Integrated Pest & Crop Management

Are Those Weeds Worthy of Treatment?

by Kevin Bradley

I've gotten a few calls lately from producers asking what density of winter annual weeds justifies treatment in winter wheat. While there's not a lot of information out there in the weed science literature on this subject, I present here a few highlights of what I could find for some of our most common weeds that infest wheat in Missouri.

Common Chickweed. Most of the available research on common chickweed indicates that this winter annual will cause wheat yield reductions when this weed is present at densities of at least 30 plants per square meter and higher. In research conducted throughout Missouri, wheat yields were reduced by as much as 28% with common chickweed densities of 169 plants per square meter.

Cheat/Downy Brome. In fields with cheat and downy brome infestations, herbicide applications are almost always warranted, especially when these grasses emerge at or within the first few weeks after wheat planting. Researchers in Oklahoma have observed a 49% reduction in wheat yield due to cheat infestations of 86 plants per square meter (Koscelny and Peeper, 1997). Similarly, wheat yield reductions greater than 60% have been reported in fields with 200 downy brome plants per square meter (Blackshaw 1993).

Some producers are asking what density of winter annual weeds justifies treatment in winter wheat. According to our research, henbit infestations like the one shown above can reduce wheat yields when densities are greater than 80 plants/m2.

Henbit/Purple Deadnettle. Henbit is one of those weeds that may not compete as effectively with wheat as some of the other winter annuals like chickweed, cheat, and downy brome, but still may cause yield reductions when present at high densities. I would put purple deadnettle in this same category, but can't find any data to support that statement. Research conducted in several locations in Missouri has revealed that henbit densities of 18 plants per square meter will not cause wheat yield reductions but henbit densities of 82 plants per square meter can reduce yields by as much as 13%. Another thing to consider before making a decision to treat henbit and purple deadnettle especially is their stage of growth. If these species are blooming at the time of application, they have already entered into their natural state of senescence and their sole goal at this point is to complete seed production. So while you may reduce seed production in these species, chances are these weeds are not going to be competitive enough with wheat to make it an economically justifiable treatment.

Wild Garlic and Wild Onion. Although wild garlic is not considered much of a competitor with wheat, control of wild garlic in wheat is an absolute necessity because of the dockage that will occur at the grain elevator. So there really can't be any allowance for this species in wheat. ■

In This Issue

Spring Soil Sampling for Soybean Cyst Nematodes

by Manjula Nathan

Soybeans planting is just weeks away, and it is important that you test your fields for Soybean Cyst Nematodes (SCN) now before planting. SCN is a major concern to growers throughout the state. These parasitic round worms invade the plant roots and suck nutrients from the plants, decreasing their ability to produce adequate yields. The challenge with preventing SCN is that infected plants do not easily express symptoms. Fields can sustain up to 30% yield loss due to SCN without displaying any symptoms, making sampling the only way to identify a problem that you might not actually be seeing. Producers often ignore the possibility of SCN because they plant resistant varieties, but it is important to realize that SCN can adapt to the resistance lines if the same source is used year after year. It is important to check SCN egg counts periodically (every three years) to see if the egg counts are increasing.

Although typically fall is a good time to check fields for SCN because the results will be available for use in making decisions and plans for the next growing season, especially in terms of crop rotation and soybean variety selection, it is still not too late to sample the fields now ahead of planting.

Since SCN egg counts are only as good as the sample taken, here are a few tips for sampling for SCN:

- Limit the size of the area being sampled: 10 - 20 acres is a good target.
- Using a bucket and probe or shovel, walk the area in a W or Z pattern, sampling about 8 inches deep between the rows. Take about 20 cores (with a shovel take ¼ cup of soil from near the shovel tip). Mix the cores well into a composite sample, and bag about a pint of it for submission.
- Label the plastic bag, avoid storing it in the sun and ship it as soon as possible.
- Fill out a submission form (available from our Website or your local extension agent) or on a piece of paper indicate:
    1. Name, address, phone, and email (if you have email, results can be sent quickly.)
    2. County and cropping history
    3. Type of test: SCN egg count ($20), HG Type race test ($75 modified, $100 full, $150 out of state), or Complete Nematode Analysis ($30)
    4. The mailing address for the lab is: Extension Nematology Lab, 23 Mumford Hall,University of Missouri, Columbia, MO 65211

The **SCN Egg Count test** is what most soybean growers would need. If you notice a field that is slipping in yield, had high egg counts years ago, or you haven't had your soils tested for SCN in the last five years, a $20 SCN Egg Count test is a worthwhile investment that can offer peace of mind and save considerable yield loss. If results indicate that the egg count is medium or high, you may want to sample your other fields.

The **HG Type race test** would be for the grower who has high egg counts after growing resistant lines for years. This test indicates the HG type (or race) of SCN in the field, and what sources of resistance would be good to choose when buying seed. The website below offers a comprehensive listing of the "sources of resistance" for commercial soybean lines: http://www.ag.uiuc.edu/~wardt/cover.htm

The **Complete Nematode Analysis test** is a count of the worm stages of all the plant parasitic nematodes in the sample. (It does not give an SCN egg count.) This test is used if you feel you may have a corn nematode problem. This test would also be important for growers in SE Missouri who may have the Root Knot nematode as well as SCN.

The Extension Nematology Lab has a website with more information on how to sample the tests we provide, and how samples are actually run in the lab. A submission form can also be downloaded from the site. http://soilplantlab.missouri.edu/nematode. The turn around time for the lab is typically 3-5 to working days. ■

For management decisions regarding SCN please refer to the University of Missouri Extension Guide on Soybean Cyst Nematode: Diagnosis and Management.

This guide can be downloaded at http://muextension.missouri.edu/xplor/agguides/crops/g04450.htm

Manjula Nathan, nathanm@missouri.edu
Bob Heinz, heinzr@missouri.edu

Soil Fertility Summary Emphasizes the Need for Soil Testing

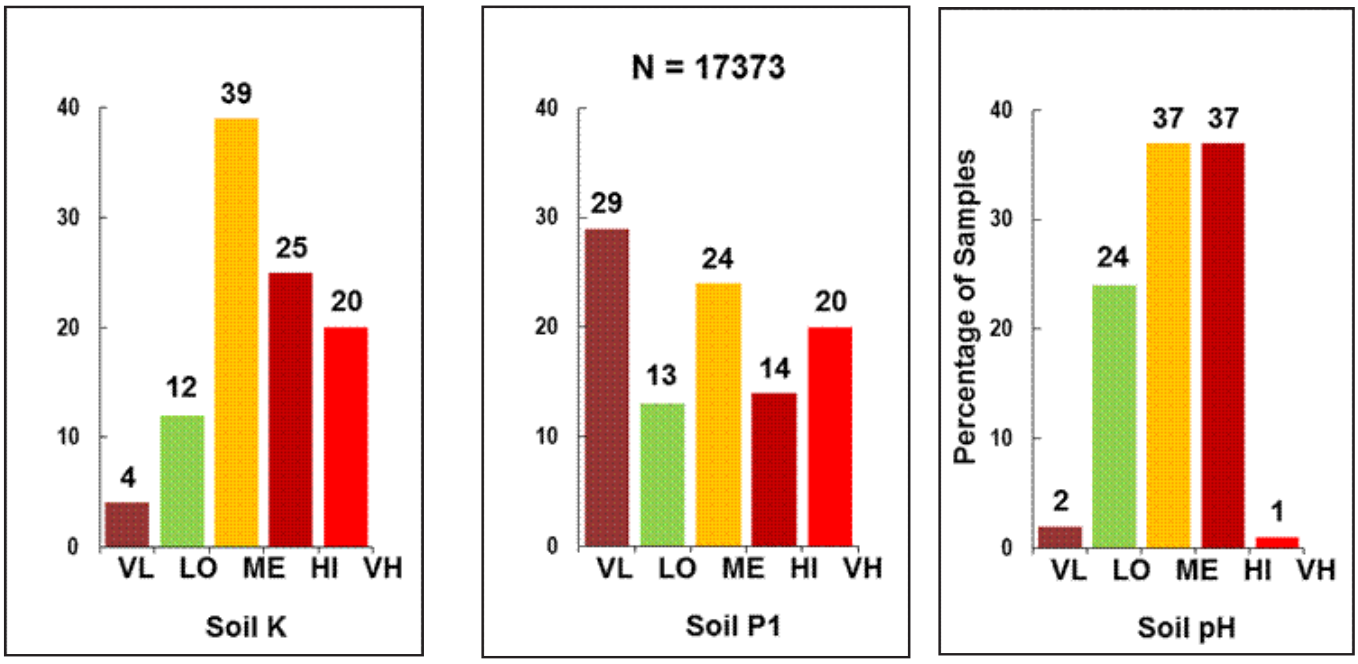
by Manjula Nathan

The MU Soil Test have been flooded with soil samples from early March. Spring is the time when normally the labs receives heavy loads of soil samples for testing. Even though fall sampling is ideal for farmers as it gives the starting point to plan for next year's nutrient management plan, we have many who wait until spring to test their soils. The 2013 growing season was dominated by anomalous weather conditions for much of the spring and summer, and made it another challenging year for Missouri farmers. The cool, wet weather during April delayed spring tillage and planting opportunities across the state resulting in pushing behind the harvest dates. The severe winter weather conditions during the winter made it difficult to sample the fields until early March.

The soil fertility summary provides a valuable index of the soil fertility status of Missouri farmland and identifies broad soil fertility trends in the state. The trends in soil fertility status summary in the state for 2013 emphasizes the importance of soil testing (Fig.1 and Table 1). Out of the total of 17,373 field crops samples tested by the MU soil testing labs in the state during 2013, about 26% tested very low to low in soil pHs (less than 5.3) indicating lime should be applied for economically viable crop production. Another 37% of the samples received, tested medium in soil pHs (5.4 to 6.0), and is likely to need lime to avoid profit loss.

For example, the desired soil pHs range for alfalfa and row crops is between 6.1- 6.5. The lower soil pHs will hinder alfalfa establishment and nodulation. The statewide trend in soil P indicated 42% of the samples tested low to very low, and P fertilizer is essential to avoid profit loss by crops. Another 24% of the P tests were medium (23 to 45 lbs of P/ac) indicating P fertilizer is required for economic crop production. The desired soil P levels for row crops, small grains, and alfalfa are 45 lbs/ac and for forages are 40 lbs/ac. The majority of soils (39%) in the state tested medium in soil K (111to 220 lbs/ac) and 16% tested low to very low (less than 110 lbs/ac) and indicating K fertilizer will be required to avoid profit loss by crops. Fertilizer response to high and very high P and K testing soils are unlikely, however, may need maintenance requirements at the high levels depending on the soil test K levels. In Missouri the soil organic matter (OM) tests are used to estimate N availability in soil. The N credit from soil OM varies depending on soil texture. A general rule of thumb is every 1% of soil OM in the soil will release about 20 lbs of N/ac for crop. Majority of the soils tested (47%) had medium levels of soil OM (2 to 2.9%). (Table 1).

Fig. 1: Statewide Soil Test Summary of Soil pH, Bray 1 Phosphorus (P1), and Potassium (K) Distribution of Samples. Received by the MU Soil Testing Labs for Field Crops, 2013.



VL, LO, ME, HI, VH refers to very low, low, medium, high and very high ratings as given above.

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Soil Fertility Summary Emphasizes the Need for Soil Testing

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Table 1: Statewide Soil Fertility Status Summary in Missouri Based on Samples Received by the MU Soil Testing Labs in 2013

Test	Very Low	Low	Medium	High	Very High
	Percentage of Samples				
pHs	2	24	37	37	1
Bray P, lbs/ac	29	13	24	14	20
Soil K, lbs/ac	4	12	39	25	20
Soil OM, %	4	23	42	20	11

pHs : Very low less than 4.5; low 4.5 to 5.3; medium 5.4 – 6.0; high 6.1 – 7.5; very high greater than 7.5
P1: Very low less than 14 lb./ac; low 14 – 22 lb/ac; medium 23 – 45 lb/ac; high 46-70 lb/ac; very high greater than 70 lb/ac
K: Very low less than 65 lb/ac; low 65 – 110 lb/ac; medium 111 – 220 lb/ac; high 221- 330 lb/ac; very high greater than 330 lb/ac
OM: very low less than 1; low 1-1.9:%; medium 2.0 % to 2.9%; high 3.0 – 4.0 %; very high greater than 4%

If you are going to apply nutrients in spring you need to know how much to put on. Without soil testing, nutrient applications are a guess, and there is no room for guessing in today's atmosphere of narrow margins due to varying fertilizer prices, and public concern of the environmental pollution. Testing soils reduce the risks involved with applying nutrients. What kind of fertilizer do you need to achieve your yield goals? Well, a good place to start would be the MU soil and plant testing lab.

Soil testing is a farmer's best guide to the wise and efficient use of fertilizer and soil amendments. A soil test is like taking an inventory of the nutrients available to plants, which are too high, too low or just right. While plant growth and prior yields may offer clues to nutrient availability, a farmer won't precisely know until they test their soil. Although soil-testing kits are available in garden centers, laboratory testing is more reliable, and the results from laboratories are accompanied with interpretations and recommendations.

Soil fertility fluctuates throughout the growing season each year.

The quantity and availability of mineral nutrients are altered by the addition of fertilizers, manure, and lime in addition to leaching and de-nitrification losses. Furthermore, large quantities of mineral nutrients are removed from soils as a result of plant growth and development, and by the harvesting of crops. The soil test will determine the current fertility status. It also provides the necessary information needed to maintain the optimum fertility year after year.

The soil test takes the guesswork out of fertilization and is extremely cost effective. It not only eliminates the waste of money spent on unnecessary fertilizers, but also eliminates over-usage of fertilizers, hence helping to protect the environment.

Soil samples can be taken in the spring or fall for established sites.

Although fall and early spring are typical times to test soil, one can really do it any time the soil is not frozen, but avoid sampling after recent fertilizer or lime applications. For new sites, soil samples can be taken anytime when the soil is workable. However, fall is a preferred time to take soil tests if one wants to avoid the spring rush. Fall soil testing will allow you ample time to apply lime to raise the soil pH.

As clearly evident from the statewide soil fertility status summary, soil testing is highly recommended for field crops. The cost of soil testing is minor in comparison to the cost of seed and plants and labor. Correcting a problem before planting is much simpler and cheaper than afterwards. Routine fertilizer or lime applications can result in excessive soil nutrient levels or deleterious soil pH. For example many fertilizers tend to have lower soil pH, and after several years of fertilization the pH may drop below desirable.

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Soil Fertility Summary Emphasizes the Need for Soil Testing

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The test results are only as good as the sample taken. It is extremely important to provide a representative sample to the testing lab so that a reliable test and recommendations can be made for the entire area. This can be accomplished by submitting a composite sample. Take 15 random samples in a zigzag pattern at plow depth, mix well, and submit a sub-sample from it to the lab. We recommend that you divide your field and submit one sample for each 40 acres.

Testing your soil for nutrients and pH is important to provide balanced application of nutrients, while avoiding over application. At University of Missouri Soil Testing Laboratory we offer a regular fertility test that includes measurements of pH, lime requirement, organic matter, available phosphorus, potassium, calcium, magnesium, and cation exchange capacity. Soil pH greatly influences plant nutrient availability. Adjusting pH often corrects the nutrient problem for most plants. The optimum pH for most plants is between 6.0 and 7.0. The lime requirement measurement indicates the amount of amendment (usually lime) necessary to correct a pH problem. Organic matter has several roles in the soil; generally the more organic matter the better. Nitrogen recommendations are based on the organic matter level. Phosphorus, potassium, calcium, and magnesium are all essential plant nutrients. The cation exchange capacity (CEC) value is a measure of the soil's ability to hold nutrients.

Test costs vary according to the number of nutrients tested. The University of Missouri Soil Testing Laboratory charges $10.00 (when submitting direct to the lab) for a regular fertility test. Several other specific analyses are available. These include but are not limited to soil analysis for sulfur, micro-nutrients (Zinc, Iron, Copper, Manganese, Boron), salt content (electrical conductivity), heavy metal analysis, and soil texture. Test reports provide interpretation and nutrient recommendations. The turnaround time for a soil test is 24 hours. Customers have to add mailing time to get the reports by regular mail services.

You can contact your Regional Agronomy/Horticulture/Natural Resources Specialist or local County Extension Office to obtain Sample Information Forms and sample boxes, and can submit samples through their offices. These Regional Specialists at your local Extension Offices can be a source of information for interpreting and personalizing your soil test reports and recommendations. Samples can be also submitted directly to the University of Missouri Soil Testing labs at 23 Mumford Hall, Columbia, MO 65211 (Tel: 573-882-0623). Customers can drop the sample off at their County University Extension offices or in person at the MU Soil Testing Lab located at 23 Mumford Hall, University of Missouri, Columbia or at the Delta Soil Testing Lab located the Delta Research Center at Portageville or mail them in. Every sample submitted should have a sample information form duly filled. Samples submitted directly to the lab should be accompanied by a check written in favor of MU Soil Testing for the amount due.

The lab maintains a comprehensive web site at http://soilplantlab.missouri.edu/soil/. The site includes information on how to collect soil and plant samples, and how and where to submit samples. The web site provides a list of services provided by the lab, costs of tests, sample information forms, location of the lab and other relevant information. The lab also provides web access of soil test results with a specifically assigned password to clients upon request. We also have the option for electronic mailing of data if required. ■

Cool Temperatures and Burndown Herbicides

by Kevin Bradley and Mandy Bish

Because of the dramatic swings in air temperature that we have experienced already this spring, we have received a few questions about the effect of air temperatures on our spring burndown applications. Specifically, most people are asking, 'When is it too cold to apply a burndown herbicide?', and 'What are the conditions that lead to poor weed control following a burndown herbicide application?'

As a general rule, when air temperatures fall below 40 F for an extended period of time after a burndown herbicide application has been made, weed control will most likely be reduced. This is especially the case with any burndown application that includes glyphosate (Roundup, Touchdown, etc.), which is a systemic herbicide and needs time to penetrate the leaf cuticles and move throughout the plant in order to have optimum activity. Weed control will likely be even poorer if you have made a burndown application and there is an extended period of cool, cloudy conditions following that initial drop below 40 F.

As a result of our network of MU weather stations throughout the state, we were able to summarize the average hourly air temperatures during the month of April over the past 13 years for the central (Boone County), northeast (Knox), northwest (Gentry County), southeast (Cape Girardeau County), and southwest (Barton County) areas of Missouri. As illustrated in the line graph below, temperatures are usually at their lowest in April between the hours of 3:00 to 6:00 am, will generally increase from 7:00 am through 2:00 or 3:00 pm, and will start to fall soon after that. Although the graph only shows the average hourly temperatures for this time period, we knew that there were years when air temperatures fell well below 40 F in April and were interested to know how often. This information is summarized for the 13-year time period for each region in Missouri in the bar graph below. As you can see from this graph, historically there can be as many as 1/3 to ½ of the days in April where temperatures fall to at least 40 F, depending on your location in the state. There have been several years over this time period when we have experienced widespread burndown failures across the state; most likely this was directly related to the air temperatures experienced before, during, or after the burndown herbicide applications were made in those years.

To make this even more complicated, all herbicides are not going to respond the same way to applications made at high and low air temperatures, and all weeds are not going to respond the same way to different temperatures regimes at the time of application. Although there have been very few studies published on this topic in the weed science literature, weed scientists in Illinois did an experiment on this a few years ago and ultimately found that lower temperatures (<60 F or so) at application had a significant impact on glyphosate activity on henbit, but had very little influence on common chickweed control with glyphosate. In this same study, they reported that glyphosate seemed to be more sensitive to low air temperatures at application than paraquat (Gramoxone).

So what can you do about all this? The simple answer is to watch your forecasts closely and to wait for more favorable temperatures to arrive before you make your burndown herbicide application. We realize that this might not always be possible and that this decision must also be balanced by the size of the weeds at the time of the application—you don't want to wait so long that your weeds have exceeded the optimum size for control, as can easily occur with horseweed and giant ragweed at this time of year. So if there is no other alternative other than to spray and you know cool conditions are going to persist after application, you may want to increase the rate of glyphosate or whatever burndown herbicide you are using and consider at least one other tank-mix partner to ensure the best chance of burndown success.

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MU IPM
Pest Monitoring Network
Taking an Environmentally Sensitive Approach to Pest Management

Cool Temperatures and Burndown Herbicides

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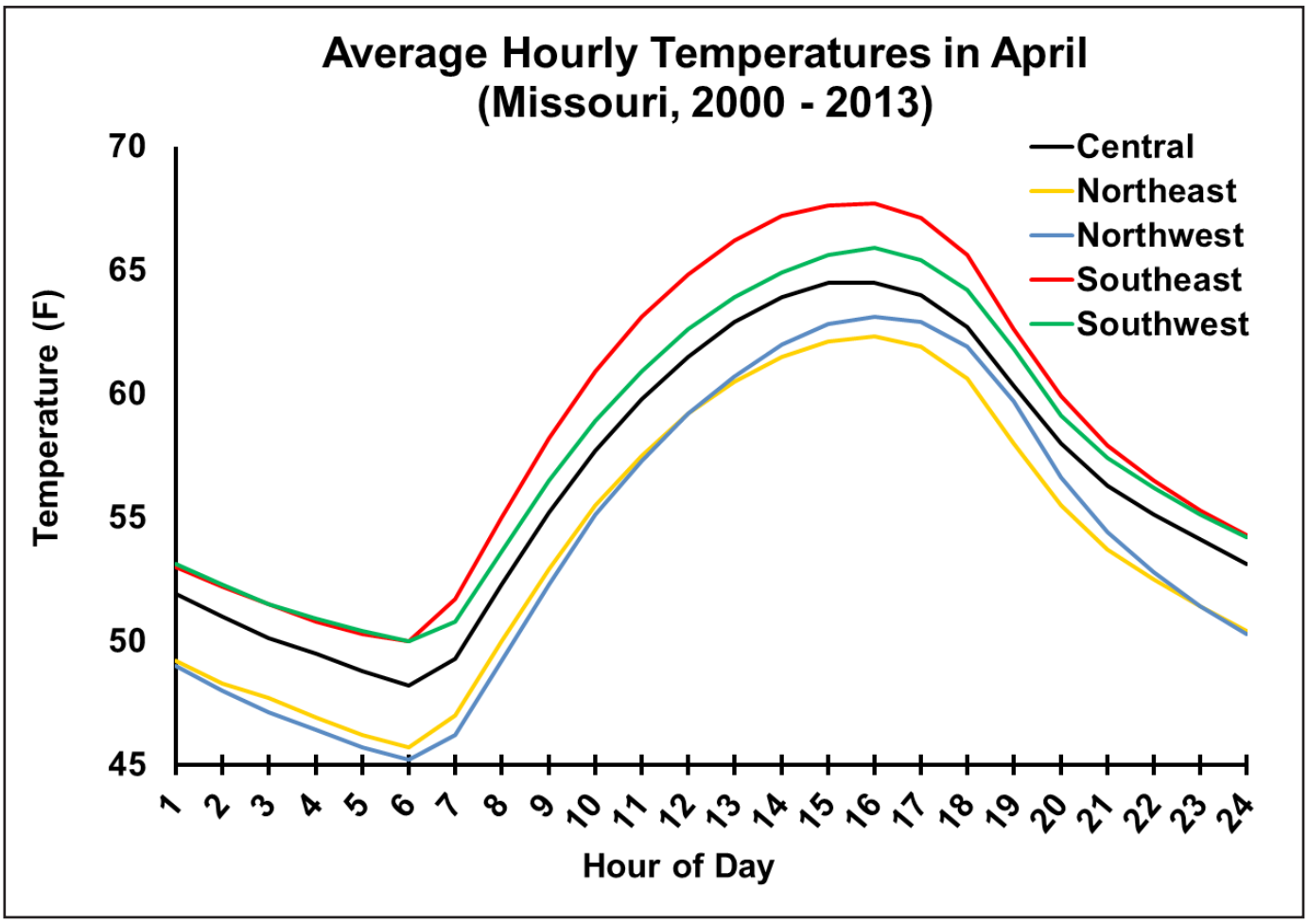
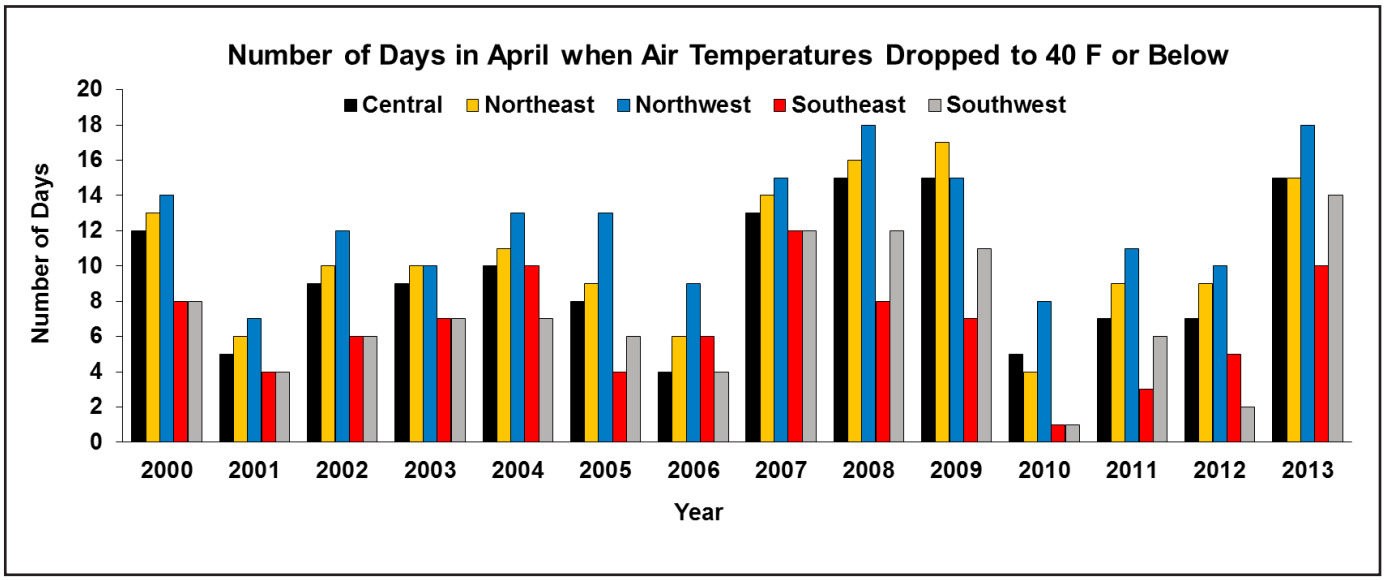


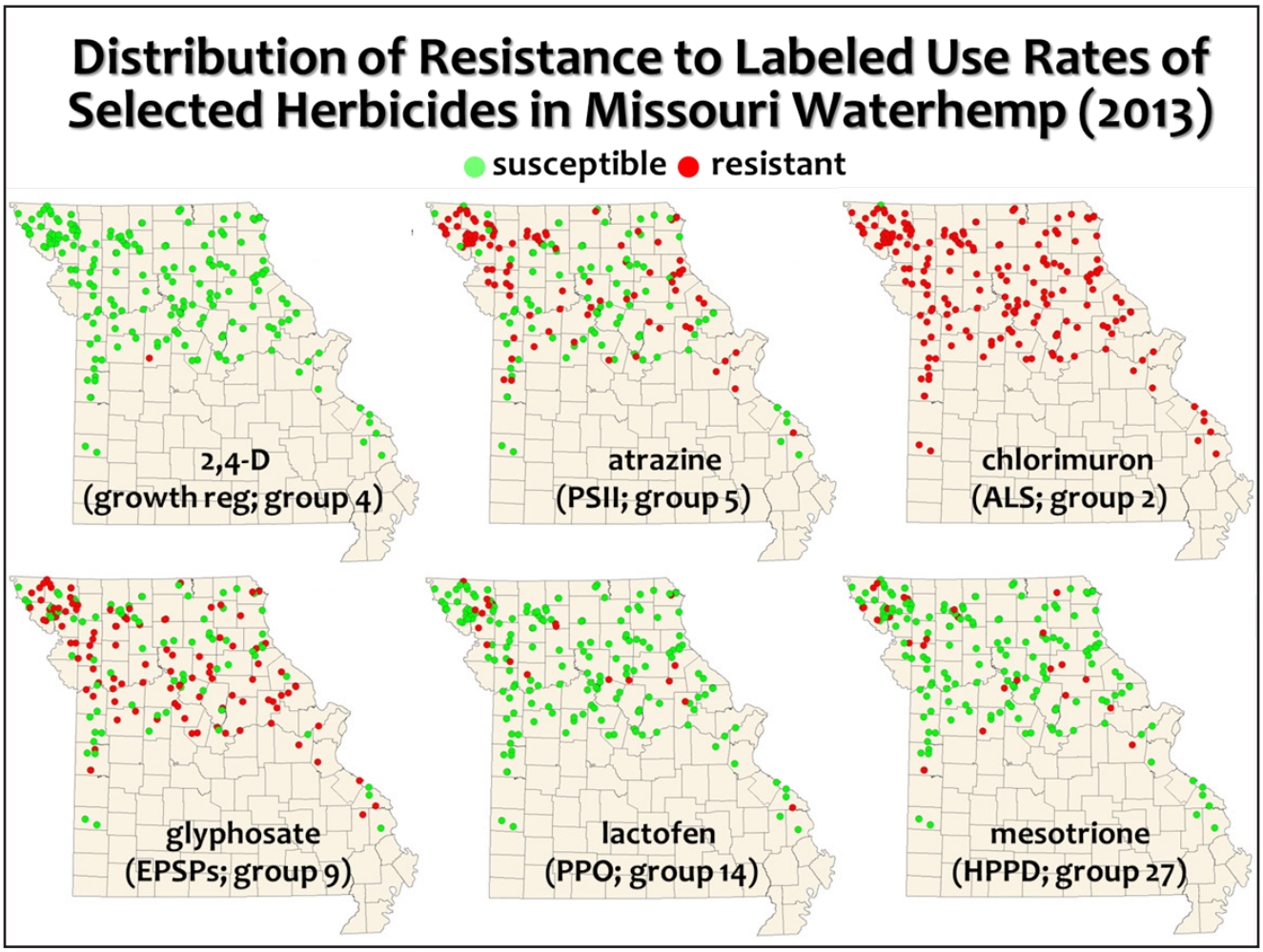


The Situation with Herbicide Resistance in Missouri Waterhemp

by John Schultz and Kevin Bradley

In 2012, 187 waterhemp seed samples were collected from soybean fields across the state of Missouri to determine the distribution and extent of herbicide resistance to six different herbicide modes of action. We screened each of these populations to labeled use rates (1X rates) of these herbicides once plants reached 4-inches in height. Results indicate that practically all waterhemp populations are resistant to group 2 (ALS-inhibiting) herbicides like chlorimuron (Classic). Atrazine (group 5) and glyphosate (group 9) resistance was present in 51 and 58% of the populations tested, respectively. Resistance to group 14 (PPO-inhibiting) herbicides like lactofen (Cobra) was observed in 11% of the populations while resistance to group 27 (HPPD-inhibiting) herbicides like mesotrione (Callisto) was present in 14% of the populations. Perhaps even more concerning is the fact that 84% of the populations tested were resistant to at least 2 different herbicide modes of action, 39% were 3-way resistant, 11% were 4-way resistant, and one population was resistant to 5 different herbicide modes of action.

As you plan your soybean weed management program for the season, it is important to consider these results and understand the extent of multiple herbicide resistances in waterhemp in Missouri. In order to manage and mitigate herbicide-resistant waterhemp in your fields, you must integrate all available cultural and chemical control tactics available with the ultimate goal of eliminating waterhemp from your fields and preventing seed production altogether.



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The Situation with Herbicide Resistance in Missouri Waterhemp

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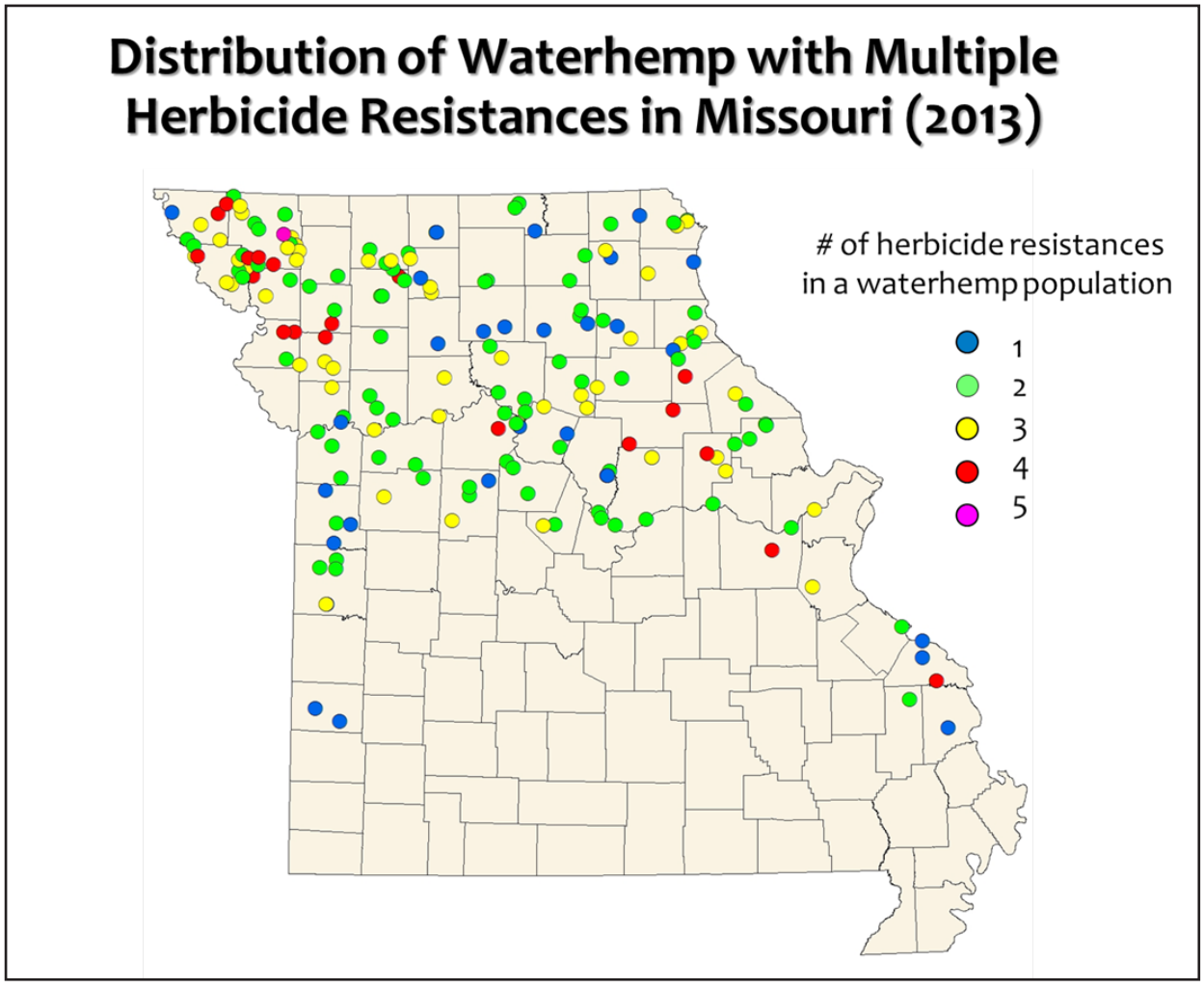
This means incorporating cultural control practices like narrow row spacings and optimum soybean plant populations along with a herbicide program that contains multiple herbicide modes of action that are effective on waterhemp. As a result of the multiple resistances present in Missouri waterhemp, some of the most effective herbicide options left for waterhemp are pre-emergence, residual applications of the group 14 (PPO-inhibiting) and group 15 (long-chain fatty acid inhibiting) herbicides and/or "overlapping" or "layered" applications of these herbicides. But we will save a discussion of the overlapping residual herbicide program for a future article.

For a more complete explanation of herbicide classification and list of herbicides belonging to these groups, see here: http://weedscience.missouri.edu/publications/47575_FINAL_TakeAction_HerbicideClassChart.pdf ■



Herbicide Options for Killing Failed Corn Stands

By Kevin Bradley

I have received a few calls lately about options for killing out poor stands of corn and planting a new stand of corn back into these areas. Most of these calls have to do with killing a Roundup Ready/Liberty Link corn variety and planting back into these fields. I don't have a lot of data on this topic, but we did conduct a few experiments several years ago (Tables 1 and 2), and I have also provided a summary of some published results from Dr. Larry Steckel at the University of Tennessee (Table 3).

Towards the end of 2008, Select Max (clethodim) received a supplemental label for the control of poor stands of corn. This label allows for the application of Select Max at 6 fluid ounces per acre for the control of Roundup Ready corn and for replanting of the subsequent corn crop into these areas six days after application. In our research with Select Max we have observed excellent control of small (V1-V2) corn stands with this product (Table 1). As the results in Table 1 indicate, taller and more mature (V4-V5) corn stands will be harder to control with the 6 fluid ounce rate of Select Max.

Although Select Max is probably the cheapest option for eliminating poor stands of Roundup Ready corn, some growers are just not willing to wait six days before replanting corn back into their fields. Another option that allows for immediate corn replanting is Gramoxone plus Sencor or Gramoxone plus Lorox. As shown in the tables below, these combinations can provide very good control of corn as well.

Table 1. Influence of Select Max and comparison herbicide treatments on corn control at two application timings (Columbia, MO 2007).

Treatments	Rate	V1-V2 Corn at Application	V4-V5 Corn at Application
		---------- % Control* ----------	
Select Max	**6 fl ozs/A**	94	66
Gramoxone Inteon Sencor	**2 pts/A 2 ozs/A**	100	75

*Indicates control of the initial corn stand 60 days after planting.

Table 2. Influence of Gramoxone combinations on corn control at two application timings (Columbia, MO 2006).

Treatments	Rate	1-3 Inch Corn at Application	4-6 Inch Corn at Application
		---------- % Control* ----------	
Gramoxone Max	**1.5 pts/A**	35	16
Gramoxone Max Sencor	**1.5 pts/A 3 ozs/A**	99	100
Gramoxone Max Linex	**1.5 pts/A 1 pt/A**	99	100

*Indicates control of the initial corn stand 50 days after planting.

Table 3. Average control of failed RR/LL corn stands across five sites in Tennessee (Steckel et al., 2009).

Treatments	Rate	6-8 Inch Corn at Application
		--- % Control* ---
Gramoxone Inteon	**2.5 pts/A**	77
Gramoxone Inteon + Sencor	**2.5 pts/A + 3 ozs/A**	98
Gramoxone Inteon + Lorox	**1.5 pts/A + 1 pt/A**	96
Gramoxone Inteon + Atrazine	**2.5 pts/A + 1 pt/A**	92
Liberty	**28 fl ozs/A**	70
Liberty + Sencor	**28 fl ozs/A + 3 ozs/A**	82
Select Max	**6 fl ozs/A**	76
$LSD_{(0.05)}$:		12

*Indicates control of the initial corn stand 15 days after application.

Tables 1-3 also show the inconsistency in corn control with a single application of either Liberty or Gramoxone. This is due to the contact nature of both of these herbicides and the likelihood that the growing point remained below ground at the time of these applications. ■

Seed Decay and Seedling Blights of Corn

By Laura Sweets

Some years, early season stand establishment problems are widespread, and in some cases, severe. The weather pattern during and immediately after planting is a major factor contributing to those problems. Corn, which begins to germinate before periods of cold or wet weather in April or early May tends to show damage from saturated soils, cold soil temperatures, frost injury, herbicide injury, nitrogen deficiencies, seed decay and seedling blights. In some fields the seed decay and seedling blight may progress into crown decay resulting in even more severe stunting and yellowing of plants. If weather patterns are favorable for germination and emergence of corn and not as favorable for development of corn seed and seedling diseases, there will be a substantial reduction in seed decay and seedling blight problems in corn.

Corn planting is later than normal because of usually wet conditions across most of the state. The unusual fluctuations in air temperatures (near record highs one weekend followed by lows the next weekend) and soil temperatures further impacted corn germination and emergence, as well as seedling vigor. Conditions which delay seedling development and emergence give seed decay and seedling blight fungi more of an opportunity to attack developing corn seedlings. This may be a year when seed decay and seedling blight are more widespread and damaging than usual.

Seed decay and seedling blights of corn are generally caused by soil-inhabiting fungi such as species of Pythium, Fusarium, Diplodia, Rhizoctonia and Penicillium. These fungi may rot the seed prior to germination or cause preemergence or postemergence seedling blight. Affected seeds are usually discolored and soft and may be overgrown with fungi. Rotted seed may be difficult to find because they decompose very rapidly and because soil adheres fairly tightly to the decomposing seed.

With preemergence seedling blights, the seed germinates but the seedlings are killed before they emerge from the soil. The coleoptile and primary roots are usually discolored and have a wet, rotted appearance. With postemergence seedling blights, the seedlings emerge through the soil surface before developing symptoms. Seedlings tend to yellow, wilt and die. Discolored, sunken lesions are usually evident on the mesocotyl. Eventually the mesocotyl becomes soft and water soaked. The root system is usually poorly developed, and roots are discolored, water soaked and slough off. If the primary root system and mesocotyl are severely affected before the nodal or permanent root system has developed, the plants have little chance of surviving.

Most of the fungi which cause seed decay and seedling blight of corn may also contribute to decay of the permanent root system and crown rot of young plants. Tips of the permanent root system may be water soaked and discolored with the outer layers sloughing off. The base of the crown on the young plant is discolored and soft. This discoloration may be evident on the outside of the plant but may be more evident in internal tissues if the crown is split open. The internal crown tissues may be discolored ranging from light pink to light brown or dark brown to black and the texture may be very soft and spongy. Severely affected plants are not likely to survive. Less severely affected plants may survive but may remain stunted and low in vigor throughout the rest of the season.

The Pythium, Fusarium, Diplodia, Rhizoctonia and Penicillium species which cause seed decay, seedling blight and crown decay are common in soils throughout the state. If conditions are favorable for germination and emergence, these fungi may not have the opportunity to invade seed, germinating seed or young seedlings so seed decay, seedling blights and crown rot will not be significant problems. On the other hand, conditions that are not favorable for germination and emergence, give these soil fungi more time to attack the seed and developing plants.

Numerous other factors also contribute to early season corn establishment problems. Insect damage, nutrient imbalances, herbicide injury, soil conditions and environmental factors, especially saturated soil conditions and oxygen deprivation, may also cause or contribute to early season corn establishment problems. Corn seedling blights are more severe in wet soils, in low lying areas in a field or in soils that have been compacted or remain wet for an extended period of time. Low soil temperatures (50-55°F) and wet soil conditions especially favor Pythium seed decay and seedling blight. Disease severity is also affected by planting depth, soil type, seed quality, mechanical injury to seed, soil crusting, herbicide injury or other factors which delay germination and emergence of corn.

Planting high quality seed into a good seedbed when soil temperatures are above 50F will help minimize these early season problems. Virtually all field corn seed comes with a fungicide seed treatment. Hopper box treatments can be used to supplement the existing seed treatment.

Outlook: Unfortunately, there are no controls for seed decay, seedling blights and crown decay in corn at this point. When evaluating corn stands this season, it is important to check several plants to determine the extent of damage to the initial root systems, the mesocotyls and the permanent root systems. It can also be helpful to split the lower stem and crown open on several plants to check for crown decay. With good growing conditions, marginally affected plants might recover and take off. If stressful conditions continue, marginally affected plants may continue to decline and more plants may show symptoms. Also, although warm, drier conditions would be helpful; hot, dry conditions, especially with drying winds would not be helpful. Warm temperatures with drying winds could stress plants with poor root systems causing them to wilt, turn gray-green to brown in color and even die. ■

Weather Data for the Week Ending April 28, 2014

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.	April 1-28	Departure from long term avg.	Accumulated Since Apr.1	Departure from long term avg.
Corning	Atchison	73	50	83	43	62	+6	1.80	-1.10	201	+121
St. Joseph	Buchanan	71	50	79	44	60	+4	4.85	+1.51	176	+85
Brunswick	Carroll	70	51	76	44	61	+4	4.22	+1.05	195	+90
Albany	Gentry	70	47	77	37	59	+3	2.99	-0.52	158	+84
Auxvasse	Audrain	73	49	77	44	61	+3	5.24	+1.75	189	+79
Vandalia	Audrain	72	49	79	41	60	+3	4.03	+0.50	171	+83
Columbia-Bradford Research and Extension Center	Boone	73	48	76	42	61	+3	6.54	+2.60	181	+50
Columbia-Capen Park	Boone	76	47	82	38	61	+2	6.48	+2.47	185	+41
Columbia-Jefferson Farm and Gardens	Boone	73	50	77	44	61	+3	6.24	+2.34	198	+66
Columbia-Sanborn Field	Boone	73	52	79	47	62	+3	6.19	+2.26	225	+80
Columbia-South Farms	Boone	72	49	76	43	61	+3	6.25	+2.29	195	+63
Williamsburg	Callaway	73	50	79	44	61	+4	6.49	+2.79	197	+89
Novelty	Knox	69	48	79	41	58	+1	3.96	+0.63	142	+50
Linneus	Linn	68	49	76	40	59	+2	2.76	-0.38	157	+69
Monroe City	Monroe	71	48	79	42	59	+2	4.19	+0.90	162	+52
Versailles	Morgan	74	50	80	45	62	+3	4.62	+0.59	224	+60
Green Ridge	Pettis	72	49	78	42	61	+4	5.47	+1.69	192	+81
Lamar	Barton	74	49	82	41	62	+3	1.17	-3.06	226	+62
Cook Station	Crawford	76	48	79	34	62	+3	3.37	-0.64	224	+58
Round Spring	Shannon	78	45	79	35	62	+3	4.00	-0.12	218	+68
Mountain Grove	Wright	72	51	76	45	61	+3	3.61	-0.66	217	+92
Delta	Cape Girardeau	74	51	79	43	62	+1	8.30	+4.06	228	+19
Cardwell	Dunklin	77	53	83	47	65	+2	6.12	+1.71	290	+24
Clarkton	Dunklin	76	51	82	44	64	+1	11.29	+7.08	269	+14
Glennonville	Dunklin	76	53	81	46	64	+1	12.13	+8.03	276	+17
Charleston	Mississippi	75	52	80	44	64	+3	7.90	+3.62	277	+66
Portageville-Delta Center	Pemiscot	76	54	82	47	65	+2	8.95	+4.73	297	+33
Portageville-Lee Farm	Pemiscot	76	54	83	46	65	+2	8.31	+4.08	305	+46
Steele	Pemiscot	76	51	81	45	64	+1	6.32	+2.00	281	+19

‡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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Editor: Amy Hess (hessa@missouri.edu)