Integrated Pest & Crop Management





Insect Management Recommendations for "On Farm Stored Grain"

by Wayne Bailey

Insect problems in stored grain are best prevented through sound grain management at the on-farm level. Implementation of sanitation practices which reduce residual pest insect numbers in empty bins and grain handling equipment coupled with pre-harvest insecticide applications to empty bin surfaces and surrounding areas is the first step in effective management of insect pests in stored grain. The second step is to apply a grain protectant on the grain to be stored. This application is essential if the grain will be in storage through the summer months or longer the following year. The grain is generally treated with a labeled insecticide as the grain stream is moved into the storage structure. This is followed by a second insecticide application to the top of the leveled grain mass inside the bin or structure. This (capping) treatment prevents insect from infesting the grain through the top of the grain mass. The third step is to monitor stored grain on a specific schedule to determine if insect infestations are present. Grain held through the winter into the following summer months is at high risk of developing insect infestations if not treated during filling of the storage structure. Due to high oil content of soybean, insect problems during storage of this crop are minimal if grain moisture is maintained at 13 - 14%.

If grain bins and handling equipment are not sanitized prior to grain fill and grain is moved into storage without receiving a preventative insecticide application, then insect infestations can develop in as little as 3 to 6 weeks following initiation of grain storage. In normal years cool fall temperatures usually allow the stored grain mass to be cooled to 50 - 55 degrees Fahrenheit which causes insects infesting the grain to become inactive. Some grain management recommendations suggest reducing the temperature of the grain mass to 35-40 degrees F to restrict the development of molds. Grain should not be frozen when reducing grain mass temperature in the fall. During periods of warm fall temperatures the risk of late season insect infestations of stored grain is increased. In the spring the grain mass should be warmed to a minimum of 60 degrees F to prevent condensation of moisture on bin walls and subsequently damage from insects and molds.

The high value of grain crops held in on-farm storage can best be protected by implementation of a monitoring program for detection of insect infestations and other pest problems within the storage structure. Producers should monitor stored grains regularly to assess grain moisture, temperature, and the presence of insect infestations.

The following summary includes a list of labeled insecticides, use rates and labeled uses. This information was revised 9/2014.

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Steps to Successful Insect Management in Farm-stored Grains

WHAT TO DO BEFORE HARVEST

A. **SANITATION.** Thoroughly clean all grain residues from bins. Remove all residues from areas around the bins and nearby feed bunks or feed storage areas. Remove all grain residues from combines, trucks, and augers. Be sure to clean grain debris from fans and other grain handling equipment. These residues will be the main sources of insect infestations for farm stored grain. This is a very important part of a good grain management program and can prevent many stored grain insect problems.

B. **RESIDUAL SURFACE SPRAYS TO EMPTY BIN.** After all debris and grain residues have been removed, an application of a residual insecticide should be made to the complete inside of the bin. This insecticide should also be applied around the exterior and to all areas where residues were removed. Spray all surfaces until wet; usually one gallon will cover 1,000 square feet prior to storing or handling grain. Use a course spray at a pressure of at least 30 psi. Insecticides are most effective if temperatures are 60F or higher. ***For optimal insect control, labeled products should be applied to empty grain bins 6-8 weeks prior to filling bins with grain. If sprayed within a few days of grain, fill the performance of the insecticides may be reduced.*** Insecticides labeled for empty bin surfaces include:

1. Beta-Cyfluthrin Formulations: for application to empty bin interior and exterior surfaces only, not to grain.
    - Tempo 20WP see specific label
    - Tempo 2EC see specific label
    - Tempo SC Ultra – 0.27 to 0.54 fl oz per 1 gallon of Water
2. Chlorpyrifos-methyl plus Deltamethrin: for application to empty bin interior and exterior surfaces only, not to grain.
    - Storcide II – 1.8 fl oz per 1 gallon of water Warning-This insecticide should only be applied from outside the bin using automated spray equipment. Do not enter the bin until all sprays have dried.
3. Deltamethrin: for application to empty bin interior and exterior surfaces only, not to grain.
    - Suspend SC – Use 0.25 to 1.5 fl oz in enough water to cover 1000 square feet of area. See and follow specific label rates and directions.
4. (S)- Methoprene: Interferes with insect development, but does not directly kill adult insects. For use in reducing insect numbers over an extended period of time.
    - Diacon II and Diacon-D – see and follow specific label rates and directions.
5. Silicon Dioxide, Diatomaceous Earth:
    - Several brands including Dryacide, Insecto, Protect-It and others - Follow specific label directions.
6. Malathion:
    - Malathion – various formulations available, but not recommended for empty bin treatment due to lack of control of Indian meal moth and lesser grain borer. "Do not apply directly to grain".

At Harvest Grain Protectants

C. **PROTECTANTS FOR APPLICATION TO GRAIN.** If grain is to be held in storage into the summer months of the year following harvest or longer, then a grain protectant applied at harvest is recommended. Formulated sprays, drips or dust formulations are typically applied to moving grain stream as it goes into storage vessel.

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1. Chlorpyrifos-methyl + deltamethrin (Storcide II) – dilute labeled rate of Storcide II in 5 gallons of water and apply formulated spray into grain stream. Five gallons of formulated spray applied to 1,000 bushel of grain. Storcide II rates per 1,000 bushel of grain crop are as follows:
   - Barley 9.9 fl oz per 1,000 bushels
   - Oats 6.6 fl oz per 1,000 bushels
   - Rice 9.3 fl oz per 1,000 bushels
   - Sorghum 11.6 fl oz per 1,000 bushels
   - Wheat 12.4 fl oz per 1,000 bushels

2. Pirimiphos-methyl: labeled for corn including pop corn and grain sorghum.
   - Actellic 5E – use 9.2 to 12.3 fl oz per 5 gallons of water per 30 tons of grain (approximately 1071 bu.). Note: labeled for corn and sorghum only.)
3. (S) – Methoprene: Labeled for barley, corn, grain sorghum, oats, rice, and wheat.
   - Diacon II and Diacon-D – see and follow specific label rates and directions

D. **SURFACE TREATMENTS OR TOPDRESSING AFTER BIN FILL IS COMPLETE.** Fill bins only to height of side walls and level grain prior to applying surface or top-dress insecticide treatments to prevent invading insect infestations, especially Indian meal moth.

1. Bacillus thuringiensis (Bt)
   - Biobit HP and Several Dipel formulations including Dipel DF – 1 lb/ 10-20 gal/1,000 square feet. Most often used for Indian meal moth larval control. See label for specific instructions and target pests.
2. Silicon dioxide, Diatomaceous earth
   - Several formulations including Insecto at rate of 4 lbs/1,000 square feet or Protect-It at the rate of 40 lbs/1,000 square feet may be used if grain mass was not previously treated with this protectant. See label for specific instructions and target pests.
3. Pirimiphos-methyl
   - Actellic 5E–3.0 fl oz per 2 gallons of water per 1,000 square feet of grain surface. Note: Labeled for corn and sorghum only.

MONITORING FOR INSECT PESTS IN STORED GRAIN MASS

Grain masses should be monitored a minimum of once each month during the winter months of November through April and at least twice per month during the summer months of May through October. Areas of the grain mass most frequently infested include the grain surface and central core. Special attention should be given to these areas when sampling, but other areas of the grain mass should not be ignored.

Scouting methods differ by location in the bin and the specific type of insect present. To determine if insects are present, producers should visually inspect the top of the grain mass by looking through the roof access door. A sour smell, grain clumped together, condensation present on the inside surface of the bin roof, webbing on the grain surface, or the presence of insect larvae, adult beetles or moths all indicate the presence of an insect infestation. If an insect infestation is found on the surface of the grain mass and webbing is present, this usually indicates the presence of Indian meal moth. As this insect only damages the upper 12-14 inches of the grain mass, removal of the webbing and damaged grain along with an application of an appropriately labeled insecticide are recommended. Pest strips containing (dichlorvos or DDVP) hung above the grain mass inside the storage structure may help prevent Indian meal moth infestations by controlling the moths of this common pest as they enter the storage structure. If no insects, webbing or foul grain odors are found during the inspection, then it is unlikely that Indian meal moths are present in high numbers. If the grain was properly leveled and the grain surface treated (capped) with an insecticide after filling of the storage structure the previous fall,

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it is best not to break or disturb the protective cap of insecticide previously applied at that time. It is best not to enter or walk on the treated grain surface as insects may establish in the disturbed areas unless these area are retreated.

Similarly, an inspection of grain from the interior of the grain mass is also needed. Monitoring of the grain mass is best achieved through the side access panel by using plastic tube traps, probe traps, and sticky pheromone traps. These traps are inserted into the grain mass for a certain period of time and then retrieved. These types of traps will attract insects and help determine the kind and number of insects present. If traps are unavailable, a quick but less accurate method of sampling the grain mass for insects can be accomplished by direct observation of grain removed from the side door using a grain probe. Deep probes should be collected from several locations in the bin with the collected grain placed in a quart glass jar, plastic bag, or some other container through which insects can be seen if they are present in the grain. These containers of grain should be placed in a warm area to allow the grain to warm to at least 60 degrees F or higher in order to stimulate insect activity. Although there are no reliable thresholds for most insects found in stored grains, it is usually considered that if insects are found in the 1 quart samples of collected grain, the grain content of the bin should be either quickly used before grain quality is diminished by insect activity or treated (fumigated) to kill insects present in the grain and prevent excess loss of grain quality when stored at summer temperatures.

IV. Rescue Treatments

If infestations of various flour beetles, grain weevils, or other stored grain beetles are found infesting the cold grain mass, then the immediate use of grain for livestock feed or some other use where the insects do not cause problems in the end product is recommended. The grain should be fed to livestock prior to the arrival of summer temperatures when insect activity increases. If the grain is to be retained into the summer, then fumigation of the entire grain mass is a second, but less attractive management option. Producers can legally fumigate grain bins in Missouri providing they possess a valid private pesticide applicator license when purchasing and using the fumigants. However, due to the extreme hazard associated with the very poisonous gases emitted by the fumigation pesticides and the extreme danger if used improperly, it is strongly recommended that a professional fumigator be contracted to fumigate grain bins and other grain storage structures. A third option would be to move the grain out of the storage facility immediately after the grain has been warmed in the spring. The grain would be moved to another storage structure with the grain being treated with a recommended insecticide as the grain is moved. Be sure to consider whether the grain was previously treated with and insecticide when placed in the bin the prior fall to avoid excessive insecticide residues. This method of insecticide application should provide satisfactory insect control on a short term basis. Of these three options, immediate use of the grain as livestock feed is generally the best option. Once the grain in removed from the bin, sanitation procedures should be implemented and the empty bins treated with an approved insecticide both inside and out.

E. **GRAIN FUMICANTS.** Recommend use of commercial pest control specialist when using grain fumigants for stored grain insect control. Special safety equipment including a self-contained breathing apparatus is required for this insecticide application.

1. Aluminum Phosphide (phosphine gas - restricted use)
    - Phostoxin, Fumiphos, Fumitoxin, Phoskill, Phosteck, Phosfume, Weevil-cide and other formulations. **See specific labels for rates of pellet or tablet use)**.

All insecticides for stored grain insects have very specific labeled uses so special attention must be given when selecting an appropriate insecticide. Some insecticides are labeled for use in empty grain bins, but are not labeled for use on grain. Some insecticides are labeled for wheat only or corn only, whereas others may be labeled for both. Be sure to read and follow all insecticide label instructions, restrictions, and precautions when using insecticides for management of stored grain insect pests.

Color images of common stored grain insects can be found on the Commercial AG Electronic Bulletin Board at http://agebb.missouri.edu/storage/pests/insect.php. ■

Johnsongrass (Sorghum halapense), a Pest with Multiple Weapons

Mandy Bish and Kevin Bradley

Currently, Johnsongrass is the only grass listed on the Missouri Dept. of Agriculture's noxious weeds list. This perennial grass can reach over 6 feet in height, is found throughout the United States from Massachusetts to Florida to southern California, and can live in habitats ranging from roadside ditches to pastures to agronomic crop fields (Figure 1).

Johnsongrass produces rhizomes, which are root-like structures that spread underground and are the vegetative structures from which new shoots emerge (Figure 2). Secondly, Johnsongrass forms large seed heads. These seed heads, or panicles, have a purple tint, and the seeds are approximately 3 to 5 mm in length (just under 1/8th of an inch). One plant can produce as many as 80,000 seed in one year.

Figure 1: Johnsongrass growing in the perimeter of a soybean field.

Figure 2: A Johnsongrass rhizome: these structures spread underground and produce new shoots.

The leaves of Johnsongrass are without hairs (or glabrous), reach about 6 to 20 inches in length, and have white midveins as they reach maturity (Figure 3.)

Prior to the formation of a seed head, this grass can be mistaken for barnyardgrass and/or fall panicum as all three grasses have leaves with prominent midveins. However, the ligules, or thin structures that occur at the junction between the leaf and stem, are membranous on Johnsongrass, consist of a fringe of hairs on fall panicum, and are altogether absent on barnyardgrass (Figure 4). Additionally, both barnyardgrass and fall panicum lack rhizomes.

Figure 3: A mature Johnsongrass leaf has a prominent, white, midvein.

Another weed that is easily confused with Johnsongrass is shattercane (Sorghum bicolor). Shattercane is a member of the same genus as Johnsongrass, looks very similar to Johnsongrass throughout its lifecycle, but is an annual plant and lacks rhizomes.

The origins of Johnsongrass introduction in the U.S. are debated; however, the consensus is that the seed was introduced as a forage crop in the 19th century. The end of the Civil War may have aided in the weeds rapid movement across the country as authorities ordered that the grass be planted in eroded soils that had been fallow during the war. Regardless of when Johnsongrass was actually spread, the control and eradication of this weed has been challenging ever since.

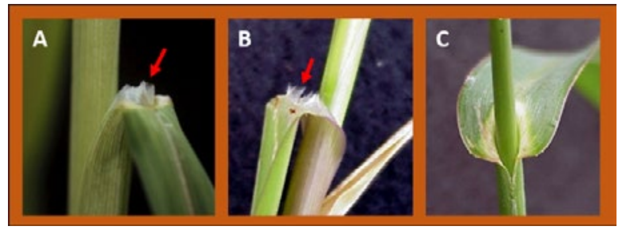

Figure 4: The ligules on Johnsongrass leaves (A) are membranous, while the ligules on Fall Panicum leaves (B) are a fringe of hairs. Barnyardgrass (C) lacks ligules

At a minimum, Johnsongrass control programs should seek to: 1) prevent spread of rhizomes from infested to un-infested areas, 2) kill or weaken established plants and their underground rhizome root system, 3) control seedlings that originate from shattered seed, and 4) prevent production of seed and its spread to new areas.

It is also important to note that glyphosate-resistant (group 9) biotypes of Johnsongrass have been reported in nine U.S. states, and also that Johnsongrass populations with resistance to Group 2 ACCase-inhibiting herbicides (SelectMax, Assure II, Fusilade, etc.) occur in at least five states.

Fall is actually a very effective time for controlling Johnsongrass with herbicides, as the net flow of carbohydrates and photosynthates within the plant is towards the rootstocks. Therefore, by applying a herbicide at this time of year, more herbicide is translocated into the roots, resulting in better long-term control of this troublesome perennial weed species. One of the most effective herbicide treatments for this weed is glyphosate (Roundup, Touchdown, etc.). If the plants have been cut off with a sickle mower or combine, make sure to wait for the plants to resume active growth before treatment. Field infestations of Johnsongrass should also be minimized by actively controlling the Johnsongrass in the non-planted areas surrounding the field and by driving field equipment around weedy patches instead of through them.

For more information on this intriguing weed and others, please visit our Web site at www.weedid.missouri.edu. For more information on the identification of grass weeds that are common in Missouri, purchase or download a copy of: IPM1024, Identifying Grass Seedlings: http://weedscience.missouri.edu/publications/ipm1024.pdf . For more information on Missouri's noxious weed list, control measures, and laws, please visit the Missouri Dept. of Agriculture Web site at http://agriculture.mo.gov/plants/ipm/noxiousweeds.php ■

Delayed Wheat Plantings May Effect Yields

Brent Myers and William J. Wiebold

With corn and soybean harvest slowed by uncooperative weather, wheat planting is also delayed. Missouri farmers will need to decide soon (if they have not already) whether or not to plant wheat this fall. An important piece of information needed to make that decision is the effect of planting date on wheat yield.

Predicting the response of wheat yield to planting date is complicated because seedling emergence and grain development occur in two different years separated by a winter dormant period. For corn and soybean, we can accurately predict that delayed planting will move grain filling of these two crops later into the season. Decreased sun energy and more adverse weather conditions during grain filling will often reduce corn and soybean yields. Delaying wheat planting may have little effect on the timing of grain fill. Instead, the effect of planting date on wheat yield is much less direct and highly dependent on weather conditions between planting and establishment of dormancy.

Wheat is a cool season grass with a minimum temperature for growth of 40°F or slightly cooler. But, wheat grows very slowly near this minimum temperature. To maximize yield, we depend on wheat plants to accomplish three things during the autumn growth period. First, it must develop a root system that will resist heaving. Heaving occurs when water freezes and thaws underneath the wheat crown. The expanding ice raises the plant upward and can completely jack the plant out of the soil. If this happens, the plants desiccate and die. Second, sugars are stored in the wheat crown. These sugars are needed to feed early growth in spring, but also help protect the growing point from freezing during the winter. With low concentrations of sugars and other solutes, wheat plants are vulnerable to winter kill. Third, wheat plants produce tillers (branches) in the fall. These tillers will produce grain heads the next spring. Wheat yield is severely decreased by inadequate tillering. Wheat plants can tiller in the spring, but it is unlikely that spring tillering can produce enough tillers to maintain yield potential.

Figure 1. Hessian fly-free dates for Missouri.

These processes require active plant growth that is diminished if temperatures are too low or the time between emergence and dormancy is short. Since growth rate is so tightly linked to temperature, temperature after planting will greatly affect winter survival and the number of tillers. In turn, winter survival and the number of tillers will affect yield the next year.

The best place to begin a discussion on wheat planting date is with the fly free date. **Figure 1** presents the fly free dates for Missouri. The female Hessian fly lays eggs on wheat seedlings. The maggots that hatch from those eggs feed by rasping leaf surfaces and drinking plant juices. The adult flies die in early fall. The timing of fly death is affected by cooling weather, thus, the fly free date in Missouri ranges from September 28 along the Iowa border to October 17 in the bootheel. Even if Hessian fly did not exist, the fly free date is recognized as the optimum date for planting wheat.

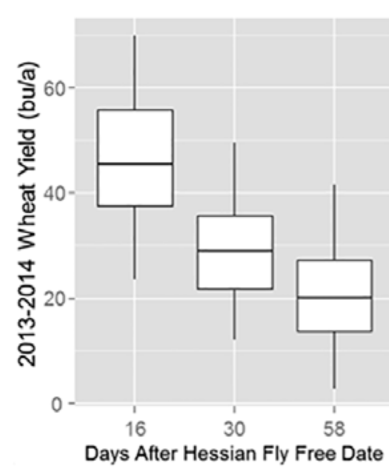

Figure 2. 2013-2014 wheat yield loss due to delayed planting.

In the 2013 – 2014 winter wheat season we started an experiment on the effect planting date has on wheat yield at the Bradford Research and Education Center in Columbia, MO. **Figure 2** presents the effect of planting date on wheat yield from the first year of this study. The x-axis is the number of days after the fly free date. While this is not enough data for us to develop recommendations, we will be collecting more over time. So far, these results are similar to data from adjacent states. As noted above, the fall weather after planting can have a large effect. Warmer than normal temperatures will allow additional growth and tillering, so the yield loss would be less. Cooler than normal temperatures will decrease growth and tillering, and yield loss could be greater than depicted in the graph. ■

ALS-resistant Common Chickweed Becoming More of an Issue in Nearby States

Mandy Bish and Kevin Bradley

Common chickweed (Stellaria media) that is resistant to Group 2, or ALS-inhibiting herbicides, is on the increase in certain areas of the U.S., and can be a considerable problem in wheat production. Prior to 2014, resistance was confirmed in Virginia, Maryland, Delaware and Kentucky wheat fields and Pennsylvania wheat, alfalfa and barley fields. This year ALS-resistant common chickweed has also been confirmed in Tennessee and Kentucky. So far, we aren't aware of any cases in Missouri. In many of these states, the chickweed populations are also showing resistance to more than one kind of ALS-inhibitor herbicide. Last year, due to the problematic nature of the chickweed infestations in Pennsylvania, the state approved metribuzin for use in winter wheat and winter barley under a special local needs label1.

Common chickweed is primarily a problem weed of cereal grains, alfalfa fields, pastures, and gardens; it grows prostrate and relies on neighboring plants for support. When present at densities of 30 or more plants per square meter, this weed can cause wheat yield reductions. In Missouri, wheat yields were reduced by 28% when common chickweed was present at densities of 169 plants or more per square meter.

Currently, Harmony Extra and many other ALS-inhibiting herbicides labeled for use in wheat such as Finesse and Osprey provide good control of common chickweed in Missouri wheat fields. If you have been using Group 2 herbicides in wheat for a number of years and are now experiencing poor chickweed control, chances are you may be seeing resistance in your chickweed population as well. Unfortunately, there are only a few other herbicide alternatives for the control of this species in wheat. Metribuzin (Dimetric, Glory, etc.) and some of the growth regulator herbicides (2,4-D, dicamba, Starane) and mixtures of these herbicides are some of the few active ingredients that provide acceptable post-emergence control of chickweed. In order to prevent ALS-resistant chickweed populations from becoming problems in Missouri wheat fields in the future, wheat growers should implement an annual rotation of herbicides with different sites of action or use tank-mixes of herbicides with different sites of action.

- For more information on common chickweed and other problematic weeds, visit our Web site: http://weedid.missouri.edu
- To learn what sites-of-action many commonly-used herbicides target, download the Take Action on Weeds Herbicide Classification chart: http://bit.ly/1sD17Rr
- To see a survey of herbicide-resistance weeds in the U.S. and world-wide: http://www.weedscience.org/summary/home.aspx

[1]Glory Herbicide (metribuzin) Receives Special Local Need Label for Control of ALS-Resistant Chickweed in Pennsylvania: http://bit.ly/1sCG7KD

[2]Wertz BA. (2014) Common chickweed. Penn State Extension: http://bit.ly/1DnfTnN ■

Seed Germination Before Harvest

William J. Wiebold

The two primary requirements for soybean seed germination are temperatures above 50F and seed moisture percentages greater than 50%. Air temperatures and seed moisture content during seed-filling are well above these minimums. But, soybean seeds almost never germinate before maturity. Soybean, like many other grain crops, possess several mechanisms that prevent sprouting before maturity.

Developing soybean seeds produce several hormones (e.g. abscisic acid). The hormone balance in immature seeds prevents germination. As seeds approach maximum dry weight (physiological maturity) and seed moisture decreases, the hormone balance changes from concentrations that prevent germination to concentrations that allow germination to occur if requirements are met.

After maturity, soybean seeds may germination while still in the pod if temperature and seed moisture requirements are met. Unfortunately, weather conditions this fall are conducive to premature sprouting of soybean seeds. The Columbia area received at least a trace of rain on 14 of the first 15 days of October. Other regions of Missouri have had similarly wet October weather.

Germination of soybean seeds while still in pods often involves two steps. First, seeds swell to a size large enough to break open the pod. As soybean pods mature, both the pod walls and the seeds inside shrink. Frequent rains, continuous drizzle, or foggy days and nights can bathe the soybean pod in enough water that the water soaks through the pod wall and wets the seeds. Soybean seeds rapidly absorb water and expand, but pod walls enlarge only slightly. The two halves of the pod wall are sutured together and these sutures can rupture if enough pressure is provided by expanding seeds. Under weather conditions Missouri fields have recently experienced, it will not be uncommon for some seeds to have broken through the pod wall (Figures 1 and 2). If the seeds shrink upon drying and the pod is opened wide enough, seeds will fall from the pod. This is called shattering. Shattering is more common with several wetting and drying cycles.

Once the pod is open the second step involved in germination within the pod can occur. Open pods allow much more water to enter the seed. If air temperature is above 50F and seed moisture content increases above 50%, germination will begin. Soybean seeds can increase in moisture below 50% and then dry to less than 10% multiple times without causing germination. But once seed moisture rises above 50%, germination will start. The germination process will continue as long as the weather remains wet. The first visible sign that germination has begun is the elongation of the embryo root called the radicle (Figure 3).

Premature sprouting is quite damaging to soybean grain quality. Sprouted seeds should dry to acceptable moisture before harvest. Seeds that have not germinated remain alive even when dried to 8% moisture or drier. Germinated seeds will die and the small seedlings may break into several parts (Figure 4). During germination, seeds release enzymes that break down carbohydrates, proteins and fats. This breakdown releases free sugars, amino acids, and fatty acids. These simple compounds spoil easily in storage. The soybean seed coat ruptures during germination, and this makes stored grain vulnerable to invasion by fungi and insects. These and other problems decrease grain storage time and grain quality. Grain often is downgraded if sprouted seeds are evident. Sprouted seeds are included in the total damage portion of the GIPSA grain grading standards.

Figure 1. Tips of swollen soybean seeds visible between the two halves of the pod wall.

Figure 2. Close-up of swollen seed. The hilum is visible so the seed has detached from the pod wall and subject to shattering.

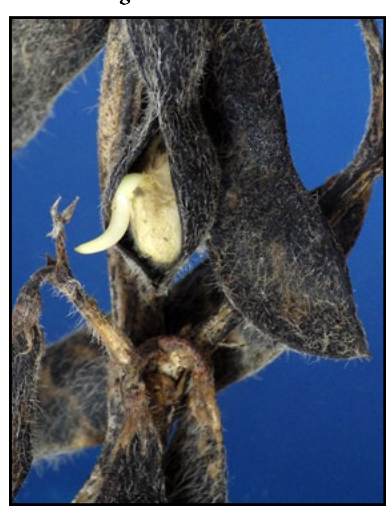

Figure 3. Germinated soybean seed with radicle clearly visible.

Figure 4-A. Germinated soybeans seeds removed from soybean wall.

Figure 4-B. Germinated soybeans seeds after 24 hours of drying. Note color changes and breaks in the seed coats.

Corn kernels are also subject to germinating while on the ear. If the ear remains pointing upward and the husks do not completely cover the ear tip, water from rain or even a heavy dew may run down the inside of the husks and pool at the butt end of the ear. Under these conditions, the husks trap water near the kernels and if temperatures are above 50°F, kernels will likely germinate. Sprouting on the ear is almost always limited to several rows of kernels at the butt end of the ear because this is where water is trapped. Sprouting may occur from uncovered kernels near the ear tip, but this is far less likely unless weather conditions, such as multiple days of fog or continuous drizzle that keeps kernels constantly wet occur. ■

Cover crops as forage: Think twice before you feed or graze

Mandy Bish and Kevin Bradley

While many cover crops are being planted following corn/soybean rotations to reduce soil erosion, increase soil health, and even for weed control, some producers also desire to use their cover crops for grazing and/or forage. A question that has been starting to pop up frequently this fall is "can cover crops be fed as forage?" More specifically, "can a cover crop be used as forage if the species was seeded following a soybean/corn herbicide program?" And the answer to that question is, it depends on the previous herbicides that were applied on that field and the specific rotation restriction listed on the herbicide label. What many producers don't think to consider when it comes to the issue of grazing or feeding their cover crops is that once a herbicide is used in the previous corn or soybean crop, the grazing and feeding restrictions on those herbicide labels must be followed for that crop AND the subsequent cover crop until the restrictions on those labels have been met.

If the specific cover crop species you have planted is not listed on the herbicide label, this does not mean that the species you have planted can legally be fed or grazed. In fact, most of the species being utilized for cover crops are not specifically mentioned on current herbicide labels. In those cases, growers must fall back to the default listing on the label, which usually states something to the effect of "all other crops" or "all others" to find the grazing and/or feeding restrictions that they must follow. Most often, the average rotation restriction for cover crop species that fall into this "all other crops" category is between 12 and 18 months after treatment.

As just one example, the Flexstar label indicates: "Do not graze rotated small grain crops or harvest forage or straw for livestock." Other labels have similar statements. The only way to be sure is to carefully check the labels of the specific herbicides that were used in your fields during the past growing season. (Many common herbicide labels can be found on the CDMS web site: www.cdms.net under the "services" tab.) Also, Dr. Vince Davis at the University of Wisconsin has put together an excellent fact sheet on this issue that can be accessed at the following website: http://wcws.cals.wisc.edu/new-fact-sheet-herbicide-rotation-restrictions-in-forage-and-cover-cropping-systems/. Producers that have an interest in utilizing cover crops for forage need to plan ahead and take note of the herbicide programs they intend to use during the summer and what implications these programs may have on using cover crops as forage. ■

Weather Data for the Weekly Period Oct.23-29, 2014

		Weekly Temperature (ºF)						Monthly Precipitation (in.)		Growing Degree Days‡	
Station	County	Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	October 1-29	Departure from long term avg.	Accumulated Since Apr 1	Departure from long term avg.
Corning	Atchison	75	49	88	33	61	+10	2.30	-0.27	3716	+265
St. Joseph	Buchanan	72	50	84	36	61	+9	5.22	+2.47	3562	+121
Brunswick	Carroll	74	48	85	35	61	+9	7.33	+4.46	3726	+235
Albany	Gentry	73	46	83	31	59	+8	4.48	+2.01	3392	+42
Auxvasse	Audrain	72	49	81	37	60	+7	7.04	+4.20	3531	-27
Vandalia	Audrain	70	47	81	35	58	+6	5.77	+3.13	3419	-72
Columbia-Bradford Research and Extension Center	Boone	71	48	82	38	60	+7	9.60	+6.73	3515	-145
Columbia-Capen Park	Boone	75	45	86	33	58	+4	8.72	+5.64	3516	-277
Columbia-Jefferson Farm and Gardens	Boone	73	50	86	38	61	+8	9.57	+6.69	3649	-24
Columbia-Sanborn Field	Boone	72	52	82	39	62	+8	9.11	+6.13	3866	+65
Columbia-South Farms	Boone	71	49	83	38	60	+7	9.81	+6.89	3604	-62
Williamsburg	Callaway	73	48	85	36	60	+7	7.52	+4.27	3562	+72
Novelty	Knox	69	47	78	34	57	+5	4.32	+1.29	3211	-203
Linneus	Linn	70	48	82	34	59	+7	5.08	+2.22	3368	+12
Monroe City	Monroe	70	47	84	33	58	+7	6.81	+4.13	3358	-117
Versailles	Morgan	75	52	87	38	63	+8	8.54	+5.18	3858	+85
Green Ridge	Pettis	74	51	87	36	61	+9	6.76	+3.41	3624	+92
Lamar	Barton	75	52	87	37	62	+7	5.23	+1.71	3962	+13
Cook Station	Crawford	74	44	85	32	59	+5	3.87	+0.55	3656	-95
Round Spring	Shannon	73	42	85	33	56	+3	6.08	+2.66	3484	-107
Mountain Grove	Wright	71	48	83	37	59	+6	5.21	+1.85	3556	-15
Delta	Cape Girardeau	*	*	*	*	*	*	*	*	*	*
Cardwell	Dunklin	74	49	85	39	61	+4	4.68	+0.51	4295	-255
Clarkton	Dunklin	74	49	85	38	61	+4	3.81	+0.84	4183	-295
Glennonville	Dunklin	73	50	84	40	61	+4	4.23	+1.33	4235	-208
Charleston	Mississippi	74	50	84	39	61	+5	4.58	+1.08	4202	-7
Portageville-Delta Center	Pemiscot	75	51	85	41	62	+5	4.16	+0.17	4393	-130
Portageville-Lee Farm	Pemiscot	75	50	85	40	62	+5	3.83	+0.01	4408	-78
Steele	Pemiscot	75	49	87	38	61	+4	4.12	+0.35	4276	-259

‡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.

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