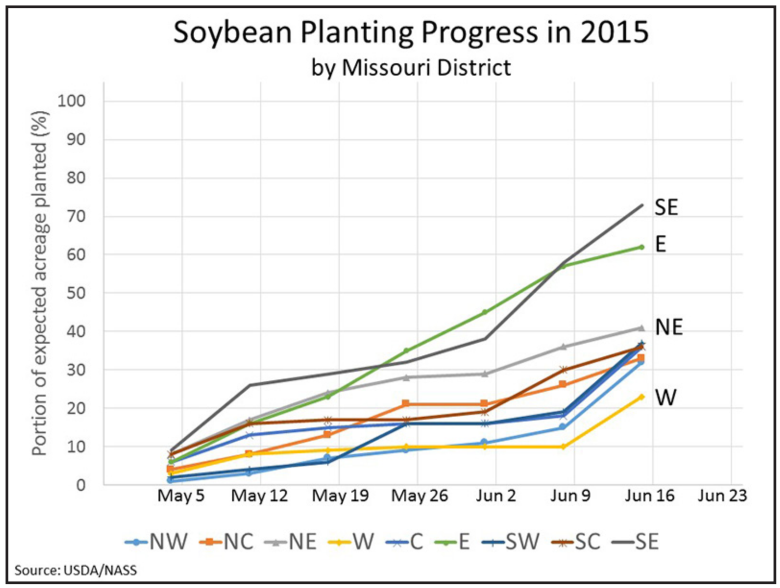

Figure 2.

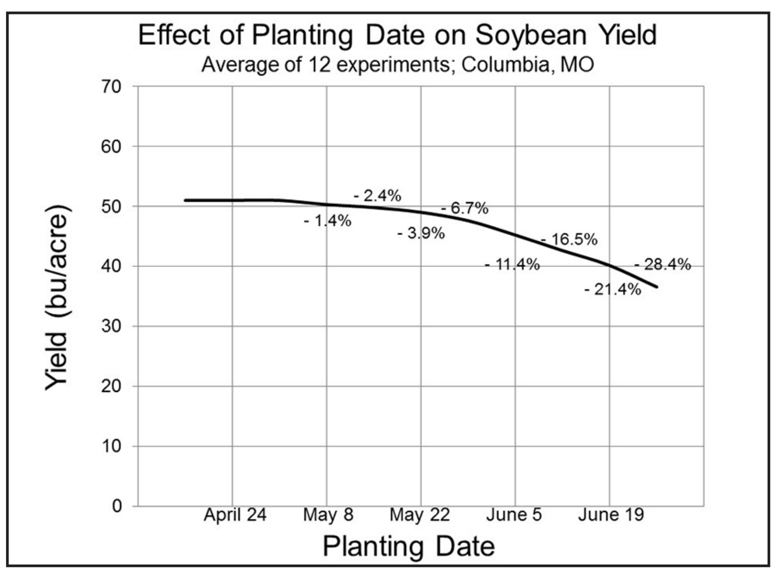

Figure 3.

The Waters of the U.S. Rule

by Raymond Massey

Genesis 1 records day 3 of creation in this way ""Let the water under the sky be gathered to one place, and let dry ground appear." And it was so." And then the EPA found a "significant nexus" between water on land and water in navigable waters.

The Clean Water Act passed by Congress in 1972 gave authority to the EPA to regulate water pollution on waters of the U.S., specifically navigable waters. Resulting regulations targeted not just navigable waters but waters flowing into waters that flow in to navigable waters. In several Supreme Court cases, the majority of justices said the EPA was stretching the definition of waters of the U.S. further than the law allowed.

The EPA recently released a final Clean Water Rule, often referred to as the Waters of the U.S. (or WOTUS) rule. WOTUS seeks to define which waters are subject to EPA and Army Corp of Engineer authority.

A few definitions in the Rule may be helpful. Navigable waters are easily recognized, clearly protected and not a point of contention in the Rule. Tributaries to navigable waters, by definition, must show physical features of flowing water – a bed, bank and ordinary high water mark. WOTUS states "Tributary streams, including perennial, intermittent, and ephemeral streams, are chemically, physically, and biologically connected to downstream waters" and "are the dominant source of water in most rivers." This means that these perennial, intermittent and ephemeral streams are waters of the US and subject to Clean Water Act regulations.

Nearby waters covered by the WOTUS Rule are waters more difficult to define. Nearby waters include, but are not limited to, waters within a minimum of 100 feet of jurisdictional waters or within a 100-year floodplain. This definition of nearby waters expands the quantity of streams, ponds, wetlands, etc. beyond what most farmers previously recognized as regulated.

Trying to get a handle on whether water sitting on or flowing across a particular parcel of land is subject to EPA jurisdiction can be daunting. A tool found at http://geosyntec-can.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=9952781243db4c069d0556d04d7d8339 provides some help. Using the USGS National Hydrography Dataset the tool allows users to zoom in to particular parcels of land and observe waters that may be subject to the WOTUS rule.

A cursory glance at Missouri farmland indicates that most parcels of land have perennial or intermittent streams flowing across or by them. Many of what the National Hydrograph Dataset lists as stream (and hence a tributary according the WOTUS rule) are named creeks or branches. Many of these creeks and branches have designated ponds or wetlands within 100 feet of them.

The EPA states that the "Clean Water Rule will provide greater clarity and certainty to farmers, will not create any new permitting requirements, and will not add economic burden on agriculture." This claim is a point of disagreement between many readers of the Rule.

Addendum: The map referenced above was generated by the Agriculture's WOTUS Mapping Initiative, funded by the American Farm Bureau and other agricultural groups. It simply maps all features available in several national databases such as the National Hydrography Dataset, National Wetlands Inventory and FEMA 100/500 Year Floodplain data. The WOTUS rule specifically states "Among the types of remote sensing or mapping information that can assist in establishing the presence of water are USGS topographic data, the USGS National Hydrography Dataset (NHD), Natural Resources Conservation Service (NRCS) Soil Surveys, and State or local stream maps, as well as the analysis of aerial photographs, and light detection and ranging (also known as LIDAR) data,…"

Despite the EPA's stated objective of "providing greater clarity," it is uncertain how well these databases provide quick information in knowing what water on individual parcels of land is covered by the WOTUS rule. Some contend that these databases overestimate the amount of water subject to WOTUS because such items as ponds identified in the maps may not actually be covered. Others contend that the databases underestimate the amount of water subject to WOTUS because they do not designate all areas showing "physical features of flowing water" which WOTUS defines as a regulated tributary. ■

Crop Plant Response to Flooding

by William J. Wiebold

The nearly continual heavy rains Missouri has experienced the past month has caused both flash floods and prolonged flooding. Increased runoff can cause water levels in rivers and streams to rapidly rise above flood stage. These flash floods are often short-lived and the flooding water moves rapidly. With prolonged heavy rainfall, even in locations outside of Missouri, water levels in our rivers rise, and this blocks runoff from our fields. Rivers and backed up streams will remain above flood stage until water can drain through the system. Low areas in fields with slow or poor drainage can experience ponding even if separated from rivers or streams. In this type of flood, water will collect in a portion of, or perhaps, the entire field. This type of flood may last longer than flash floods, and the water will be moving very slowly or not at all.

Ponded water in soybean field.

Flooded soybean plants covered with soil.

The primary damage to plants (other than lodging) from flooding or ponding is oxygen deprivation. Oxygen content of water is much lower than of air – even air within the soil. Water in soil (water-logging) or above the soil surface (flooding) means there is much less oxygen available to plants. Plants require oxygen for respiration from which high energy compounds are made. These compounds are required for nearly all other life reactions including yield production. Low oxygen availability means that the entire process of respiration slows. If oxygen levels decrease too much, plant respiration changes to a pathway similar to fermentation. While some live-sustaining energy is produced during fermentation, energy production is reduced up to 95%. Low oxygen availability (anoxia) means sharply reduced plant growth and, if long enough in duration, plant death.

In addition, fermentation produces several chemicals including lactic acid, acetaldehyde, and ethanol that can be harmful to plants. The most problematic chemical is lactic acid, not from direct toxicity, but because of its effect on cell pH. Accumulation of lactic acid lowers pH. If pH drops too much, cell enzymes denature or precipitate out of solution and the reactions they control stop. Plant death and tissue damage are often caused by this acidosis.

The ultimate effect of flooding on plants is affected by at least three factors: the temperature of the water, the speed of water motion, and the duration of the flood. Temperature is related to the speed of respiration. The faster the respiration the quicker oxygen is depleted and the sooner fermentation begins. Warm water speeds respiration and oxygen use.

Fast moving water creates turbulence. This turbulence oxygenates the water, slightly. Increasing oxygen content of the water through turbulence decreases the impact of flooding on plants, but only slightly. Duration of the flood is important because many of the effects of low oxygen on plants are reversible, up to a point.

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Crop Plant Response to Flooding, continued.

Long durations allow for increased oxygen depletion and the build up of harmful chemicals. Although local conditions influence susceptibility of plants to flooding, two to three days is the often the tolerable limit.

Soil drainage properties can aggravate the flooding effect. Soils high in clay content or with other drainage restrictions prolong the flooding and remain water-logged after flood waters recede. Soils within the northeast region of Missouri possess a thick claypan. This claypan restricts or nearly prevents downward movement of water. Many days of no rain will be required to move water out of these soils.

Location of the plant's growing point may affect response to flooding. In general, corn can tolerate flooding better than soybean. But, if flooding occurs while plants are young, the corn growing point is near the soil surface (below or above) making it likely to be submersed longer. The soybean growing point is located at tip of stem and may remain above water.

Effects from flooding may last long after flood waters recede. Soybean plants may turn yellow because oxygen for nodule function had been reduced. This nitrogen deficiency should be temporary. Corn may suffer from N loss through denitrification and/or leaching. Unless more N is supplied, permanent yield reduction is possible. Sometimes flood waters deposit silt and residue on leaves. Photosynthesis will be reduced until the soil and residue are washed from the leaves by subsequent rain. Finally, roots are often damaged and will be more susceptible to diseases. Disease symptoms may not appear until several weeks or even months after the flood event. ■

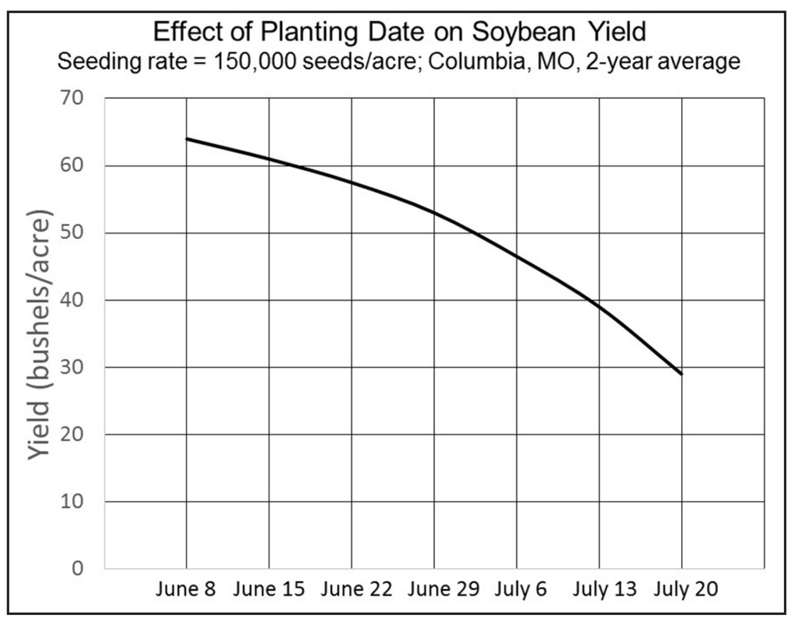
Flooded corn plants with soil leaf whorl.

What to Expect from Ultra Late Planted Soybean

by William J. Wiebold

Sometimes it is difficult to find silver linings on clouds, and the clouds we've seen in Missouri for the past six weeks have hidden those linings quite well. Missouri farmers are faced with soggy soil and over 2 million acres of bare fields where soybean plants should be flowering. So, what I offer is more like tin than silver. Because Missouri lies further south than many of its Midwestern neighbors, we have a longer growing season. Later fall freeze occurrences gives us options if we decide to plant soybean on dates that I'll call ultra-late – after July 1.

Many Missouri farmers have experience with double cropped soybean after wheat harvest, so we know that plants will often mature before fall frost and profitable soybean yields are possible. But, as planting continues to be delayed, risks from freezing temperatures and less than profitable soybean yields increase.



For several years after the wet spring of 2008, I conducted an experiment that focused on yield potential of soybean planted in July. The experiment also included seeding rate and row width components. I've discussed those two components in a previous article. Figure 1 presents the yield data collected in central Missouri. The data have been averaged over two years and two row spacings (15-inch and 30-inch). Because seeding rate

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What to Expect from Ultra Late Planted Soybean, continued.

affects yield response to planting date I selected data from only the 150,000 seeds/acre rate. The latest planting dates in the study were July 16 and July 20 (2009 and 2010). The variety I used was late MG III for maturity.

In both years, plants matured before frost. The Columbia area did not experience a hard freeze (under 28°F) until Oct 18 in 2009 and Oct 29 in 2010. Yield potential averaged over the two years decreased by about 55% from June 1 through the July 20. But, average yield was still about 30 bushels/acre when planted after mid-July. Remember I'm an agronomist and not an economist, so you need to determine profit or benefits from your insurance program. And, my yield information is from a small data set. Finally, weather in late August and early September will greatly affect ultra-late planted soybean yields, and weather is difficult to predict.

University of Missouri Extension has produced a new website that will help farmers determine chances for fall freezes. Information can be found at http://ipm.missouri.edu/FrostFreezeGuide/index.cfm . I've presented some of the available information for six weather stations in Table 1. Please remember than weather stations often measure temperature four feet above soil level and cold air will drain to lower parts of fields. I normally use 28°F as a killing frost. Plant leaves do not freeze at 32°F, but temperatures near 32°F will affect plant growth and may negatively impact tender plant and cell parts. Note that the 30-year average for first occurrence for 32°F is about two weeks earlier than for 28°F. Use the probability number to match your acceptable risk. Most average freeze dates use 50%, but that means that in half of the years a freeze event would occur before the date. Using dates associated with 10% or 30% would decrease the risk of freeze injury to plants.

Soybean yield is protected from frost if the plants have reached R7 or physiological maturity. At R7, seed moisture is about 60% and some green color is still present in seeds. If a killing frost occurs before R7, leaves will remain on the plant making harvest more difficult. Soybean seeds will not change from green to normal yellow color, and green beans are often docked at point of sale. This green color may fade with storage, but a change in color is surely not guaranteed.

Table 1. Average freeze dates for selected Missouri counties.

	Probability of a temperature as cold, or colder, earlier in the fall than the indicated date					
	10%		30%		50%	
County	28 (ºF)	32 (ºF)	28 (ºF)	32 (ºF)	28 (ºF)	32 (ºF)
Nodaway	10/7	9/27	10/17	10/5	10/24	10/12
Scotland	10/6	9/26	10/17	10/5	10/23	10/11
Saline	10/15	10/3	10/26	10/14	11/1	10/21
Lincoln	10/12	10/1	10/22	10/11	10/28	10/17
Barton	10/19	10/8	11/1	10/20	11/6	10/27
Scott	10/31	10/19	11/11	11/1	11/20	11/6

I have a limited data set in which I determined R7 dates for soybean plants that differ for planting date. Rules of thumb can be misleading, but in general, a three day delay in planting will delay R7 by one day. This is because photoperiod strongly influences soybean maturity. Maturity groups differ for R7 date about 8 to 10 days. Please be careful how you apply these rules of thumb.

In north Missouri, I determined R7 for three mid MGIII variety planted on June 6 at Albany for just one year. Average R7 date was September 22. I'm reluctant to extrapolate one-year data or use my rule of thumb for later plantings. But, this is at least some indication that soybean could mature before frost if planted in late June. In central Missouri, I have two years of data from a study in which I planted four MG III and four MG IV varieties in late June (approximating double cropped date). Averaged R7 date was October 4 and Oct 11 for MG III and MG IV.

In central Missouri, I do not recommend switching soybean variety maturity unless planting is delayed past July 12. Exchanging soybean seed at seed dealers is difficult and carrying over soybean seed to next spring while maintaining vigor is nearly impossible. Varieties that mature earlier than varieties adapted to a location usually yield less than adapted varieties because they are shorter and produce less leaf area. For ultra-late planted soybean, quickly developing leaf area to capture available sunlight is key to success. But, any decision on what variety to plant or if planting is warranted must be made in consideration of the plants having enough time to mature before killing frost this fall. To improve yield potential, plant in rows as narrow as possible and increase seeding rate at least 30,000 seeds/acre. ■

Weather Data for the Week Ending June 28, 2015

Station	County	Weekly Temperature (ºF)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	June 1-28	Departure from long term avg.	Accumulated Since Apr 1	Departure from long term avg.
Corning	Atchison	88	64	98	59	76	+1	3.83	-0.56	1289	+149
St. Joseph	Buchanan	85	67	92	62	76	+1	6.14	+1.47	1252	+119
Brunswick	Carroll	86	67	93	63	76	+1	4.21	-0.55	1419	+245
Albany	Gentry	84	64	92	57	74	-1	5.16	+0.53	1185	+87
Auxvasse	Audrain	84	66	92	63	74	-1	12.07	+7.57	1341	+149
Vandalia	Audrain	84	65	90	63	73	-2	11.58	+7.59	1322	+183
Columbia-Bradford Research and Extension Center	Boone	84	66	92	63	75	-1	5.08	+0.88	1328	+99
Columbia-Capen Park	Boone	88	64	95	58	75	-1	5.54	+0.89	1353	+75
Columbia-Jefferson Farm and Gardens	Boone	85	66	92	62	75	-1	6.10	+1.90	1372	+141
Columbia-Sanborn Field	Boone	85	67	94	64	76	0	5.04	+0.50	1450	+169
Columbia-South Farms	Boone	84	66	92	62	75	-1	6.24	+2.01	1357	+127
Williamsburg	Callaway	85	65	93	61	74	-1	9.25	+4.97	1346	+197
Novelty	Knox	82	63	88	60	72	-3	12.66	+8.76	1218	+88
Mosow Mills	Lincoln	84	65	92	60	74	-2	9.88	+5.65	*	*
Linneus	Linn	83	65	89	61	73	-1	8.88	+4.20	1252	+148
Monroe City	Monroe	83	64	90	62	73	-2	9.32	+5.66	1301	+127
Versailles	Morgan	87	67	93	63	77	+1	9.34	+5.16	1433	+155
Green Ridge	Pettis	86	67	92	62	76	0	6.42	+1.67	1339	+134
Unionville	Putnam	80	64	87	60	71	-3	8.12	+2.95	*	*
Lamar	Barton	87	69	91	61	78	+1	5.08	-0.31	1430	+105
Butler	Bates	88	68	94	62	78	0	6.77	+1.19	*	*
Cook Station	Crawford	85	66	91	57	76	+1	6.73	+2.71	1381	+90
Round Spring	Shannon	87	66	95	58	76	+2	4.32	+0.70	1366	+137
Mountain Grove	Wright	85	66	92	56	75	0	7.01	+3.52	1295	+116
Delta	Cape Girardeau	87	70	93	61	78	0	4.85	+1.68	1533	+34
Cardwell	Dunklin	90	72	95	64	81	+1	2.40	-0.69	1728	+51
Clarkton	Dunklin	91	72	95	64	81	+2	2.35	-0.88	1685	+47
Glennonville	Dunklin	90	73	94	63	81	+2	2.52	-0.40	1695	+66
Charleston	Mississippi	90	71	96	61	80	+1	1.77	-1.92	1677	+168
Hayward	Pemiscot	92	73	96	66	82	+3	3.60	+0.16	1771	+128
Portageville	Pemiscot	92	73	97	65	82	+3	2.64	-0.96	1774	+115
Steele	Pemiscot	92	73	97	66	82	+3	2.43	-1.30	1752	+79

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

Weather Data provided by Pat Guinan | GuinanP@missouri.edu | (573) 882-5908

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