

AgTimes



New MU plant pathologist talks seed treatments, urges crop rotation to help manage soybean cyst nematode

BY LINDA GEIST
University Extension

COLUMBIA—New University of Missouri Extension plant pathologist Kaitlyn Bissonnette brings research on soybean cyst nematode (SCN) management to Missouri.

SCN numbers are growing in Missouri as farmers devote more acres to soybean production. SCN infests about 75 percent of Missouri fields, according to a recent survey by MU College of Agriculture, Food and Natural Resources researcher Melissa Mitchum. Many of these fields have high SCN egg counts.

SCN populations are changing also. Traditional management practices for SCN — crop rotation and resistant soybean varieties — are not as effective as they once were, says Bissonnette.

“Seed treatments are an emerging tool in the SCN management toolbox that can be used as a supplement to traditional SCN management practices,” she says. “They have the potential to change the way we manage SCN.”

While seed treatments show promise, they do not give season-long control. Performance depends upon soil conditions, temperature and rainfall. And they are expensive.

According to Iowa State University Extension researcher Greg Tylka, the number SCN-resistant soybean varieties is

increasing, from fewer than 25 in 1991 to more than 950 in 2016. However, nearly all varieties are of the type PI 88788, which means they have the same resistance source. Further complicating the problem is that resistance is inconsistent among varieties, says Bissonnette.

Eggs within cysts (dead females) can survive up to 10 years in the soil, even when rotating to non-host crops such as corn and planting SCN-resistant seed varieties. When in the presence of a soybean host, they can reproduce, often with three to six cycles in one growing season.

SCN-resistant varieties help to reduce SCN reproduction during the growing season, but they do not eliminate reproduction entirely. Nematodes that reproduce on a SCN-resistant variety can then produce eggs that can reproduce on other SCN-resistant varieties with the same resistance source. Over time, the population of nematodes in the soil changes to survive when farmers continually plant varieties with the same resistance source.

As a result, SCN-resistant seed varieties become less effective.

“Can anyone say ‘glyphosate?’” Bissonnette says, referring to the development of glyphosate-resistant weed populations after repeated use of the herbicide for weed control.

Bissonnette and her colleagues recommend “rotate, rotate, rotate” to manage SCN:

- Rotate with a non-host crop such as corn, alfalfa or small grains.

- Rotate to resistant varieties. When numbers are high, do not plant a susceptible variety.

- Rotate resistance sources (Peking, PI 88788, Hartwig) or the resistant varieties you use.

Multiple university researchers report that SCN egg numbers can be reduced between 5 and 50 percent in the first year after corn in rotation. However, the effectiveness of rotation drops in the second and third years of the rotation. This makes it important to manage SCN while egg numbers are low, Bissonnette says.

She and other researchers, along with the Iowa Soybean Association, tested Clariva and ILeVO seed treatments for SCN management in university small plot experiments and in statewide strip trials. They measured reproductive factor and yield changes per acre.

They found variability in both SCN reproduction and yield in individual test plots and by location. Some reductions in SCN reproduction were significant, she says, but inconsistent.

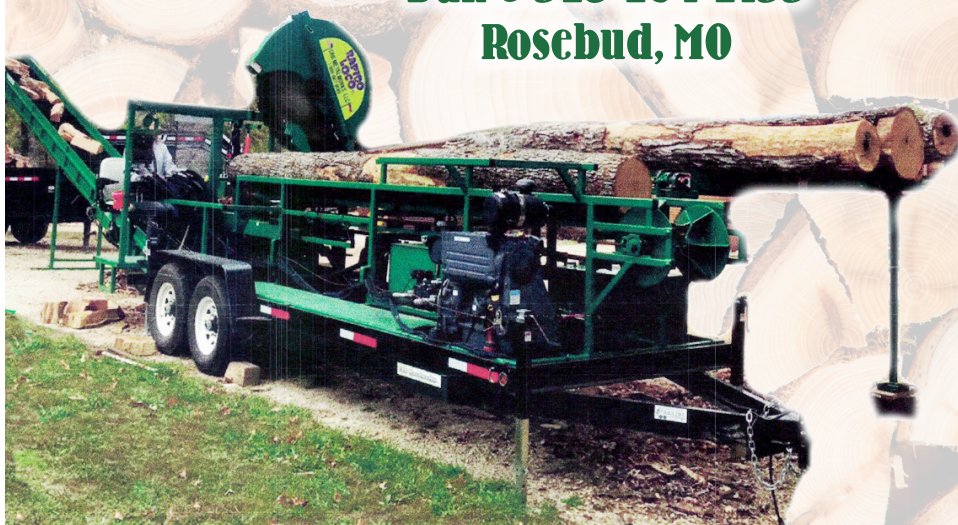
For more information, you can reach Bissonnette at bissonnettek@missouri.edu or follow her on Twitter at @kmbiss.

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DOUG MEYER off-loads corn he and his father, Henry, shelled on family land off Meyer Road during the fall 2017 harvest season. **SIMON RADEMACHER** combines 2017 soybeans on rented ground off the L&D Drive Extension. **JAMIE DECKER (on the cover)** harvests soybeans along Route Y as dry conditions prevailed throughout the fall harvest season for area farmers. **ALSO, AUSTRALIAN** cattlemen and women visited Gerloff Farms last fall.



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A look at the moderate-size cow

BY RALPH VOSS

What is a moderate-size cow?

Ask that question at a meeting of cattle producers and you'll get a lot of different answers. Some will tell you a 1,000-pound cow is the perfect size. Some will say the 1,200- or 1,300-pound cow is moderate in size and about what they want. Others will say the frame score – or hip height – of a cow is what's important, not the weight.

Alan Newport, the editor of Beef Producer magazine, is a big proponent of the small- or moderate-size cow. In his magazine he frequently reports on research that shows the small cow is more profitable than the large cow. Although I find some of the research on the small cow vs. the large cow a little difficult to understand, I always assumed the small or moderate cow would outperform the large cow.

I came to this conclusion more than 15 years ago, when we found that a lot of our large, spring-calving cows were coming up open. One fall we shipped 15 spring-calving cows that were open. Another year we sent



18 to market. In most instances the cows we shipped were large. At least 1,200 to 1,400 pounds – sometimes more than that. By moving to fall calving, we got more of our cows to breed, but we were not impressed with the fall calves.

We created our own fertility problem. Forty years ago we had a herd of Angus cows with Emulous blood lines. You seldom

hear of Emulous anymore. They were good cows – able to handle heat, humidity, fescue and poor management. I don't know if you'd call them moderate in size, but they were not as big as the cows we finally ended up with after introducing Canadian bloodlines into our herd.

The Emulous cattle were developed by Carlton Corbin, a rancher in the Flint Hills

of Oklahoma. Ours came from Carlton's son, Bill Corbin, who operated a ranch in the Flint Hills of Kansas, and from Richard Cummins, a breeder from Stanberry, Mo., whose herd was heavily influenced by Bill Corbin's cattle. Our old Angus did the job until we started using bulls that traced back to the gigantic Canadian bulls that were unable to adapt to the environment of central Missouri.

During one period in the late 70s and early 80s we had a 100% calf crop three out of four years. Once we brought in the Canadian bloodlines, our cows got bigger and less fertile. We loved to go to sales and buy the biggest, most beautiful cow or bull there. Our largest cows would produce gorgeous calves... usually one every other year. By keeping the biggest heifers and breeding them to big bulls, we got some monsters. We had two cows in the neighborhood of 1,800 pounds.

We got into South Polls 15 years ago and the founder of the breed, Teddy Gentry,

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always emphasized the importance of having small cows. He also stressed fertility, disposition, longevity, good udders and a host of other qualities, but that moderate-size cow was always very important to Teddy.

We went along with Teddy's idea of the small/moderate cow, but we got there more by chance than design. We noticed that our cows would usually produce daughters smaller than herself. As a result, we saw that the size of our typical cow was going down.

In the last two years we have been keeping better records on our cattle and the performance of our 2017 calf crop has been revealing.

In 2017 we had 80 calves. If we divide the calves into four groups of 20, we can see a clear trend.

Of the first 20 calves born, 15 of the 20 were out of cows that weighed less than 1,000 pounds and 16 out of the 20 calves weaned at over 50% of their mother's weight. Of those four cows that didn't wean a calf at 50% of her weight, three weighed more than 1,000 pounds. In addition, 18 of the 20 bred back in the first 21 days.

A look at the last 20 calves to be born shows a much different picture from the first 20. Of the 20 calves, 12 were out of

cows that weighed more than 1,000 pounds and only four of the 20 cows weaned calves that weighed 50% of their mother's weight. None of these 20 cows bred back in the first 21 days.

Some of the reason for the difference between the two groups is quite apparent if given much thought. For example, the calves in the first group hit the ground earlier and had more time to grow and as a result were a higher percentage of their dam's weight. The cows in the fourth group didn't breed back in the first 21 days because they calved later in the spring and had fewer days on good grass to get ready for breeding. Some of the cows had their calves just a few days before the bulls were turned out.

We turned out our bulls on June 1 in 2016. Gestation charts show a June 1 mating will produce a March 10 calf. We choose to use March 10 as the date we determine if a cow settled in the first 21 days of the breeding season and calved in the first 21 days of the calving season. If a cow calved within 21 days of March 10 (which makes our calculations easy in that 21 days after March 10 takes us to the end of March) we assume she got bred in the first 21 days.

We also have the veterinarian's preg-test results. If a cow preg-tested 150 days bred on Oct. 27 (the day we preg-tested in 2017),

this means the cow bred in the first 21 days. The vet's evaluation is confirmed the following spring. There is a little movement, but very little. And the movement goes both ways. For example, a cow thought to be 120 days bred can actually have been bred for a shorter or longer period of time.

This could be off a little, but usually not much.

As we noted, our old Angus cows got less fertile as they got larger. Our South Polls on the other hand got more fertile as they got smaller.

Five years ago I felt our calf crop was too spread out. As we've reduced the size of the average cow, we've been able to come up with a set of calves where 52 of 80 were born in March, which means 65% of the calves were born in the first 21 days. Almost all hit the ground in the first 42 days of the calving season. Of the 80 calves born last year, all but nine came in those first 42 days. Of those nine, five barely missed the 42-day mark and only four "stragglers" were born in May.

In our world, having our females born in March and April is a necessity. A heifer born in either of those two months, will almost always breed at 15 months and calve at two. A heifer born on our place in May or June will frequently not breed at 15 months and

as a result will not calve at two. In those instances where the June heifer calves at two, she will have difficulty breeding back and having her second calf at three. Heifers born in May or June usually end up in another home.

A lot of breeders like to calve at three. I readily admit a female that has her first calf at three is going to be bigger and possibly look nicer than our small females. A female that calves at three is much more likely to reach a mature weight of 1,200 pounds. Why do we want to maintain a 1,200 pound cow that raises a 500-600 pound calf, when a 900-pound cow will produce a calf that's just as big as the calf out of the 1,200-pound cow? We don't want to and we don't have many 1,200 pound cows.

I'm convinced one of the reasons our cows are smaller in size is that we keep pressure on them to produce a calf every year beginning at two, and don't give them a chance to grow larger.

Fescue is the other reason we believe our cows are smaller. I think it's unrealistic to think cattle are going to reach their full genetic potential on Kentucky 31.

A producer can cull his herd for many reasons. We hardly ever cull for disposi-

See **Moderate-size**, Page 7B

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Tips for negotiating new farmland leases

BY LINDA GEIST
University Extension

COLUMBIA — Renters and property owners are negotiating new farmland leases in response to lower farm commodity prices, says University of Missouri Extension agriculture business specialist Joe Koenen.

Communication helps landlords and tenants find a middle ground for new leases, Koenen says. Landlords in tune with lower farm prices recognize that tenants will request rent adjustments. “I know of renters who are negotiating leases. Several are being successful,” he says. “Overall, so far it seems relatively smooth.”

Some owners, however, resist the change. Landowners who invested in land with expectations of a set return seem most reluctant to renegotiate new terms, Koenen says. Open communication between landlord and tenant throughout the term of the lease — not just when down

markets hit — is key.

“Communicate every year, not just when prices go down,” Koenen says. Talk to landlords about income and expenses and how that affects your bottom line.

“Agriculture is cyclical,” he says. “We’re in a downturn. Everybody is in the same boat.”

He says income on current Missouri corn/bean rotation farms is down more than \$150 per acre.

Do not pressure your landlord to accept an unrealistic lower rate, he says. Renters do not want to put landlords in the position of putting the land out for bid. Renters should consider additional factors such as proximity to other ground they farm.

Tenants who are good stewards of rental property should remind landowners of this. Loyalty and tradition still matter in rural areas, Koenen says.

Koenen recommends that tenants offer something of value to landowners to offset

the feeling that they are losing. Tenants may be able to offer services such as plowing snow on the landowner’s roads, marketing timber on the property or fixing fences.

Don’t bring up topics such as your new pickup truck or the expensive vacation you are taking, Koenen says. The landlord will be more willing to lower rent if he sees that you are cutting back on your budget. He recommends that renters do a five-year average of their farm income and expenses before meeting with the landlord.

USDA’s National Agricultural Statistics Service (www.nass.usda.gov) releases average cash rental rates for farm, forage and pasture ground each September. MU Extension studies rates every three years.

Koenen teaches MU Extension classes on farm and recreational ground leases. The MU Extension guide “Farm Lease Agreement” (G426) is available for free download at extension.missouri.edu/p/G426.

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tion, because that’s almost never a problem. Teddy took care of that decades ago. In the past we have culled for udder quality, but we’ve greatly reduced that issue in our herd. Longevity is not something to cull for, but it is a quality we strive for by keeping back heifers out of 12- and 14-year-old cows.

For us culling calls for taking a look at the last 25% of calves born. If a cow calves in May two years in a row, regardless of how she has performed in the past, she’s a candidate for a ticket to another environment. Six cows we sent to Alabama two years ago have thrived there, where fescue is not much of a problem. Fescue is torture for a female until she adapts, as she will. But I don’t want to put females through that and I don’t want to put myself through it.

Those cattle and their calves we sent to Alabama in 2016 will never come back to Missouri. There are ready buyers in Georgia and Texas and the cattle will do well for a new owner who does not live in fescue country.

For us, fertility is the key. If cattle can maintain high fertility in our environment — which necessarily includes fescue — then we think everything else will take care of itself.

Ralph Voss is a breeder of South Poll cattle in Linn. He writes for various publications.

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MU beef nutritionist suggests 'feed less, need less' strategy to stretch short hay supply

BY DUANE DAILEY
University Extension

COLUMBIA—As winter feeding season continues, cow herd owners face dwindling hay supplies.

Eric Bailey, University of Missouri beef nutritionist, gives the short answer: "Feed less, need less."

In practice, that takes management decisions and exacting math.

The "need less" part means selling cows. That makes fewer mouths to feed. Selling some cows may be beneficial as it puts stocking rate in synch with carrying capacity of the farm. If a cow isn't carrying a calf, she shouldn't still be in the herd. Pregnancy checks are a starting point.

Cows with bad attitudes or poor production should go down the road. Again, it's fewer mouths to feed. "No cow should be given a second chance," Bailey says.

If she fails to conceive in your farming system, she'll likely fail on retry. Keeping

bad cows builds a mediocre herd.

In his MU Extension talks to farmers, the nutrition specialist goes beyond talking vitamins and minerals. He tells management tips that cut costs. He urges dealing with big problems first. Profits are the point of feeding cows.

In hay feeding, match amount fed to the body needs of the cow. Here's where matchups become important. Is it an 800-pound bale or a 1,200-pound bale? Is it a 1,000-pound cow or half again more in body weight?

Rations are based on the body weight of a cow. General rule: Hay needed is 3 percent of body weight per day. In an example, Bailey uses a 1,000-pound bale and a 1,400-pound cow. With easy math, rounded off, each cow needs 40 pounds of hay a day. That lets one bale feed 22 cows. But not all hay is the same quality. Hay testing allows fine-tuning needs.

A mid-gestation cow needs a ration of

See **Feed less**, Page 9B



WITH THREE hours of access, a cow wastes 6 pounds of hay a day. Given 24 hours, she wastes nearly 14 pounds a day.

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Feed less • from page 8B

55 percent TDN (total digestible nutrients). A cow that calved and nurses a calf needs 65 percent TDN. That mid-gestation cow needs only 7 percent crude protein. The lactating cow needs 11 percent CP.

Oh, then there's hay waste to calculate. Feeding cows requires precision to stretch hay supplies.

Some tips: Roll out only a day's worth of hay at a time. Then cut hours of access to that hay. With three hours of access, a cow wastes 6 pounds of hay a day. Given 24 hours, she wastes nearly 14 pounds a day.

Feeding less hay may take buying and feeding supplement. Needed feed can be made in part by plentiful low-cost byproduct feeds. Those are feeds left in making biofuels, whether ethanol or soy oil. A ration fed at 1 percent of body weight can be half grain (such as corn) and half byproduct.

Before he came to Missouri, Bailey used the MU Extension weekly byproduct feed report published on the MU AgEBB (Ag Extension Bulletin Board) website. Look it up on the web and subscribe.

Feeding management starts with knowing how many days of hay are left. Then herd owners must know what it takes to maintain different animals in the herd.

Counting cows doesn't provide an answer on how much hay will be needed. Feeding is based on body weight of animals.

Bailey, who came to Missouri after working in the Southwest, grew up on a New Mexico ranch.

With that background, he says Missourians have great resources for beef cow herds. Plentiful grass and hay grow here. Supplements are plentiful and low-cost.

Last year an ag drought across much of Missouri reduced grass growth and fall stockpiles. While hay may be short, feed is plentiful.

Producers keep him busy speaking at MU Extension winter meetings.



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BY MICHAEL FLYTHE, GLEN AIKEN AND ISABELLE KAGAN

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Functional Feeds

It is well known that the value of clover is in nitrogen. Clovers fix their own nitrogen so that an input of nitrate fertilizer is not required. Furthermore, they are rich in protein-nitrogen, and can be used to meet the protein requirements of ruminants. Clovers also contain a class of chemicals called isoflavones, and we have recently discovered evidence that the isoflavones positively influence the way that ruminants digest protein.

Many members of the legume family (Fabaceae) produce natural products called isoflavones. They are well known for being biologically active because they are chemically similar to the hormones called estrogens. Most of the older research on isoflavones has been about the negative

effects on reproduction in specific circumstances. For example, a large proportion of red clover in the diet has interfered with the estrous cycle in sheep, and reduced lambing rates, in some cases. This same estrogenic property has been exploited in red clover supplements that reduce the symptoms of menopause in humans. Soy isoflavones are also of interest in human medicine. There is evidence that hypertension can be reduced by the isoflavones in soy-based foods.

Human nutritionists call foods with medicinal value, like soy, “functional foods”. We can borrow that term to consider whether legume forages, such as red clover, have value as “functional feeds”. Cattle often receive drugs of different types at different stages of the production system. Vaccines and anthelmintics are given to young calves, while steroid implants, beta-agonists and antibiotics can be used in backgrounding and finishing. These drugs have revolutionized modern production systems, but they have been criticized. The use of antibiotics

for growth promotion has been especially criticized because of possible contributions to antibiotic resistance in bacteria. Therefore, we explored the idea that red clover could be used as a functional feed to achieve the same benefit as antibiotic growth promoters.

Antimicrobial Growth Promoters and a Plant-Based Antimicrobial

To evaluate chemicals from clover as antimicrobials, we first need to understand how antibiotic growth promoters work. Chemicals like tylosin, lasalocid and monensin are antibiotics, that is, they are made by microorganisms to kill other microorganisms. The rumen is densely populated with many types of bacteria and other microorganisms. Some bacteria, like those that break down fiber, are very important to the animal. Others carry out wasteful processes, such as methane production and protein degradation. The steps in rumen protein degradation are shown in Figure 1. Plant protein is consumed; it is broken down into amino acids by one group of microorganisms; then another converts

the amino acids into ammonia. Some of the ammonia gets recaptured into microbial protein by beneficial bacteria, but much of it is transported into the blood and is lost in the urine. Protein and amino acids that survive the rumen are called “bypass protein”, and can be absorbed by the animal in the lower digestive tract. A group of rumen bacteria called the Hyper Ammonia-producing Bacteria (HAB) convert most of the feed amino acids into ammonia. Antibiotics like monensin kill HAB, which increases bypass protein, feed efficiency and weight gain.

We began by extracting a mixture of isoflavones and similar natural products from red clover (cultivar Kenland). The extract was added to pure cultures of rumen HAB. It was determined that the extract could prevent the growth and ammonia production by the HAB. This result indicated that red clover contained at least one compound that had the desired antimicrobial property. The natural

See **Clover**, Page 12B




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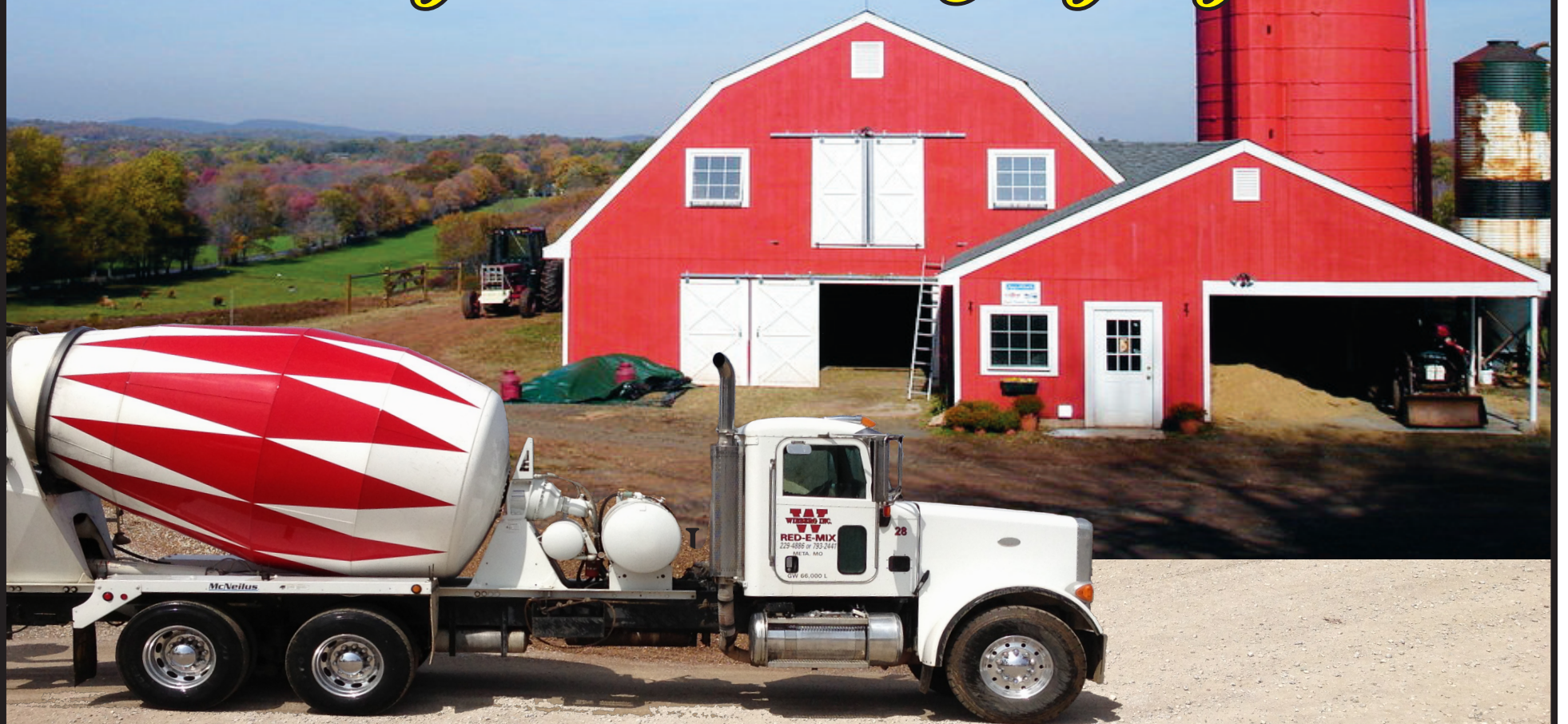


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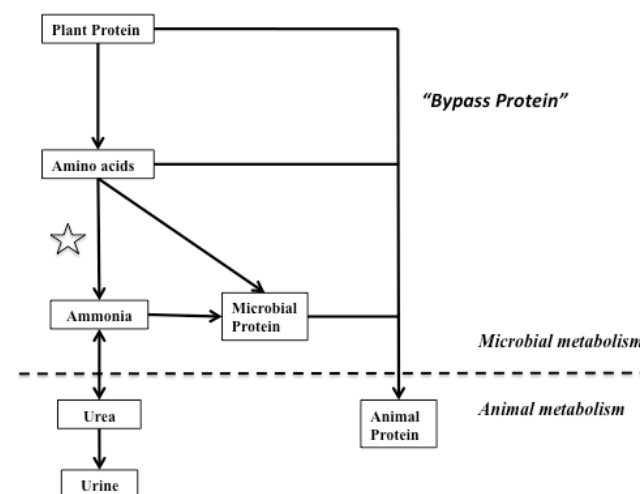
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FIGURE 1. Protein Metabolism in the Rumen. The steps carried out by the ruminant animal are below the dotted line. The steps carried out by the rumen microorganisms are above the dotted line. The star shows the activity of the Hyper Ammonia-producing Bacteria (HAB), which are inhibited by both antibiotic growth promoters and by the red clover isoflavone, biochanin A.



Clover • from page 10B

products in the extract were chemically separated and screened for activity using the pure HAB culture. The compound that prevented growth of the HAB was identified as an isoflavone called biochanin A.

Next we tested both the red clover extract and pure biochanin A on natural rumen bacteria. Instead of using a pure HAB culture, rumen fluid was collected from fistulated goats. When the bacteria from the rumen fluid were fed amino acids, ammonia was produced. Either the clover extract or biochanin A decreased ammonia production. These results showed that the antimicrobial had the desired effect on a natural mix of rumen bacteria, not just a pure culture, and that biochanin A was the active component.

Field Testing Biochanin A as a Growth Promoter

Once it was determined that the red clover isoflavone, biochanin A, could reduce ammonia production from rumen bacteria by killing the same bacteria as antibiotic growth promoters, then the next step was to test its ability to promote growth. Two feeding trials were carried out (spring and fall 2015). In each trial, 48 Angus cross steers were put on pasture (clover-free, novel endophyte fescue) in one of three groups:

pasture only, pasture plus dry distillers' grains or pasture plus dry distillers' grains with added biochanin A. The biochanin A was given at 7 g/head/day, which would be equivalent to the amount of biochanin A in a diet that was approximately 1/3 red clover. The average daily gains were calculated the end of the 63- and 61- day trials (Figure 2). In both cases, the addition of biochanin A improved average daily gain.

The Unexpected Bonus: Clover Isoflavones to Treat Fescue Toxicosis

The results of the feeding trials can be explained solely by the effect of biochanin A on the activity of rumen bacteria. However, the effects of the isoflavone on the physiology of the animal itself must also be studied. As previously mentioned, the isoflavones are estrogenic, which could affect ruminants in a number of ways. A survey of research done on humans and non-ruminant animals revealed that isoflavones were also used to treat hypertension. Previous researchers showed that biochanin A could dilate a blood vessel (the aorta) in rats. This made us consider the common wisdom about clovers in tall fescue pastures. Fescue toxicosis is caused by toxic

See **Clover**, Page 15B

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Rotational grazing proved its value in one of the worst droughts of 20th Century

BY RALPH VOSS

Rotational grazing proved to be of exceptional value in one of the worst droughts of the 20th Century – a drought that began 50 years ago and lasted for six years.

The drought took place in the Sahel, a region in Africa of more than 1 million square miles that takes in parts of nine nations. The Sahel is 3400 miles long – running from the Atlantic Ocean on the west to the Red Sea on the east – and extends between 300 and 600 miles north and south. To get a good idea of the size imagine an area extending across the U.S. from coast to coast, with a depth approximately equal to the north-south dimensions of the state of Missouri. It's an extremely arid region that for centuries has been plagued with droughts – with one megadrought running for 250 years from 1400 to 1750.

The most serious drought in terms of human suffering occurred between 1968 and 1974 and claimed the lives of between 100,000 and 250,000 people and forced another 5.5 million to be displaced.

At the peak of the drought, a National Aeronautics and Space Administration satellite flew over the Sahel and took photos of the devastation, showing nothing but near-desert conditions.

A green pentagon-shaped object appeared in one of the photos, however, and had NASA officials baffled. Later it was learned the pentagon was a 250,000-acre cattle ranch separated from the surrounding burned-up landscape by nothing more than a barbed wire fence. The ranch was divided into five grazing cells of 50,000 acres each and the cattle were rotated through the cells on a five-year cycle that gave the herd only one of the five tracts each year.

The concept practiced at that ranch was based on the foundation central to rotational grazing – namely giving the land a necessary rest period. In the Sahel a four-year rest period was decided upon and the person who made that call clearly demonstrated a lot of wisdom. In Missouri, with average annual rainfall of about 35 inches in the northwest to 47 inches in the southeast, our appropriate rest periods are more like three weeks to three months.

The story of the green pentagon was reported in a book entitled *Dirt*, written by Dr. David R. Montgomery. In his book Montgomery chronicles how people are causing the planet to lose much of its topsoil and in doing so are ultimately destroying their ability to feed themselves.

The book does not have a photo of the green pentagon. But that photo was undoubtedly taken. There is mention in stories on the Internet that it appeared in *Science* magazine in the 1970s, but still the photo proves hard to find. Hopefully we will be able to find it and publish it.

Dirt is an extremely fascinating book in which the author gives numerous examples where nations have eroded their prosperity and power by allowing their soils to be eroded. Examples are Greece, Rome and Great Britain.

He also talks in detail about the conditions leading up the Dust Bowl in the 1930s, where a large part of the topsoil from the U.S. Great Plains ended up in the eastern part of the country.

Two other items of considerable interest discussed in the book deal with Russia. Part of reason Nikita Khrushchev was ousted as the leader of Russia, Montgomery says, is that Khrushchev's decision to plow up part of that nation's equivalent of our Great Plains ended up about the same as our Dust Bowl. A similar policy adopted more recently resulted with Russia declaring a state of emergency in 1993 over Dust Bowl-like conditions.

A fact driven home by Montgomery is that nations around the globe are losing topsoil more rapidly than topsoil is being replaced. It can take years and even centuries to replace an inch of topsoil, but in places that much topsoil is being lost in very short periods of time.

Montgomery is impressed with the potential of no till and cover crops to not only stop the loss of topsoil, but to also provide for rebuilding soil. He was one of the featured speakers at the No till on the Plains Winter Conference held recently in Salina, Kan.

Ralph Voss is a breeder of South Poll cattle in Linn. He writes for various publications.

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There's still time: why responding to your Census of Agriculture is important

THE AMERICAN FORUM

There's still time. To ensure an accurate representation of the agriculture industry in this country, the United States Department of Agriculture's National Agricultural Statistics Service has extended their 2017 Census of Agriculture response deadline through spring, and the Rural Coalition/Coalición Rural (RC) is calling on all farmers and ranchers to participate.

Representing thousands of diverse producers throughout the United States, the RC has worked for 40 years to promote just and sustainable rural development that brings fair returns to diverse farmers and communities. It also works to protect the environment and bring safe and healthy food to consumers.

Serving as an advocacy voice, the RC was able to secure more than 30 sections of policies in the 2008 Farm Bill that provided more opportunities for small and minority producers, and developed methods and

models to serve its constituencies best.

Small and minority producers need policymakers to continue to respect their value. According to the 2012 Census of Agriculture, small farms make up 88 percent of all U.S. farms. It's data like this that demonstrate economic importance. With a new Farm Bill around the corner, this is the time to be counted.

The Census of Agriculture, conducted just once every five years and sent to every farm and ranch in the country, is the only source of uniform, comprehensive, and impartial agriculture data down to the county level. Providing an overall picture of U.S. agriculture, census data are then relied on when making important decisions about farm policy, disaster relief, loan programs, research, technology development, infrastructure improvements, and more.

Trade associations, extension educators, agribusinesses, even farmers and ranchers themselves have used census data in support of American agriculture.

For nearly 30 years, the Outreach and Assistance to Socially Disadvantaged and Veteran Farmers and Ranchers (OASDFR) Program has been the primary tool to help historically underserved producers gain access to USDA's credit, commodity, conservation, and other services.

In the four years of the 2008 Farm Bill, the program received \$75 million in mandatory funds, about \$18 million per year. According to the 2012 Census of Agriculture, during that time, the number of Hispanic and Asian-American farmers increased 21 percent, African-American farmers increased 12 percent, and Native American farmers increased 5 percent.

In the 2014 Farm Bill, Congress expanded OASDFR to include Veteran farmers, making increased funding all the more necessary. However, that Farm Bill reduced mandatory funds to only \$10 million annually.

If everyone is counted, data from the 2017 Census of Agriculture will help make the case for restoring the additional funding

needed to bring OASDFR to its previous or better levels. But this is just one example of how census data have been and will be used. For farmers and ranchers, the Census of Agriculture is their voice, their opportunity to be represented in the data. There's strength in numbers.

This year's Census of Agriculture aims to show an even more detailed account of the industry. Producers will see a new question about military veteran status, expanded questions about food marketing practices, and questions about on-farm decision-making to better capture the roles and contributions of new farmers, women farmers, and others involved in running the business.

What will the 2017 Census of Agriculture tell us about changes over the last five years?

We will see, but now is the time to ensure an accurate representation of the industry—not just for the future of your operation but your community as well. We urge you to respond to your Census of Agriculture today.

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Clover • from page 112B

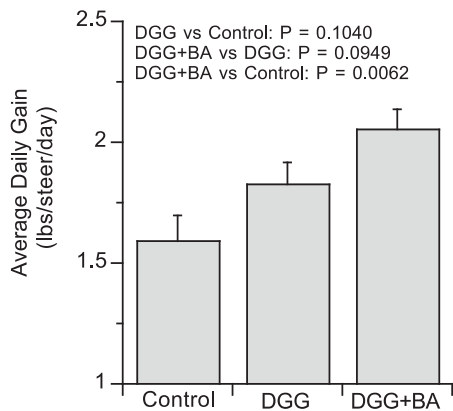


FIGURE 2. Effect of biochanin A (red clover isoflavone) on average daily gain of steers on pasture. There was no effect of season, and the trials were analyzed together. The error bars show standard error. Control is pasture only. DGG is pasture supplemented with dry distiller's grains. DGG+BA is pasture supplemented with dry distiller's grains and biochanin A.

alkaloids produced by a fungus that lives in the grass. The alkaloids cause the blood vessels to constrict, which causes many of the negative health effects associated with tall fescue. It has long been held that clovers in the pasture can "dilute" the concentration of alkaloids in the diet; that is, the animals will consume less tall fescue because they also have clover. However, if isoflavones could relax blood vessels in ruminants, then clover might directly counteract blood vessel constriction by fescue alkaloids.

Two experiments were conducted with goats to explore the interaction of fescue alkaloids and clover isoflavones. In the first experiment, six goats were administered toxic tall fescue seed and red clover extract together for 4 days. The carotid artery, in the throat, and left recurrent interosseous artery, in the forelimb, were observed with ultrasonography. The luminal areas (size of cross-section of the vessel) were not different from goats receiving only orchardgrass hay. Then the red clover extract was taken away, and the goats only received fescue seed. The blood vessels constricted within 48 hours. In the second experiment, the goats received only fescue seed initially, and the vessels were very constricted. When the goats began receiving red clover extract with the fescue seed, the vessels began to open up and were normal by 5 days of treatment. These results demonstrate that clover isoflavones can counteract the toxic effect of tall fescue on blood vessels.

Conclusions

These results may explain many of the benefits seen in animals grazing clovers. It is well known that clovers fix their own nitrogen and convert the nitrogen to valuable protein for grazing ruminants. Now there are reasons to believe that the isoflavones in clover also improve utilization of the protein and promote weight gain by influenc-

ing rumen bacteria in a manner similar to antibiotic growth promoters. The discovery that clover isoflavones can counteract at least one of the negative effects of toxic tall fescue gives us another reason to maintain clovers in the regions where this forage grass is prevalent. Isoflavones are estrogenic,

which means that they have to be carefully used. For example, different feeding levels might be recommended for backgrounding and finishing beef versus pre-weaning or in dairy production. There are also special considerations for sheep, which are believed to be particularly sensitive to reproductive

effects of plant estrogens. Clearly, more research is needed on the biologically active chemicals made by forage legumes, as well as how to best utilize them as "functional feed" in each industry supported by forage. However, the above results indicate that this research is well worth pursuing.

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Land that drinks in the rain

There are two Ozark hills. Both face north and their rocks and soil are covered with a healthy sward of vegetation which is intermittently grazed by livestock. One hillside is the substrate for a diverse native grassland and the other for fescue. Both are well managed, and we figured that the land in both locations would drink in the rain in similar fashions.

When the land drinks in water, it is used to produce crops, forage, and other vegetation, and it also recharges groundwater supplies. In contrast, rain that makes a sudden dash for the ocean often causes floods, and in its determination to find lower elevations, it causes damage to farmland, roads, and houses. In its haste, it carries with it soil from the land causing a loss of the land's productivity, and problems arise downstream as a result of the sediment in the streams. So, it is important not only for the land on which the rain falls and the plants growing there that it infiltrates, but it is also important for the neighbor downstream.

But how are we to know if the rate at which the land drinks in the rain in a diverse native grassland will be the same as in a fescue field without measuring? So in a quest to measure, we set up a simple experiment with the help of Doug Peterson, a Soil Health Specialist with the Natural Resources Conservation Service. We began at the diverse native grassland and drove a metal ring into the soil, measured out an amount of water equivalent to one inch of rain, and dumped it in the ring. One minute and twenty five seconds later, the land had drunk it all in. Again we poured on water. This second inch of rain took longer

See **Rain**, Page 17B




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	Diverse Native Grassland	Fescue Field	Crop Field
First Inch of Rain	1.42 min.	3 min.	>60 min.
Second Inch of Rain	12 min.	33 min.	Even longer

Rain • from page 16B

so while waiting we began to look around at the soil. Doug immediately noticed a large amount of worm castings on the soil surface. He pointed them out noting that the holes earthworms create in the soil could really increase water infiltration. Twelve minutes later, the land had drunk in the second inch of rain. Doug contrasted these infiltration rates to that of a tilled crop field where after an hour of waiting for the land to drink in the first inch of water, they got bored and left.

We loaded up the equipment and moved to the other hillside to repeat the tests in the fescue pasture. The first inch of water disappeared in three minutes. It wasn't quite as fast as the infiltration rate in the diverse native grassland, but three minutes was still a fairly quick infiltration rate. We dumped in the second inch, and while waiting for it to disappear into the soil, we began to look for earthworm castings on the soil surface. They were fewer and further between. Back at the test site, a considerable amount of water remained in the ring. Conversation ensued about the lack of earthworm sign. A big difference in these two hillsides was the vegetation covering them. Doug reminded us that more and more evidence was surfacing that fescue is not conducive to life; not only do the toxins from the endophyte cause problems in livestock, but it apparently causes problems with soil life as well. Still water remained in the ring. Finally, after thirty three minutes, we determined that the land had drunk in the last drop of water. It took almost three times as long as in the diverse native grassland! And while this wasn't a replicated study, it does give us a solid observation to think about.

When the writer penned the ancient words, "Land that drinks in the rain often falling on it and that produces a crop useful to those for whom it is farmed receives the blessing of God" (Hebrews 6:7), he understood the importance of water infiltration. Fescue is so widespread across Missouri's landscape, and pondering all of this makes us imagine what a difference native vegetation could make if it covered a whole watershed. The land would drink in more rain, which would mean more water for the plants to grow and complete their lifecycles. Furthermore, as the water filtered through the soil and into the groundwater supply maybe fishing holes would return to our small creeks and springs that haven't run in years would run again...

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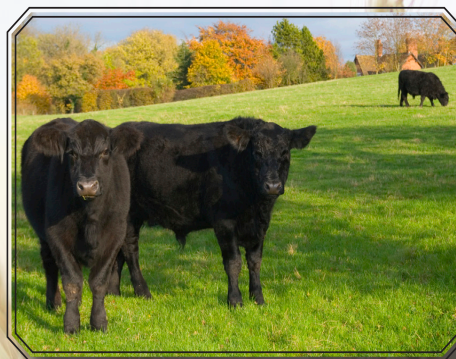
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Inexpensive soil tests can save farmers thousands

BY LINDA GEIST
University Extension

COLUMBIA — Soil tests can save farmers thousands of dollars, says Manjula Nathan, director of the University of Missouri Soil and Plant Testing Laboratory.

Too often, farmers follow routine fertilization schedules and end up applying too much fertilizer to fields, Nathan said. A simple soil test gives the farmer accurate information to guide nutrient management decisions.

Two Lawrence County farmers shared their savings stories with MU Extension agronomist Tim Schnakenberg.

One farmer had fertilized his cattle pastures every year with the same fertilizer. “He budgeted a lot of money to do it,” Schnakenberg says.

One year, he spent \$270 on soil sampling. He reported saving \$20,000 that he would have spent on fertilizer. Another businessman bought a farm

and budgeted \$10,000 for nutrients. He spent \$85 for soil tests that showed that nutrient levels were fine. “Soil testing is a great investment compared to the cost of lime and fertilizer over several acreages,” Schnakenberg says.

In other cases, however, soil tests show low fertility levels. Area MU Extension agronomists can review test results with farmers and make unbiased, research-based recommendations to build up fertility levels.

Fall is a good time to submit soil samples, Nathan said. The lab processes about 32,000 field crop tests annually. Spring is the busiest time. Sampling in fall gives producers sufficient time to make plans for fertilizer applications.

You can take samples to your county MU Extension center or mail them directly to the lab on the MU campus. A basic soil test is \$12.50 per sample if you submit directly to the lab. There is a small shipping charge if you take samples to an MU Extension center.

The MU soil and plant testing lab has a one-day turnaround time. Regional agronomy and horticulture specialists and firms with accounts at the lab receive the soil test results by email on the same day they are processed. Users may also access soil test results online with a password. If you are receiving results by mail, it takes about seven to 10 days from submission to county extension offices to receipt of results.

“Soil testing is an essential management tool for efficient nutrient management that results in improved production and optimized returns,” Nathan said.

The Soil Testing and Plant Diagnostic Services website at soilplant-lab.missouri.edu has downloadable submission forms, instructions for taking and submitting soil samples, information about available tests, and a guide to interpreting test results. For questions, call 573-884-0623 or email soiltestingservices@missouri.edu.

Soil testing not just for farm fields, can benefit gardens, flower beds

COLUMBIA — If a little is good, a lot must be better. All too often, that’s the approach home gardeners take when plants and flowers don’t do well, says University of Missouri Extension soil scientist Manjula Nathan.

Trying to improve flower beds and vegetable gardens by adding more fertilizer and topsoil may be a waste of money. It also can be bad for the environment because excess nutrients often leach into water supplies.

A soil test through the University of Missouri’s Soil and Plant Testing Laboratory can save home gardeners money and trouble by revealing just what their soil needs, Nathan says.

A soil test provides information on soil pH, reserved acidity, nutrient levels, and organic matter content, along with fertilizer and lime recommendations based on your plants’ specific needs.

Test your soil every three years on established lawns. If you have a problem with your lawn, test annually, Nathan says. She recommends testing new lawns before they are established. This makes it easier to amend the soil. Also consider testing soil if fertilizers such as phosphate or potash have been used on a regular basis.

The MU Soil and Plant Testing Laboratory provides reliable, unbiased low-cost tests for soil, plant, water, manure, compost and greenhouse media.

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Review crop, liability insurance before spraying herbicides

BY LINDA GEIST
University Extension

COLUMBIA — Recent issues with dicamba spray drift have highlighted the need for producers to understand third-party liability associated with all herbicide applications, said University of Missouri Extension economist Ray Massey.

Massey presented information about liability risks related to herbicide application at MU Extension's annual Crop Management Conference, Dec. 14-15 in Columbia.

"It's always important that growers understand their liability when using certain products and consult an attorney who specializes in this area for legal advice about any specific third-party pesticide injury," Massey said.

Crop insurance does not cover damage from pesticide drift, according to the crop insurance manual of the U.S. Department of Agriculture's Risk Management Agency, Massey said. However, farmers may exclude yield from damaged acres in their Actual Production History numbers if they report damages to their insurer within 72 hours.

In addition to crop insurance, general liability insurance might help with third-party herbicide injury, Massey said.

"The cause of loss is a critical hurdle for insurance companies to clear because of the various causes of herbicide injury," Massey said. Third-party herbicide injuries can include spray tank contamination,

herbicide drift and volatilization.

"Liability insurance usually covers accidental tank contamination and drift, but it is less clear whether herbicide injury due to volatility is a covered loss," Massey said.

If liability insurance companies approve a crop injury claim, they likely will wait until after harvest to settle so they can estimate yield loss, especially because more than just herbicide injury could affect yield in a field or a portion of it, Massey said.

Here are tips he suggested:

- Verify that your applicator is certified to apply the pesticide being used. Check the applicator's license. If you spray your own field, take the required training and become certified.

- Review your farm's policies and procedures for spraying decisions.

- Review your application for general liability coverage insurance. Update your application if you have made any changes in your farm operation since applying. This includes hiring an employee.

- If you spray your own fields, make sure you have a spray endorsement provision in your policy. If you spray for others, verify that your spray endorsement covers commercial as well as private applications.

MU Extension offers online training for synthetic auxin herbicides applicator training. Go to extension.missouri.edu/main/spotlight/dicamba.aspx to register or for more information. For ques-

tions, call 573-882-4349.

Missouri Department of Agriculture requires all certified

applicators to complete online or in-person training before buying or using dicamba. MDA design-

nated MU Extension as the state's sole training source for required dicamba training.

Online synthetic auxin herbicide applicator training offered by MU

COLUMBIA — Online training on synthetic auxin herbicides (dicamba and 2,4-D products) is now available, says University of Missouri Extension weed scientist Kevin Bradley.

Bradley and MU researcher Mandy Bish teach the online, self-paced class. For more information, go to extension2.missouri.edu/synthetic-auxin-herbicide-applicator-training-program.

The Missouri Department of Agriculture (MDA) requires certified applicators to complete online or in-person training before buying or using dicamba. MDA designated MU Extension as the sole source for dicamba training. Only certified applicators may purchase or apply dicamba. Visit agriculture.mo.gov/dicamba to learn more about Missouri's requirements.

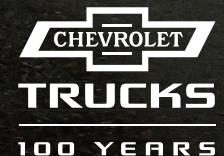
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