Integrated Pest & Crop Management

Nitrogen Watch 2011 Launches

By Peter Scharf

Nitrogen deficiency in corn has been a huge problem across the midwest for the past three years (an estimated 1.5 billion bushels have been lost), and 2011 is shaping up to continue that trend. Nitrogen Watch is a web feature to help corn producers and ag service providers identify the locations with the highest probability of nitrogen deficiency. Producers and ag service providers in these regions should prepare for rescue nitrogen fertilizer applications in the case that nitrogen deficiencies develop.

Nitrogen Watch 2011 launched on May 16, and can be found at: http://plantsci.missouri.edu/nutrientmanagement/

Radar-based precipitation maps form the basis for Nitrogen Watch. High rainfall can lead to loss of previously-applied nitrogen fertilizer, resulting in nitrogen deficiency. Cross-hatching is used to identify areas in Missouri and in the Midwest that are on track to get enough rainfall by the end of June to cause widespread N deficiency in fields with all N applied before planting. Currently all of Indiana, Ohio, and Kentucky are on track to have N deficiencies, along with most of Illinois and Michigan and the southeastern half of Missouri. Not all of these areas will develop N deficiency problems, depending on future precipitation.

The Nitrogen Watch page will be updated weekly through the end of June to reflect current conditions based on accumulated rainfall.

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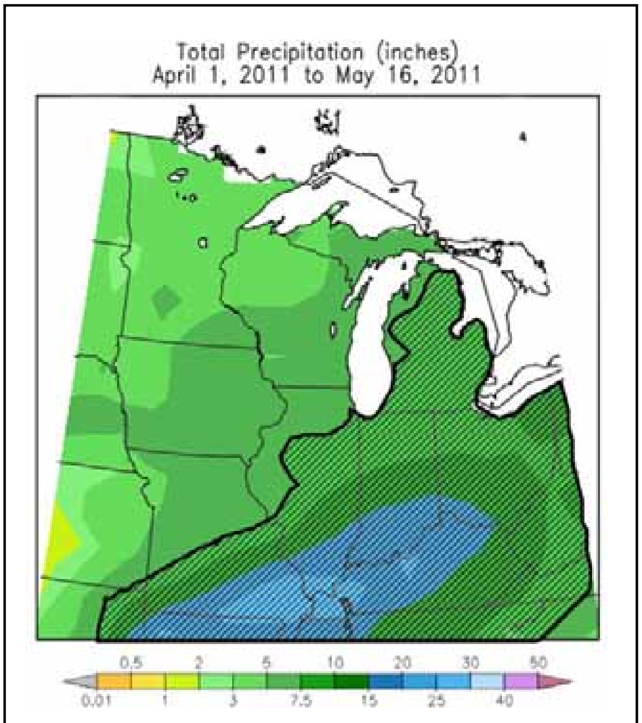

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Overview of Vineyard Canopy Management

By Andy Allen

Canopy management is the attempt to control and direct grapevine vigor and growth in such a way as to maximize both production and fruit quality without negatively affecting vine health or growth. While it may include the impact of factors such as trellising and training systems, pruning severity, fertilization and irrigation, and disease, insect and weed management, canopy management is usually thought of as those manipulations of the canopy during the growing season such as shoot thinning, shoot positioning, leaf pulling, and hedging that directly impact the microclimate within the vine canopy. These practices can have a significant impact on fruit quality and vine productivity both in the year they are applied and in the subsequent year.

Highly vigorous, unmanageable vines have dense canopies that produce undesirable microclimates for high quality fruit production. Low to moderate vigor vines have more open canopies that promote higher quality fruit with less incidence of disease and fruit rots due to a more favorable microclimate within the canopy. In open canopies the majority of leaves and a high percentage of fruit clusters are exposed, whereas in denser canopies a large percentage of leaves and most clusters are in the shade of the exterior leaf layer. This is important because of the need for sunlight by leaves for photosynthesis and by fruit for pigment formation. Grapevines leaves can absorb almost 90% of the sunlight striking their surfaces and reflect around 7%, meaning less than 10% may be transmitted. In dense canopies, then, leaves in the interior of the canopy will not receive enough sunlight to be photosynthetically productive.

Fruit and leaves from open canopies can reach higher temperatures during the day and lower temperatures at night due to radiational heating and cooling, even though the air temperature within the canopy is the same as the ambient air temperature outside the canopy. In dense canopies leaf and fruit temperatures remain near the ambient air temperature. In an open canopy the humidity remains at or near the ambient air humidity, whereas in a dense canopy humidity can increase by as much as 10% as leaves transpire. Air movement within dense canopies is reduced compared to that within more open canopies since leaves block air flow. In very dense canopies wind velocity can be reduced to only 10-20% of that outside the canopy. Less sun exposure, lower daytime temperatures, higher humidity and reduced air flow within dense canopies equal a lower evaporative potential, which means that the surfaces of interior leaves and fruit dry off more slowly after rains and dews than those in more open canopies. This can lead to a more favorable environment for disease development, especially fruit rots. Low light in the basal area of the canopy, where the buds for next year's crop are being formed this year, can result in poor fruit bud development, which leads to poor cluster development, poor fruit set, smaller clusters of fewer berries, or even no clusters at all.

Very few grapevine canopies in Midwest vineyards fall within the preferred range of the parameters that characterize the ideal canopy. In areas with deeper, often somewhat fertile soils, normally abundant rainfall, and a long growing season, these factors combined with the vine's natural vigor may lead to very vigorous vines, often with very dense canopies. Heavy use of fertilization and/ or irrigation may also result in excessively dense canopies, even in poorer soils. When this is the case, then vine management practices that help to open the canopy need to be employed to expose the fruiting and renewal zones of the canopy to better illumination and air movement.

The first of the canopy management practices to be utilized during the season is shoot thinning. Shoot thinning allows you to directly determine shoot density by removing excess shoots. Shoot density is defined as the number of shoots per linear foot of canopy and is optimized for most cultivars at about 5 on spur-pruned, low-cordon trellis systems. Thus, for vines on eight-foot spacing on a low-cordon system such as the Vertical Shoot-Positioned (VSP) trellis, there should be approximately 40 nearly evenly-spaced shoots along the cordon length. A lower number of shoots results in an unnecessarily open canopy and a loss of yield potential. Excess shoot number causes shading within the canopy, resulting in poorly illuminated leaves and fruit. On high-cordon trellis systems, more shoots (6-8) may be retained per linear foot of canopy length since they are spread out vertically as well as horizontally and since the canopy is not artificially compressed into a narrow plane as it is in the VSP system. However, for an eight-foot spaced vine shoot number should not exceed 60-70 to avoid excess shading of foliage. Shoots from the base of spurs, multiple shoots from the same node, shoots growing from non-spur positions or originating in the head region or on the trunk are all candidates for removal, unless needed to replace an old or poorly positioned spur or an old cordon. Selecting shoots that are not fruitful for thinning is preferable unless some crop reduction is needed. Shoot thinning can be done anytime after budbreak but preferably before shoots become more than 12 inches long, as longer shoots may be more difficult to remove. The optimum timing for shoot removal is when the shoots are between 3 and 6 inches in length since they are very easily removed at that stage.

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Much of the early work in canopy management simply utilized shoot positioning to provide a better environment for quality fruit production. Particularly in low cordon-trained systems such as the VSP, where most of the foliage is produced above the fruiting zone, positioning the shoots into a narrow plane held directly above the fruiting zone by pairs of foliage wires allows greater sunlight penetration and air movement into the lower canopy area. Even in high cordon-trained systems, shoot positioning may help to improve the light environment within the canopy. In these systems the shoots may have a tendency to run along the top of the canopy forming a dense cap of foliage over the fruiting zone. To prevent this situation the shoots are separated and combed into a downward position with minimal overlapping of the shoots. In both low- and high-cordon systems, the goal is to distribute the vine's shoots and foliage uniformly through the vine's available space and to minimize mutual leaf shading. An added benefit of shoot positioning is that it makes other canopy management chores, such as hedging and leaf removal, easier to accomplish. It also improves the efficiency of operations such as pruning. Shoot positioning is easier to do if done once or twice (occasionally 3 times with cultivars such as Norton) as the shoots elongate rather than waiting until the shoots get very long and become entangled. It is also easier to do if the foliage catch wires of low-cordon trellis systems are not in fixed positions but are movable and placed below the cordon level after winter pruning.

Figure 1. Shoot positioned Norton. Note that each shoot is combed into its own space and shoots do not overlap each other.

Hedging is a very beneficial practice for low-cordon systems such as VSP and its variations. In these systems hedging generally involves removing the tops of shoots once they have emerged through the upper pair of foliage support wires and have begun to arch over, creating shading on the canopy and fruit below. Hedging should be done in these systems at about a foot above the upper foliage wires. This will leave enough leaf area to properly ripen the fruit. It may also be done along the sides of canopies in highly vigorous situations if lateral shoot development is excessive and causes undue shading in the fruiting zone. Hedging should be delayed as long as possible, preferably 3-4 weeks after bloom. Once the shoot tips have been removed through hedging, lateral development will generally be stimulated. In high-cordon trellis systems, hedging normally involves pruning cascading shoots about 1 foot above ground level in order to facilitate air movement within the canopy and weed management.

In the warm, humid climate of the Midwest leaf removal is undoubtedly the most valuable and necessary canopy management task performed. By directly reducing the leaf number in the fruiting zone, leaf removal creates a much more favorable microclimate around that zone. The resulting increase in light penetration and air movement not only provides a better environment for fruit quality enhancement, but also greatly helps in the control of fruit diseases by reducing the favorable conditions for fungal development and enhancing spray penetration into the fruiting zone. (I have seen severe powdery mildew problems on susceptible winegrape cultivars on grapevines with poor fruit exposure while vines that had leaf removal performed had fewer or less severe infections.) Typically, only 3-4 leaves need to be removed per shoot in order to improve the exposure of the fruiting zone. The goal is not to completely strip the foliage from around the fruiting zone, but to provide between 40 and 60 % exposure of the clusters. This can be accomplished by removing a relatively small number of leaves. Also, it

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Head Disease of Wheat

By Laura Sweets

Wheat acres rebounded significantly from the record low acres of 2009-2010. Now wheat in the southern portion of the state is or has headed. Wheat in the central portion of the stand is beginning to head. Wheat in the northern regions of the state is approaching heading. Thus far, there have been questions about Fusarium head blight or scab, loose smut and foliage diseases of wheat. However, there have been few actual reports of these diseases occurring in the field. Generally head diseases are most obvious right after flowering when heads are still green. As heads and plants begin to dry down it becomes more difficult to detect and diagnose head diseases of wheat.

From flowering through the early stages of grain fill is the time to scout for loose smut, Fusarium head blight or scab, Septoria and Stagnospora infections on heads, bacterial stripe and black chaff on heads and take-all.

Loose smut is 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. Spores produced on smutted heads are wind carried to adjacent plants in the field and infect through the flowers. The fungus that causes loose smut survives within the embryo of wheat seeds. If infected seed is planted, the plants growing from those seeds will be infected and develop smutted heads the next season. If seed from a field that has a "small" amount of smut in one season is used for seed, the field planted with that seed may have a substantially higher level of smut. Loose smut is best controlled by planting either disease-free seed or using a systemic fungicide seed treatment.

Scab or Fusarium head blight of wheat was covered in last week's issue of the *Integrated Pest and Crop Management Newsletter.* Symptoms of scab should become evident over the next few weeks. The characteristic symptom of scab on wheat is a premature bleaching of a portion of the head or the entire head. Superficial mold growth, usually pink or orange in color, may be evident at the base of the diseased spikelets. Bleached spikelets are usually sterile or contain shriveled and/or discolored seed.

Septoria leaf blotch has not been particularly widespread or severe thus far this season but with scattered pop-up rains and high humidity it could still develop. Foliage symptoms may be evident on the flag leaves. On the heads dark brown to black blotches may develop. *Stagnospora 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 stripe 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 stripe or black chaff so the use of resistant or tolerant varieties and crop rotation are the main management options.

Take-all is one of the more common root and crown rot diseases of wheat in Missouri. The fungus which causes this disease may infect seedlings in the fall. Symptoms are usually most evident after heading as white heads on the wheat plants. Entire heads on infected plants may be bleached (white heads) and sterile. Infected plants are also stunted and slightly yellow, have few tillers and ripen prematurely. Plants with take-all typically have poorly developed root systems and roots are sparse, blackened and brittle. With sufficient soil moisture, a black-brown dry rot may extend into the crown and up the lower stem. This shiny, black discoloration of the lower stem and crown may be seen if the lowest leaf sheath is scraped off with a knife or fingernail. A management program for take-all should including planting good quality seed of adapted, disease resistant varieties, planting in well-drained sites under good seed bed conditions, rotating with nonhost crops for one to three years, controlling weed-grass hosts and volunteer wheat, using seed treatment fungicides and maintaining good plant vigor with adequate fertility.

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Tips for Troubleshooting Field Crop Problems

By Allen Wrather

Farmers, consultants, and university extension agronomists will all agree that problems with crop growth of some sort will develop in most fields this year. These problems will most likely be caused by too much or too little fertilizer, too much or too little water, temperatures too high or low, crust over the planted row, insects, diseases, herbicide drift or carry over, and combinations of these.

To enhance plant health, growth, and subsequent yield, the cause(s) of these problems should be diagnosed quickly so action can be taken to reduce the problem from becoming worse this year or prevent it from developing next year. Diagnosis of crop problems can sometimes be easy, but it is more often difficult. Dr. Laura Sweets, Dr. Wayne Bailey, Dr. Kevin Bradley, and I developed University of Missouri Extension Guide G4050 that contains information to help individuals more quickly diagnose the causes(s) of field crop problems, and it is online at http://extension.missouri.edu/explore/agguides/crops/g04050.htm. This following is a very brief summary of the material in this guide.

First, determine the variety and the age of the plant. An investigator should identify the plant variety because some are more resistant or susceptible to certain diseases, insects, and herbicides, and this information may be very useful when diagnosing the cause of the problem.

Second, identify all the symptoms affecting the leaves, stems, roots and fruit. An investigator should observe all parts of abnormal plants when troubleshooting a field crop problem including the leaves, stems, fruit and roots as well as the tissue inside roots and stems. Frequently, the point of injury to the plant is not where the symptoms appear. For example, leaves on one or several branches may be discolored and withered because of a canker on a lower branch or a borer in the stem. Nutritional deficiencies and injuries from herbicides may damage both roots and leaves. Examine individual plants in detail and determine the location of symptoms on the plant. Are symptoms on old or young leaves, upper or lower stems, or perhaps on one side of the plant? Look for insects and insect feeding damage. Cut stems to check for discoloration inside the stem and for insect feeding. Hold leaves up to the light to check for mosaic, other viral symptoms, or the presence of webbing and mites. Investigators should look for leaf abnormalities in color, size, shape and texture. Also, carefully dig up roots and examine them. Check for galls, rot, abnormal root color and feeder root condition, and assess root growth. While probing the soil, check for soil compaction, soil structure, texture and organic matter, and the presence and depth of hardpans. Also take note on fertilizer placement and the depth of planting and other recently completed cultural practices.

Third, estimate the percentage of plants damaged in the affected part of the field. Were all plants in an area or only 10 percent affected? Symptoms of injury due to insects and disease may appear on every plant in an area, but this is unusual. Symptoms of injury due to herbicides, improper placement of fertilizer, and lightning will usually appear on every plant in an area.

Fourth, determine the distribution or pattern of the problem in the field. Look at the entire field to determine where the problem appears. Determine the distribution of the problem in the field as it relates to field characteristics such as areas with light soil, and drainage patterns. Is the problem only in wet areas? Take notice of whether the problem is associated with certain rows or areas of lower or higher elevation.

Fifth, evaluate whether the crop and weeds in the field share similar symptoms. Examine the weeds in the area where the crop is injured and in nearby fence rows. Symptoms caused by nutritional disorders are usually not plant specific. For example, most plants growing in low-pH soils, including crops as well as weeds, will be stunted. However, diseases are usually plant specific, and weeds in the area are normally not affected by the same diseases that can attack corn or soybean.

Sixth, determine the history of the problem. Ask when the problem was first noticed, and whether crop problems were observed in the same area during previous growing seasons.

The answers to these questions may provide clues that could be useful in diagnosing the causes of field crop problems.

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Overview of Vineyard Canopy Management

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Figure 2. Chambourcin grapevines with leaf removal after fruit set. A narrow window is opened around the clusters to allow light penetration and air movement in the fruiting zone.

is only necessary to remove the leaves from one side of the canopy. In north-south oriented rows it is beneficial to leave some foliage on the western side of the fruiting zone to help prevent sunburn. Likewise, in east-west oriented rows leave some foliage on the south side of the fruiting zone. Leaf removal can be done anytime after fruit set and before veraison, but is best done by the time the individual berries are around pea-sized, usually about two weeks after fruit set. Waiting until later in the season to remove leaves will increase the risk of sunburning the fruit.

Cluster thinning is the removal of excess fruit clusters to help manage crop load and prevent overcropping. While not a direct manipulation of the canopy, it is discussed here as a canopy management technique since excess crop load can have a suppressive effect on canopy development. As with leaf removal, fruit cluster thinning can be done at any time at or after fruit set; however to get the most benefit from cluster thinning it should be done at fruit set. Small-clustered cultivars such as Vignoles or Norton are generally not cluster-thinned unless they are young and still undergoing canopy development. With moderate- to large-clustered cultivars it is recommended to follow the 2-1-None rule: At fruit set, if the shoots are greater than 20 inches in length, retain 2 clusters. If shoots are between 8 and 20 inches in length retain 1 cluster. If they are less than 8 inches in length, retain None.

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Low Black Cutworm Numbers and Increasing Bird Damage

By Wayne Bailey

Although several calls have been received concerning black cutworm cutting damage, the overall problems in fields have been less than expected. Typically, in most years there is a strong correlation between moths captured and the number of black cutworm infestations that follow. However to date, the 2011 season has shown the correlation to be less than impressive. It illustrates that many factors can influence moth egg laying and subsequent larval survival to the 4th instar, when seedling corn plants are initially cut. Windy conditions, types of field crop residues, the presence of winter annual weeds, the effectiveness of beneficial agents, and many other factors may all impact egg laying and larval survivorship. Some corn fields receiving damage from black cutworm larvae this spring may actually be fields where seedling corn plants were clipped by blackbirds and grackles. Over the past ten years, populations of various blackbird and grackle species have increased according to federal fish and wildlife surveys. These population increases have resulted in greater damage to corn and rice crops throughout many Southern and Midwestern states, including Missouri. In 2011, a Section 18 request from Missouri was submitted for the avian repellent Avipel for use as a seed treatment on field corn in Missouri. It was rejected by EPA, who requested that additional information be included in the package if re-submission was planned for 2012. At present, a team of state extension specialists are reviewing the EPA rejection letter to determine the type and availability of the information requested. Once determined, a revised Section 18 package will be submitted for use in 2012.

To date, many complaints of bird damage have been received. In addition, It is believed that a portion of the damage to seedling corn reported to be caused by black cutworm larvae may have been misdiagnosed. This is because it is often difficult to tell black cutworm cutting from blackbird clipping in seedling plants. When black cutworms cut plants, they often try to drag the plant stem and foliage beneath the soil surface to feed. In contrast, blackbirds will often walk down a corn row as they grab seedling and try to pull them out of the ground. Often the corn seedling will break near where the beak makes contact with the seedling, resulting in a plant stem and foliage appearing as if it has been cut. Usually the bird will drop the clip seedling if it breaks and continue moving down the row to pull on another plant in order to collect the seed. Often, birds will also pull soil from around the base of the plant in an attempt to reach the seed. This results in a cone-shaped hole surrounding the plant seedling.

Hopefully a section 18 Avipel package will be accepted by EPA in latter part of this year for use in 2012. Information will be passed along to growers as the process of submission moves forward.

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Crazy Top of Corn

By Laura Sweets

This has been another "interesting" year for corn planting. Wet conditions have delayed planting in many regions of the state. Some corn that was planted early is being replanted because of poor stands. Some planted fields have been flooded and some of these may still be flooded. Fields in which young corn plants are subjected to saturated soil conditions for 24-48 hours from planting to about the five-leaf stage of growth are most likely to develop symptoms of crazy top. Fields that are flooded or saturated for longer periods of time may suffer more damage from the effects of flooding and oxygen deprivation than from diseases such as crazy top.

Crazy top of corn is caused by the downy mildew fungus, *Sclerophthora macrospora*. The causal fungus is a soilborne fungus which causes infection when young plants are subjected to saturated soil conditions or water accumulating in whorls or leaf sheaths.

In corn, crazy top is likely to occur when young corn plants are subjected to saturated soil conditions for 24-48 hours from planting to about the five-leaf stage of growth. Accumulation of soil and water in the whorl of small plants may also result in infection. The disease causes a deformation of plant tissues including excessive tillering, rolling of leaves, proliferation of the tassel until it resembles a mass of leafy structures and stunting of corn plants. Leaves of infected plants may be narrow and straplike in shape, leathery in texture and yellow or yellow striped in color.

In seasons with wet springs or rains after corn has emerged, young corn plants subjected to saturated soil conditions may show symptoms of crazy top. Occasionally a band of affected plants may encircle a drowned out spot in a field. Some hybrids may be more susceptible to

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Time to Check Stored Grain for Insect Infestations

By Wayne Bailey

A reminder that it is important to check the condition of on-farm stored grain at this time. Differences in grain mass temperatures of several degrees may indicate that insect and mold problems are present. If the grain mass was properly dried this past fall (to 12 % or below) and temperature of the mass was reduced to 55 degrees Fahrenheit or below for storage during the winter months, then any insects present in the grain mass should be inactive. If the grain is to be held in storage into the summer months and no insecticide was applied in the fall, then the grain may be at risk from insect pests after just 3 to 6 weeks of storage once the grain mass temperature is warmed to above 60 degrees Fahrenheit necessary for summer storage. To determine if insects are present at this time, you should do a visual inspection of the top of the bin to see if any insects or insect damage is present. A sour smell, grain clumped together, the appearance of 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 suggest the presence of an insect infestation. Similarly, an inspection of grain from the interior of the grain mass is also needed.

Scouting methods differ by location in the bin and the presence of specific insect pests. Indianmeal moth infestations can generally be found by observing the top of the grain mass from the roof access door. If no webbing or foul grain odors are found, then it is unlikely that Indianmeal 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, it is best not to break or disturb the protective cap of insecticide previously applied at that time. Some probing of the grain surface from the access door may be necessary to determine level of insect infestations if found. Scouting for stored grain insects in the grain mass can be accomplished by using a grain probe to collect samples from the side access panel. Grain collected should be 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 grain collected, 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.

If an insect infestation is found on the surface of the grain mass and webbing is present, this usually indicates the presence of Indianmeal 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 a labeled insecticide are recommended. Pest strips (dichlorvos or DDVP) hung above the grain mass inside the storage structure may help prevent Indianmeal moth infestations by controlling the moth stage of this common pest. If an infestation of various flour beetles, grain weevils, or other stored grain beetles is 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 a problem 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 is to move the grain out of the storage facility to another storage structure with the grain being treated with a recommended insecticide as the grain is moved. When the grain is then warmed in the spring, the insecticide 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 bin treated with an approved insecticide both inside and out.

All insecticides labeled for stored grain insects have very explicit uses, requiring special attention during selection for various uses. Some insecticides are labeled for use in empty grain bins, but are not labeled for use on grain. Some insecticides are labeled for wheat- or corn only, whereas others may be labeled for both. Be sure to read and follow all label instructions, restrictions, and precautions when using insecticides for management of stored grain insect pests.

Moisture in the grain mass is one very important factor which attracts insect pests to these structures. Charles Ellis, a Regional Extension Engineering Specialist with the University of Missouri, discussed the aeration and

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Time to Check Stored Grain for Insect Infestations

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Table 1. Stored Grain Insecticides for Direct Application to Specific Grain

Common Name	Trade Name	Rate of formulated material per acre	Placement
pirimiphos-methyl	Actellic 5E	9.2 to 12.3 fl oz per 1,000 bu.	Corn, grain sorghum,
chlorprifos-methyl + deltamethin	Storicide II	11.6 fl oz per 1,000 bu. 12.4 fl oz per 1,000 bu. 9.9 fl oz per 1,000 bu. 6.6 fl oz per 1,000 bu.	grain sorghum wheat barley oats
Labeled Fumigants by Grain			
	Phostoxin or Fumitoxin	tablets 40-80 per 1,000 bu pellets 200-900 per 1,000 bu	corn, grain sorghum, wheat, barley, oats

Comments: Storicide II not labeled for use on corn; Actellic 5E only labeled for corn and grain sorghum. Fumigation best accomplished by professional commercial pesticide applicator. *Be sure to read the label and follow all directions, precautions, and restrictions.*

moisture zones in on-farm grain storage facilities in the January 15, 2009 issue of *Insect Pest & Crop Management* (Volume 19, Number 1). Proper aeration of the grain mass to manage moisture and grain mass temperature is essential for good insect control. It is important to note that it often requires a week or more of aeration to move a moisture layer through and out of a grain mass depending on several factors. These include the volume of air moved, the size of the storage structure, and the temperature of the air being moved into or out of the grain mass. If a grain mass was properly cooled to 50 –55 degrees F in the fall, then the grain mass must be properly warmed in the spring to prevent the formation of condensation and moisture damage during summer. A second article discussing moisture management in grain bins and several other important harvest concerns for on-farm grain storage was written by Tom Dorn, an extension educator associated with the University of Nebraska. His article can be found here: http://cropwatch.unl.edu/web/cropwatch/archive?articleID=989014.

Color images and additional information concerning proper management of common stored grain insects can be found on the Commercial AG Electronic Bulletin Board at http://agebb.missouri.edu/storage/pests/insect.htm.

Listed above are insecticides currently labeled for use directly on grain. Be sure to match the proper insecticide to the grain crop listed on the specific pesticide label. Please note that fumigants offer no residual protection from insect damage and that proper fumigation is best completed by professional pesticide applicator.

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Crazy Top of Corn

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crazy top. This disease is seldom severe enough to cause significant losses.

The downy mildew fungus which causes crazy top of corn (*Sclerophthora macrospora*) has been reported on more than 140 species of perennial and annual grasses. In addition to corn, downy mildew occurs on wheat, barley, rice, oats, sorghum, crabgrass, green foxtail, barnyard grass and numerous other grasses. In addition to surviving in various grass hosts, the fungus produces survival structures called oospores which can persist for months in infested crop residues and in the soil.

Losses from crazy top are seldom severe enough in corn to warrant control. Furthermore practical management options for crazy top are very limited. Improving soil drainage or water management may be beneficial. Rotation to nongrass crops may help may also be of some benefit.

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Forage of the Month: Bermudagrass

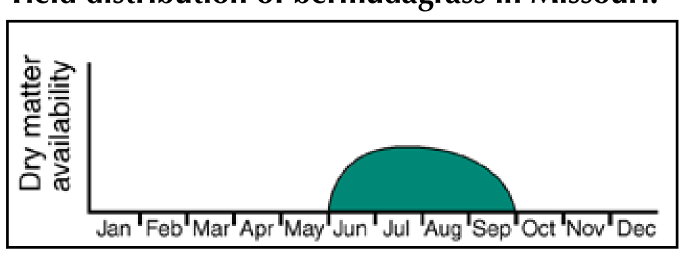
By Rob Kallenbach

Bermudagrass *(Cynodon dactylon* (L.) Pers.*)*

This perennial warm-season grass is used for forage and erosion control in the warmer portions of the United States, including the southern third of Missouri. In southern Missouri, annual forage yields in the 10,000 lb/acre range are possible with good management. Under typical management, bermudagrass is of moderate quality for both hay and pasture uses. However, forage quality and yield can be excellent if bermudagrass is well fertilized with nitrogen and frequently grazed or harvested. Bermudagrass has some limitations. Because it must be established from vegetative sprigs, it is sometimes difficult to establish. Producers must take care to control weeds during establishment. Once established, bermudagrass is aggressive and can crowd out other species, which also makes it a poor choice for wildlife habitat.

Origin: Southeast Africa
Adaptation to Missouri: Southern third of state
Growth habit: Rhizomatous, stoloniferous, sod-forming perennial.
Blade: Folded in bud, sharp tip, smooth or sparsely pubescent, scabrous margins, conspicuous midrib.
Sheath: Slightly compressed, split, loose, sparsely pubescent, tuft of hairs at the junction of the blade and sheath
Ligule: Fringe of hairs, 1⁄10 to 1⁄5 inch long.
Auricles: Absent.
Seed head: Panicle with 3 to 7 narrow branches.
Fertilization: 50 to 100 lb N/acre mid-May after grass "greens up." Apply 75 to 100 lb N/acre every 30 days thereafter. Phosphorus and potassium to soil test.
Burning management: If needed, in early spring three weeks before the last killing frost.
Timing of production: 85 percent of growth between May 15 and Sept. 15. More even yield distribution than most other warm-season grasses.
When to begin grazing: When grass is 6 inches tall.
When to cut for hay: June 1 and every 28 days thereafter.
Lowest cutting or grazing height: 3 inches
Fall management: Do not hay or graze after Sept. 1.

Yield distribution of bermudagrass in Missouri.



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Weather Data for the Week Ending May 18, 2011

By Pat Guinan

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.	May 1 - May 18	Departure from long term avg.	Accumulated Since Apr. 1	Departure from long term avg.
Corning	Atchison	66	46	79	37	56	-7	2.23	-0.38	380	+79
St. Joseph	Buchanan	65	47	76	41	55	-8	0.41	-2.61	362	+44
Brunswick	Carroll	65	47	84	38	56	-7	0.76	-2.37	368	+31
Albany	Gentry	66	45	77	36	55	-7	0.98	-1.98	332	+44
Auxvasse	Audrain	66	46	86	40	56	-7	2.06	-1.34	392	+47
Vandalia	Audrain	66	46	86	36	56	-7	1.20	-1.92	364	+51
Columbia-Bradford Research and Extension Center	Boone	65	46	84	39	55	-9	2.12	-1.25	383	+10
Columbia-Jefferson Farm and Gardens	Boone	65	46	84	37	56	-8	2.61	-0.75	405	+30
Columbia-Sanborn Field	Boone	66	47	85	40	57	-7	2.56	-0.86	447	+49
Columbia-South Farms	Boone	65	46	84	38	56	-8	2.67	-0.70	404	+30
Williamsburg	Callaway	66	47	85	39	56	-7	1.86	-1.25	411	+80
Novelty	Knox	65	46	84	38	56	-7	2.06	-1.12	306	-10
Linneus	Linn	65	45	83	36	56	-6	0.85	-2.38	329	+25
Monroe City	Monroe	66	46	86	38	56	-7	1.03	-1.93	344	+5
Versailles	Morgan	65	47	84	38	56	-8	2.40	-1.32	469	+50
Green Ridge	Pettis	65	46	81	38	56	-7	0.85	-2.29	404	+54
Lamar	Barton	65	48	78	42	56	-9	0.97	-2.81	465	+38
Cook Station	Crawford	66	45	85	33	56	-9	3.27	+0.01	474	+41
Round Spring	Shannon	68	45	87	34	56	-8	4.37	+1.07	443	+47
Mountain Grove	Wright	64	45	82	35	55	-8	3.03	-0.22	420	+60
Delta	Cape Girardeau	69	52	85	44	60	-7	5.82	+2.41	524	+7
Cardwell	Dunklin	70	53	86	47	61	-8	6.76	+3.69	637	+25
Clarkton	Dunklin	70	53	87	45	61	-7	6.10	+3.65	597	+9
Glennonville	Dunklin	70	52	84	44	61	-7	7.03	+4.53	602	+10
Charleston	Mississippi	68	52	84	42	60	-7	5.05	+2.19	567	+50
Portageville-Delta Center	Pemiscot	70	54	87	46	61	-8	7.38	+4.39	647	+43
Portageville-Lee Farm	Pemiscot	70	53	86	45	61	-8	7.76	+4.71	646	+51
Steele	Pemiscot	71	54	87	45	62	-7	6.42	+3.12	658	+49

* Complete data not available for report

‡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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