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Agricultural **TIMES**



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Early-calving heifers are our future

ALAN NEWPORT

BeefProducer.com

I (suspect most) cow-calf operators have seen the data relating early-calving heifers and cows to bigger calves, earlier-maturing offspring and longevity when defined as ability to stay in the herd.

A new study from western Canada again reiterates these relationships.

This is valuable information, yet I believe most folks are missing some logical inferences from this data. Primarily, the lesson is these are the most reproductive cows in their environment and management system. These are the future of the herd to replace themselves and produce suitable bulls.

Now that I've given you the punch line to chew on, I'll quickly review the Canadian study, and then we'll continue: The trial used 211 black Angus and Angus-crossbred heifers from the Western Beef Development Centre in Saskatchewan. This was a spring-calving herd, and the data came from 2001-17. The breeding season began June 20 each year and lasted about 65 days.

The researchers said heifers that calved with their first calf during the first 21-day period of the calving season remained in the herd longer than those that calved in the second 21-day period or later.

They also showed females that calved early as heifers tended to calve earlier throughout the remainder of their productive lives than the females that calved later in their first calving.

This matches results of a study on more than 16,000 females done at the U.S. Meat Animal Research Center in Nebraska.

In the Canadian study, heifers that had their first calf during the first 21-day period of the calving season lasted an average of 7.2 years, versus 6.5 years for second-period heifers and 6.2 years for third-period calvers.

Average longevity for the USMARC heifers that calved in the first, second or third period was 8.2, 7.6 and 7.2 years, respectively. So, to get back to my point: There is a clear genetic and hormonal difference, and I suspect a phenotypic one, between these early breeders and the later ones. Whether they are being fed a lot or a little, they obviously are more suited to their environment and management conditions. The difference is inherent.

We need to face the fact that we have made cattle extremely unsuited for range conditions by breeding seedstock for feedlot production as essentially a single-trait selection criteria. This was a flawed idea whose time to die has come, along with the "lean and efficient" concept. Cows and bulls that can put on some fat and carry it into the winter will produce calves that can get fat easily and finish early, especially in a

feedlot environment.

Moreover, this reiterates the claim by African rancher-consultant Johann Zietsman that reproduction is a survival trait and therefore is highly heritable.

For a reference from nature, several years back I spent quite a few winter days culling whitetail deer does and butchering them with a friend in the Texas Panhandle. I remember two important facts from this exercise. Regardless of the conditions, drought or no drought, even if the does seemed a little thin in appearance, I can't recall ever butchering one that wasn't reasonably fat or one that was not pregnant. And we aged them from yearlings to more than 9 years old. They were simply suited to survive and reproduce in their habitat.

I believe this is what we need to recapture in our cattle. The right kind of animals, the ones that show high capacity for reproductivity, are the only kind of cattle we need. Comments? Send email to alan.newport@farmprogress.com.

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Take narrow road for lasting horn fly control

The horn fly, one of the biggest seasonal problems for the U.S. beef industry, has a chemical-free and viable solution, but there is little evidence anything is being done to move that direction.

That solution is selecting cattle for genetic resistance. Scientific and demonstrative evidence says this is true.

However, we searched for “bulls for sale fly resistance” using the Google, Duck Duck Go and Bing search engines.

Our internet search found two seed-stock operations in Australia that advertise breeding for “buffalo fly” resistance and one in the U.S. that mentions selection for fly and internal parasite resistance in its cattle — Pharo Cattle Co.

We happened to know of one more, Steven Lukefahr in deep southern Texas, who selects for “internal and external parasite” resistance but whose website did not show up in the search. We suspect there are others, but could not find them. Also, some breeds claim great parasite resistance, but still have significant differences between individuals.

We also found information that said USDA had made a grant for research on an “anti-feeding vaccine” for horn flies.

However, there is viable research — now quite a few years old — that shows some cattle have much greater natural resistance to horn flies, just as has been shown for tick resistance here and on other continents. Some have it, and some don’t.

Dayton Steelman, emeritis professor of veterinary entomology with the University of Arkansas-Fayetteville, found in his years of research that resistance to horn flies is much different among individual cattle in particular. He also learned that resistance is highly heritable among cattle.

Steelman traded emails with Beef Producer over this topic several months ago. He said he went to work as a researcher at the University of Arkansas in the early 1980s. The university had a herd of old-type Angus cattle that had been bred and selected into four groups, stratified by hip height. The shortest averaged about 46 inches. The tallest averaged just more than 50 inches.

“I collected horn fly population data on over 400 Angus cows at the University of Arkansas and USDA Center at Boonville on a weekly basis for 14-16 weeks, each of four years, specifically on each cow,” Steelman said. “The cattle received no insecticide treatments during this time. We

used these data to calculate the heritability and repeat-ability. There was a statistically significant difference in horn fly numbers among the four size groups at the University of

Arkansas and the group in Boonville. The data showed that as the Angus cattle were selected for greater frame size ... had significantly greater numbers of horn flies.”

Steelman said they later added Charolais, Chianina, Red Poll, polled and horned Hereford cows to the study and database. He said the different breeds had statistically significant variations in fly resistance, but they also found statistically significant differences among individuals within each of the breeds. Steelman said they analyzed all the data and came up with an impressive heritability estimate of 0.58,

or 58%, for horn fly resistance.

He added that researchers studying cattle ticks in South Africa and Australia estimated greater than 80% heritability for tick resistance. He said the Africans continued using their data to develop a cattle breed that was tick resistant.

Steelman also said he saw Canadian re-search on the relationship between hairs per square centimeter and cattle size. He says the study showed him the larger cattle had about the same number of hairs as the smaller cattle, and according to the Canadian researcher’s data, all cattle within a breed have about the same number of hairs at birth. Breeding them bigger

just spreads the hairs out, he said it appears.

Steelman then did a study and found that of all the breeds avail-



HORN FLY

HORNFLY Continued on page 5B

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New tests by MU scientists will kill weed seeds before they become weeds

BY DUANE DAILEY
University Extension

COLUMBIA, Mo. - Kill seeds before they become hard-to-kill weeds. That plan will be studied by Kevin Bradley with help from Missouri farmers.

The University of Missouri Extension weed specialist plans research on crushing seeds before they hit the ground. That stops weeds competing with crops next season. Over time, that depletes soil seed banks.

The task is big. Some herbicide-resistant weeds grow several hundred thousand seeds or more per plant.

At the annual Pest Management Day, July 9 at MU Bradford Research Center near Columbia, Bradley asked soybean farmers to volunteer to help.

Soon to arrive at the MU research farm is a Case IH combine with an attached "seed terminator." The mill grinds seeds to dust. Tests in Australia with a similar system showed more than 90 percent of weed seed was not viable after exiting the terminator.

Bradley wants to test his idea and machine on weed-infested farm fields in Missouri. He's looking for soybean fields of 50 to 80

acres, preferably no more than 100 miles from Columbia.

Bradley has spent his research career at MU since 2003 studying all kinds of weed controls, including chemicals. But with repeated use of each new herbicide, farmers select more resistant weeds.

If only a few weeds escape control each year, those survivors produce thousands of seeds that farmers contend with in future years.

Bradley recently shifted gears in his research to look for alternative controls for problem weed species.

In addition to the seed terminator machine, Bradley evaluated the impact of windrow burning. Chaff and weed seed left behind the combine is windrowed and burned. The fire kills weed seeds.

Bradley's team conducts research on weed management at the Bradford Research Center as well as other MU research farms around the state.

Farmers wanting to cooperate can contact Bradley through their regional MU Extension agronomist. There is an MU Extension office in every county.

Pest Management Day visitors riding

bleacher wagons see only a small part of that work. After lunch, visitors use a guidebook to find other research. Bradley's crew planted plot signs to help visitors.

Other MU research farm field days: Aug. 6 at Greenley Research Center in Novelty; Aug. 27 (morning), Graves-Chapple Research Center, Rock Port; and Aug. 27

(evening), Hundley-Whaley Center, Albany.

For more than 100 years, University of Missouri Extension has extended university-based knowledge beyond the campus into all counties of the state. In doing so, extension has strengthened families, businesses and communities.

Published: Friday, July 19, 2019

NATIVE GRASSES

On this and some of the following pages are to be found a number of stories about native grasses. The stories come from and are used with the permission of Hamilton Native Outpost, of Elk Creek, Mo., the go-to people for native grasses. Elk Creek is in the Houston-Cabool area. We have all heard about native warm season grasses such as Big Bluestem, Indiangrass, Switchgrass and the like, but it's important to note that we can greatly improve our native grasses by adding cool season varieties to our warm season grasses. Probably the most popular of the cool season grasses is Wild Rye, a native that grows well along the Gasconade River. When we first bought land along the Gasconade, Wild Rye grew in almost solid stands. Unfortunately, I overgrazed it and killed our stand. The record flooding along the river probably didn't help, but my poor management practices deserve most of the blame, because even after the then-record flood of 1982, Wild Rye persisted in our bottoms. We are slowly getting some natives established on our hills, and strongly encourage you to do the same. The benefits of these grasses will be apparent, as the accompanying stories will describe. — Ralph Voss

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HORN FLY

CONTINUED FROM page 3B

able then, pure-bred Brahman cattle had the highest number of hairs per square centimeter. Chianina were close behind, but the fact remained that hair numbers per square centimeter became less within each breed as the cattle were selected for larger frame size.

For further knowledge, Steelman then washed the animals with hexane and found the compounds being secreted by the two sebaceous glands and one sweat gland associated with each individual hair had an effect on fly attraction or repellency. The more hairs the animal had, the more glands in the skin to secrete these compounds, he learned. He said further cooperative breeding work with USDA Meat Animal Research Center at Clay Center, Neb., showed him and the others could breed highly horn fly resistant cattle, many of them of very large size, Steelman added.

In fact, the two U.S. producers that Beef Producer corresponded with both say they have had good success breeding for genetic parasite control.

Lukefahr says he has selected for fly resistance for many years in breeding a heat-resistant line of cattle he calls STAR (Senepol, Tuli, and Angus Red cross).

“My STAR cattle with slick hides and lighter colors (lighter than red) attract very few flies,” he says. “Of course, there are other genetic factors involved, but these two traits undoubtedly have a major influence.”

Kit Pharo says his selections have been quite successful and that he has used no paratocides now for many generations. Further, he ranks his bulls for fly resistance in all sales materials.

African rancher and consultant Johann Zietsman often talks of parasite resistance as an important part of overall adaptability and reproductive efficiency for cattle. He grew up on a ranch in Zimbabwe in a culture where plunge-dipping of animals was considered the primary solution for tick problems. Eventually he came to realize natural immunity to all parasites was a more effective and profitable plan.

In his book, “Man, Cattle and Veld,” Zietsman summarized this line of thinking: “The problem of ticks and internal parasites

is not going to be solved with poisons. Dipping and dosing make cattle more susceptible to parasites and dependent on the continued use of poison.

“In addition, beneficial organisms such as dung beetles and oxpeckers

are killed whilst creating populations of chemical resistant parasites. The only lasting solution is dependent on the breeding of parasite resistant cattle and not poison-resistant parasites.”

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Missouri land values up 4% on average

BY LINDA GEIST
University Extension

COLUMBIA, Mo. – University of Missouri Extension’s recent land value survey shows that average land prices for non-irrigated cropland across the state increased about 4% or \$204 per acre from last year.

The study shows averages of \$5,421 per acre for good non-irrigated cropland. Survey respondents rated good irrigated cropland at \$6,148 per acre, \$634 more per acre than last year.

MU Extension economist Ray Massey says the web-based survey considered the average value of three classes of cropland and pasture as of July 2019. It also considered timberland as well as hunting and recreational land.

Demand remains strong and rental rates decreased little. Broadband internet expansion might influence some sales near metropolitan areas. Massey also points to low interest rates and low rates of return on “safe” investments such as certificates of deposit causing people to put their money in land.

Bootheel area land topped statewide values at \$7,090 for good non-irrigated cropland and \$7,353 for good irrigated land while even poor cropland ranked at \$4,051.

Respondents estimated good pastureland at a statewide average of \$3,174 per acre, up \$259 or 9% from 2018 estimates.

Reported changes in value varied greatly, from a 6% decrease to a 22% increase. Pastureland in counties bordering the Missouri and Mississippi rivers showed the highest values.

Hunting/recreational property in those same counties also ranked at the top, with timberland values at \$2,789 and hunting/recreational land values at \$2,700.

Overall, Missouri hunting/recreational land and timberland posted a 12% increase in value.

Central Missouri timber/hunting and recreational land grew the most in value, according to the survey, with a 32% positive change. Good cropland and pastureland in central Missouri posted upward changes of 22%.

The Lake of the Ozarks region posted the highest changes in land values in the state for timber/hunting and recreational land at 34%.

The survey also reports a growing trend of buyers planning to farm the land themselves. As many as 62% of buyers plan to farm the land; 27% intend to rent out the land; 10% plan to use the land for non-farming purposes.

Massey says survey respondents expect little change in land values in the coming year. “In 2018, the respondents to this survey expected land values to decrease slightly. This year, while some regions show decreases and some increases, the average value of cropland, pastureland, timberland and recreational land across the state is expected to hold where it is now,” he says.

Massey says 75% of responses came from lenders, 12% from farmers, 9% from rural appraisers and 4% from other occupations.

For the complete report, go to extension2.missouri.edu/g401.

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Explore a career in agriculture

The agricultural industry provides a variety of opportunities to professionals interested in this often misunderstood field.

According to the employment resource AGCareers.com, more than 250 career profiles are available to people interested in a career in agriculture. And while jobs in agriculture may not be as prevalent as they were a few centuries ago, when 72 percent of the workforce was employed in farm occupations in the United States, agriculture remains a booming industry that greatly affects the nation's economy. Today, one in 12 American jobs is depends on agriculture, according to the career resource Payscale.

The following are some potential professions for those considering careers in agriculture.

- **Agricultural business manager:** This person oversees the business operations of a farm by providing organization and leadership during the production process. He or she contacts creditors, selects seeds, buys new equipment, and ensures the distribution of product.

- **Agricultural lawyer:** Attorneys who specialize in agriculture deal with water and environmental issues, represent agricultural labor in disputes, ensure proper marketing techniques are followed, handle real estate and land use issues, and much more.

- **Animal control officer:** These officers enforce local and regional laws that pertain to the treatment and care of animals. They patrol for distressed animals and ensure cruelty-free practices are adhered to.

- **Grain buyer:** Grain buyers build relationships with producers so they can purchase grain for their particular companies. They negotiate purchase agreements, source grain supplies and issue purchase orders.

- **Poultry hatchery manager:** Hatchery managers oversee all of the aspects involved in poultry hatching. These can include management of personnel, handling and sorting of eggs, maintenance of equipment, coordination of pick-ups and deliveries, and overseeing quality control.

- **Soil scientist:** Among the many tasks they might perform, scientists in the field of agriculture test soil samples for minerals and contaminants. By studying the soil, scientists can recommend which crops the land can support, how much livestock can feed in an area and the implications of agriculture on the area as it pertains to managing natural resources.

A career in agriculture presents many exciting opportunities in a number of different applications. It's a vast industry that utilizes professionals with an array of skillsets.



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Survival of flooded crops depends on time, temperature

BY LINDA GEIST
University Extension

COLUMBIA, Mo. – “It’s raining, it’s pouring, the old man is snoring” is a child’s chant that rings far too true for Missouri farmers today.

Many Missouri field crops face fallout from flooding and excessive rain, says University of Missouri Extension corn and small grains specialist Greg Luce.

Survival of flooded corn and soybean seedlings depends on how long the flood lasts, floodwater temperatures and how fast fields dry, Luce says.

Flooded plants deplete oxygen in 24 to 48 hours. Moving water, which allows some oxygen to get to plants, results in less damage than still water, he says. Young plants can survive about two days when temperatures exceed 70 F. When temperatures fall to the mid-60s or below, they can survive as long as four days. Survival also depends on how much of the plant is submerged.

Plants should show new leaf development three to five days after water recedes, says Luce. Examine seedlings for disease. Look for rotted or discolored seedlings, roots and

damping-off symptoms. (See the recent MU Integrated Pest & Crop Management newsletter article “Stand loss due to seedling disease” at ipm.missouri.edu/IPCM/2019/5/seedlingDisease (opens in new window).)

Generally, soybean tolerate flooding longer than corn—up to 48 hours. After 48 hours, expect stand reduction, loss of vigor and lower yield. Root damage also occurs. This impairs the plant’s ability to take up water and tolerate drought stress.

Abnormally high temperatures reduce survivability by 50% or more. Plants survive better in lower temperatures because metabolic processes slow.

Flooded plants also can face disease pressure. Cool, wet fields create favorable conditions for soil pathogens. They also

delay plant development and growth. This puts some plants at greater risk of soil-borne diseases that attack seeds and seedlings.

Seed treatments can help prevent diseases, but they typically only provide protection for a couple of weeks under cool, wet conditions.

If these conditions persist longer than that, crop

stands are at risk from Pythium, a parasitic disease that damages seedlings of soybean and corn. Phytophthora also can damage soybean seedlings or start infections in the early summer that may develop and kill soybean plants later in the summer.

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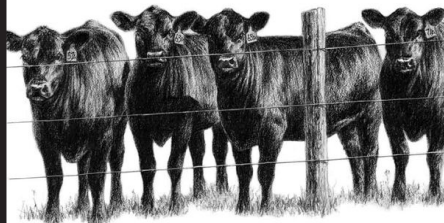


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Novel camera system could provide cost-effective way to monitor crop temperatures, MU researchers find

COLUMBIA, Mo. — A hot plant is an early warning sign of an under-watered, unhealthy plant, which makes monitoring crop temperatures a priority for many farmers. But to do so, they need the right equipment. Infrared cameras can detect heat and convert it into an image, but they are large, unwieldy and expensive. Infrared sensors are less expensive, but they don't provide images, which makes accurate monitoring difficult for medium and large-sized fields.

Now, researchers from the University of Missouri and the USDA's Agricultural Research Service have developed a novel approach that can provide precise, visual crop temperature data at a lower cost. Combining a regular digital camera with a miniature infrared camera into a specially engineered structure, the system can provide both temperature data and detailed images, giving farmers a large amount of information about their crops.

"Using an infrared camera to monitor crop temperature can be tricky because it is difficult to differentiate between the plants and background elements like soil or shade," said Ken Sudduth, a USDA agricultural engineer and adjunct professor of bioengineering at MU's College of Agriculture, Food and Natural Resources. "By augmenting a miniature infrared camera with a digital camera, we created a system that can examine crop temperatures with great detail and accuracy."

Sudduth developed the camera system with Philip Drew, a graduate student researcher who completed his master's degree at MU while working on the project. Together, the cameras produce two distinct images of the same area: a visually detailed photograph and an infrared image. The setup, known as the Multi-band System for Imaging of a Crop Canopy, allows farmers to identify problem areas from the digital camera images and analyze those areas with infrared images that map temperature to light intensity.

Coupled with an algorithm that automatically filters soil, shade and other non-plant presences from the images, the camera system would allow farmers to precisely irrigate their crops according to the specific needs of individual plants, maximizing yields and optimizing water use without requiring the purchase of more expensive infrared cameras.

"Medium-scale farmers have big fields, but they don't always have the funds for expensive monitoring equipment," Sudduth said. "Our system allows for precision monitoring

over a large area for a more manageable cost. That's good for farmers who can earn a bigger profit, and it's good for everyone who depends on their crops."

Sudduth said the system needs more fine-tuning before it can be sold to farmers, and future iterations could incorporate drones for increased versatility.

The study, "Development of a multi-band sensor for crop temperature measurement," was published in Computers and Electronics in Agriculture. Allen Thompson of MU and John Sadler of the USDA Agricultural Research Service were also involved in the study.



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7 reasons to shop farmers' markets



A farmers' market is likely coming to a field or open parking lot near you — if there isn't already one operating nearby. The United States Department of Agriculture says that, between the years of 2008 and 2013, the number of farmers' markets doubled across the country.

Farmers' markets will continue to thrive and expand as people increasingly realize the benefits of supporting local food providers. Buyers who are not yet familiar with farmer's markets can examine the following seven reasons to break the ice.

1. Enjoy fresh, seasonal foods.

Foods at farmers' markets tend to be limited to in-season offerings. Some nutritionists suggest eating seasonally available foods is better for your body, because humans ate seasonal produce for thousands of years before shipping and refrigeration changed how people received the majority of their foods. In addition, many people feel that fresh, seasonal foods taste better than the alternatives.

2. Discover new foods.

There's always something new at a farmers' market, and this can entice shoppers to expand their flavor palates. Explore interesting, locally grown items. Even children may fall in love with colorful fruits or vegetables and their refreshing tastes.

3. Embrace organic and non-GMO offerings.

Many farmers' markets offer foods that are organically grown and are produced without GMOs. Farmers' market retailers also tend to give firsthand accounts of where their foods come from and how they are grown or raised.

4. Indulge in nutritious foods.

The vivid colors and smells emanating from farmers' markets indicate just how fresh and nutritious the offerings tend to be. Farmers who peddle their wares at farmers' markets adhere to careful farming methods to ensure their foods are as nutritious as possible.

5. Learn secrets and recipes.

In addition to fresh produce, farmers' markets may offer baked and other prepared goods. Shopkeepers often mingle with their customers, offering trade secrets and recipe ideas. Additionally, local farm families supported by farmers' markets generally offer supreme customer service to keep shoppers coming back week after week.

6. Turn the trip into a social excursion.

A farmers' market can be an exciting and flavorful social gathering place for families and groups of friends, as well as a great place to meet other members of the community. Sometimes farmers also mingle with local artisans, so the market can be a one-stop-shopping locale for locally produced food and art.

7. Save money.

Farmers' markets may sell organic produce at a cost comparable or even lower than other retailers. That's because local farmers don't have to transport their items as far as retailers whose foods were shipped from far away places.

Any time of the year is perfect for grabbing a tote bag and browsing the wares at a nearby farmers' market, where shoppers are bound to find something fresh, unique and delicious.



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Missouri growers are sweet on honey of a berry

BY LINDA GEIST
University Extension

ELKLAND, Mo.—Blueberry is singing the blues. There’s a new berry in town.

Berry lovers might say “pretty is as pretty does” applies to the flavorful honeyberry. Easy-growing and easygoing, it grows well in a variety of soils, sun and shade. It resists disease and pests.

University of Missouri Extension horticulture specialist Patrick Byers says southwestern Missouri’s rocky soil is perfect for honeyberry. Farmers in other states found honeyberry plants long and strong, with a 50-year life expectancy and the ability to withstand temperatures as low as minus 55 degrees.

The purple-blue, teardrop-shaped berries are half an inch to an inch long. They are the first to bear in spring, even before strawberries.

Honeyberry goes by haskap in Japan and zhimolost in Russia.

B Berry Farms, a U-pick operation in Elkland, Mo., sells 20 different varieties of honeyberry. B Berry also grows a variety of other fruits, including blackberries, raspberries and Goji berries, as well as vegetables. Value-added products include soaps, balms and lotions.

Farm owners Brandon and Teresa—they want their customers to know them on a first-name-only basis—started growing berries for themselves and their children. They now grow up to 4,500 plants on their Webster County farm.



“We wanted more control over how fresh our food was and where it came from,” says Teresa. “That started our journey looking for local food choices.”

When they decided to add honeyberries to their operation in 2015, they cleared rocks, cedar trees and briars from the rocky, clay soil to make way for berry patches. They applied sulfur and peat moss for blueberries the following year.

When they planted 3-year-old honeyberry bushes, they immediately saw some advantages over blueberries. Honeyberry bushes flower earlier than blueberry plants, and the early-ripening, thick-skinned fruit is less vulnerable to spotted wing drosophila. The berries grow under the leaves, protecting them from birds, rain and hail.

“We also found that they can thrive in soggy, oxygen-deprived soil,” Teresa says. “Despite being covered in weeds without much sunlight, the plant will still flourish, unlike other berries.”

Honeyberry also tolerates a wide range of soil pH. Brandon and Teresa say the plants did well in soil pH of 5-8, and sometimes even outside that range. They require little maintenance.

Teresa says honeyberries have antioxidants and potassium levels nearly three times higher than blueberries.

Brandon and Teresa use the farm’s produce in hundreds of value-added products such as lip balms, tea blends and natural dyes. In addition to running the farm, they both work full-time jobs off-farm.

“We knew there would be many unknown challenges ahead for our family, but isn’t that what life is about—just doing what needs to be done?” Teresa says. “Since we opened, we have enjoyed being able to bring friends and families together to a place where their children can run around, enjoy nature and have fun eating a healthy treat.”

Learn more about the farm at bberryfarms.com.

Published: Friday, Jan. 31, 2020

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Saving bees one hive at a time: The basics of backyard beehives

Scientists and environmentalists have been warning the public for years that honeybees are disappearing at alarming rates. Scientists were initially uncertain in regard to what was decimating bee populations. Even though no single cause is to blame, data has pointed to pesticide use and the mysterious colony collapse disorder, which is a name given to the dwindling colonies seen around the world.

National Geographic News says bees are essential because of their roles as pollinators. Agriculture industries rely on honeybees, especially managed honeybees, to keep commercial crops pollinated and productive. Estimates indicate that roughly one-third of U.S. crops rely on honeybees — accounting for more than \$15 billion in crop production. Without bees, the costs of everything from blueberries to apples to broccoli would rise, as farmers would have to use a different, more expensive pollination method.

Even though backyard beehives or bee farms may not be crucial to consumer agriculture, bringing healthy colonies back to various areas is beneficial to the environment overall. The art of beekeeping has become an important endeavor, and just about anyone with some time and resources can start their own apiary.

• Start by studying bees. Interested beekeepers can begin their journey by

reading all they can on beekeeping. The American Bee Journal or backyard beekeeping books and articles are great places to start. Local beekeeping associations also are invaluable resources for information on local bee species and traits.

• Know the laws. It's important to get the go-ahead from local authorities before introducing bees into the community. By checking city or town ordinances, potential beekeepers will know how many hives are allowed and which type of property sizes are amenable and allowable.

• Get the right supplies. Research can help prospective beekeepers understand the type of equipment they will need. One



can purchase this equipment, but some beekeeping organizations may be willing to lend or rent it to interested parties. Hive boxes, bottom boards, a veil, a jacket, a smoker, and a top feeder are just some of the supplies needed.

• Order bees. Bees can be acquired from other beekeeping enthusiasts or can be ordered online. The bees will need to consist of the queen, drones and worker bees. According to the resource Bees Brothers, a starter set of bees is called a

“nuc.” Bee suppliers start selling in the winter for spring swarms.

• Place the hive. It's important to set up hives away from foot traffic. In addition, face hives away from strong winds, with the ideal directions being east and south. Hives need sunshine and some shade on summer afternoons, advises BackYardHive.

With time, homeowners can become successful beekeepers and do their part to replenish much-needed bee colonies.

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MU research targets Japanese beetles

WRITER: LINDA GEIST



University of Missouri Extension entomologist Kevin Rice

COLUMBIA, Mo. — Japanese beetles—those mean, green eating machines—are peaking throughout much of Missouri.

University of Missouri Extension field crops in Rice hopes his research on Japanese beetles will take a bite out of their buffet.

Japanese beetles cause large economic losses for the agricultural community. Adult beetles typically feed on silks and tassels in corn and foliage on soybean. They also damage the foliage and fruit of more than

400 flower, shrub and tree species.

Currently, pyrethroids are the best knock-down control measure for them, says Rice. Apply chemical control when thresholds are met. The beetles move quickly from nearby woods, fields and lawns to re-infest an area, so multiple applications might be necessary.

Rice and his team of MU graduate students are researching the use of nets containing pyrethroids to control Japanese beetles. They place nets and pheromone lures around field borders. Previous researchers found that beetles pick up a toxic dose within three seconds. The nets remain effective throughout the growing season and are unlikely to attract pollinators.

“It’s not a silver bullet,” Rice says, “but it’s a bullet.”

Japanese beetles are in peak season in Missouri now. Rice recommends chemical control when economic thresholds are reached. Bags and traps are far less effective and may attract more beetles.

Traps catch about 75 percent of beetles and can actually attract more beetles than they capture, according to the USDA publication “Managing the Japanese Beetle: A Homeowner’s Handbook” (opens in new window).

If you use traps, place them away from plants and on the borders of yards or fields.

Rice says his research is in the preliminary stages and he does not recommend nets yet. He says homeowners and farmers should

continue to monitor lawns and fields. Apply chemicals in a timely manner according to label instructions.

The adult Japanese beetle is a little less than half an inch long and has a shiny, metallic-green body with bronze-colored outer wings. The beetle has six tufts of white hair under the edges of its wings. Japanese beetles produce one generation each year and can burrow up to 12 inches below soil in the winter to survive.

You can monitor Japanese beetles and other

pests at MU’s Integrated Pest Management website (opens in new window).

Photos available for this release:

<https://extensiondata.missouri.edu/NewsAdmin/Photos/stock/bugs/Japanese-Beetles.jpg> (opens in new window)

University of Missouri Extension entomologist Kevin Rice and his team of graduate students research the use of pyrethroid nets to control foliage-eating Japanese beetles. Photo by Jessi Dodge, MU Extension.

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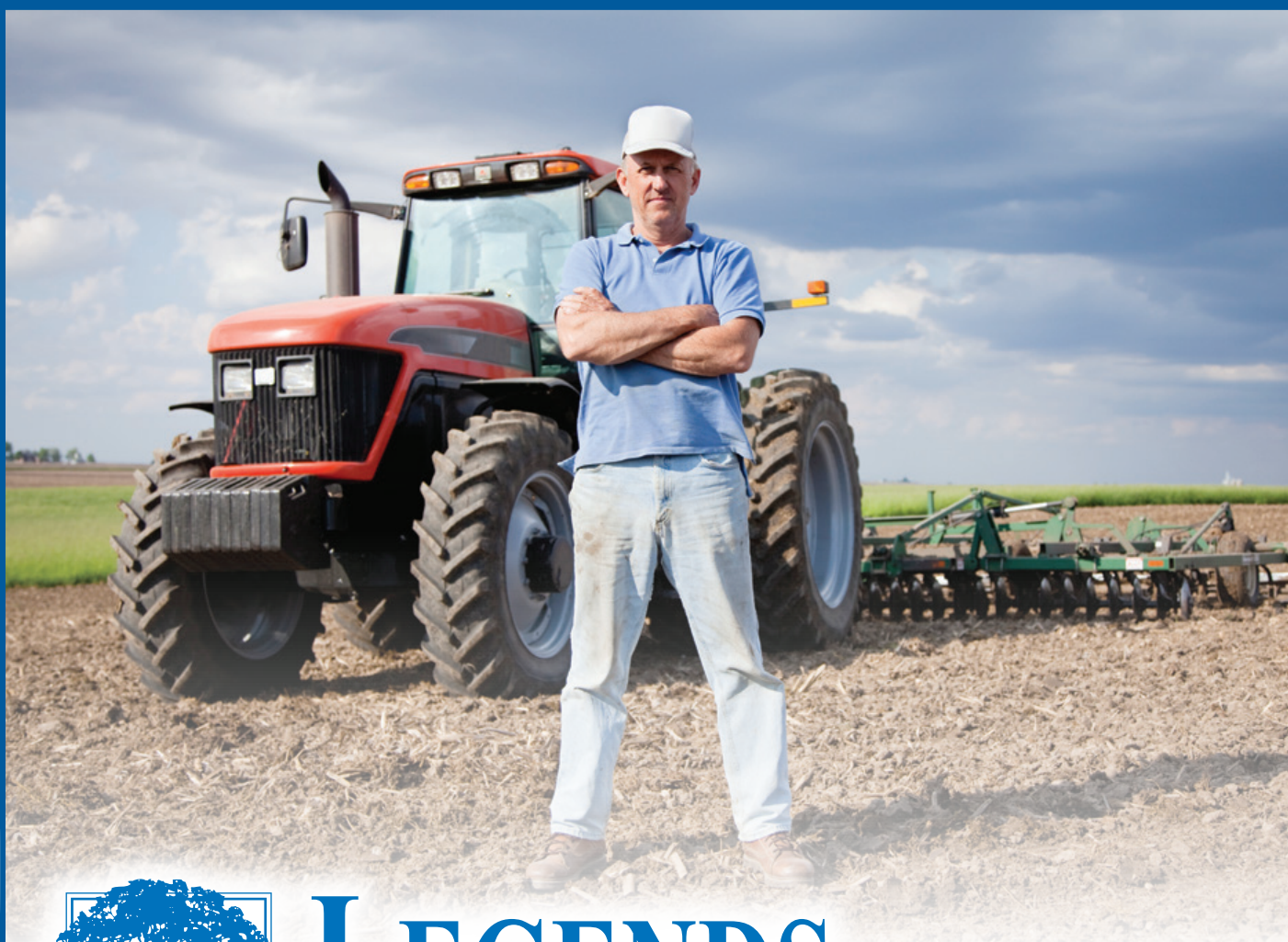
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The various benefits of farm-to-table

Few things are more satisfying than biting into a fresh tomato right from the garden or seasoning a meal with herbs picked from a windowsill greenhouse. Restaurants recognize the value of such experiences, and more and more are relying on locally sourced products in their kitchens.

The farm-to-table movement is not new, but it has gained momentum as consumers become increasingly enamored with the flavor and environmental impact of locally sourced foods. The National Restaurant Association found that farm-to-table food was one of its top 10 trends for 2015. Furthermore, the group says that one in five consumers are willing to pay more for local food, and 41 percent admit that locally sourced ingredients influence their decisions when choosing where to dine.

Newcomers to the farm-to-table dining experience may not understand all the fuss surrounding this popular trend. The following are some of the key benefits of farm-to-table.

- **Peak freshness and ripeness:** Local produce ripens on the plant and can be harvested at the last possible minute before it turns up on a plate. This helps ensure that it contains the highest amount of nutrients and flavor, according to the Harvard T.H. Chan School of Public Health. Food that has to travel further is often picked well before it is ready, ripening on the way to stores or other vendors.

- **Better for the environment:** Food that needn't travel far before reaching diners' plates saves roughly 500 gallons of diesel fuel to haul produce a distance of 1,500 miles. This conserves fossil fuels and prevents harmful emissions from entering the atmosphere.

- **Supports neighboring farms:** Supporting farm-to-table restaurants and other eateries keeps business local in two different ways. It not only benefits local restaurants, but it also directly supports

neighboring farms, fisheries and other suppliers.

- **Accessibility to seasonal choices:** Farm-to-table eating provides a wide variety of in-season foods. This can translate into tastier foods because they are grown and harvested during their optimal growing season.

- **Reduces factory farming:** According to O.info, the informational resource powered by Overstock.com, farm-to-table and local farming can reduce reliance on large, profit-driven corporations that may focus on maximum production over animal health and welfare. Local farms may be more inclined to treat their animals well and institute sustainable practices.

- **Learn about the community:** A person might live in an area and never know that a local vineyard is in the vicinity or that a producer of straight-from-the-hive honey is nearby. Exploring farm-to-table resources can open people's eyes to local businesses doing great work in and around their communities.

Farm-to-table is a popular movement that people are embracing for various reasons.





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Hitchhiking spotted lanternfly could become problem in Missouri

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — An exotic pest that hitchhikes on train cars, trucks and boats could suck the life out Missouri crops.

Spotted lanternfly has the potential to establish populations in Missouri, says University of Missouri Extension field crop entomologist Kevin Rice. It damages soybean, corn and hops, as well as fruit and ornamental trees. According to MU Extension viticulturist Dean Volenberg, it could have damaging effects on Missouri's 1,700 acres of grapes, its primary host.

Adult lanternflies are active in June and July. Entomologists reported seeing the spotted lanternfly in Pennsylvania in 2014. It has appeared since then in Virginia, Delaware and New York.

The plant hopper likes to lay its eggs on smooth, metal surfaces such as those found on train cars, boats and tractor-trailers. Its honeydew secretions attract other pests. It leaves weeping wounds as it feeds.

The adult lanternfly's forewing is gray with black spots. The wingtips are black blocks outlined in gray. It has distinctive bright orange-red and white underwings, but it appears less vibrant and may be difficult to see when its wings are not spread, Volenberg says.

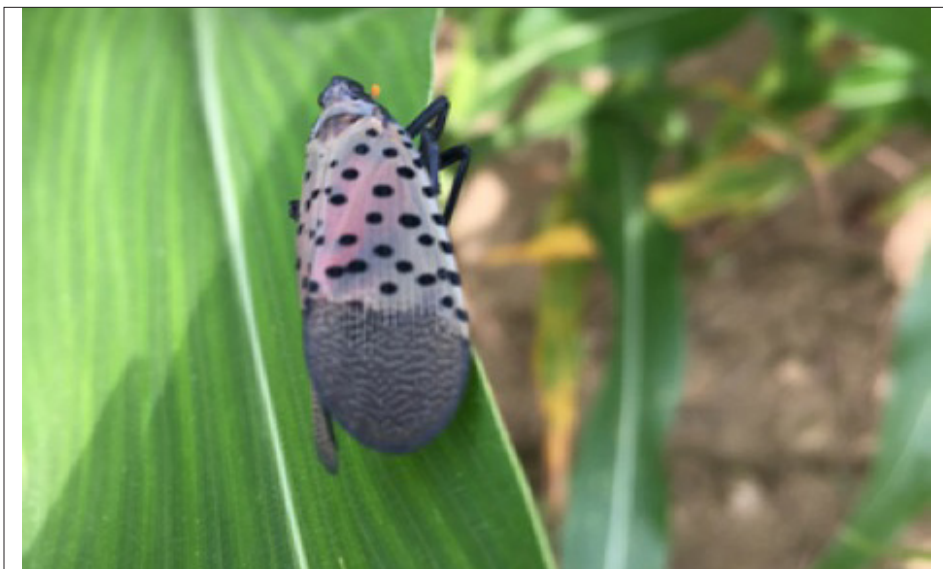
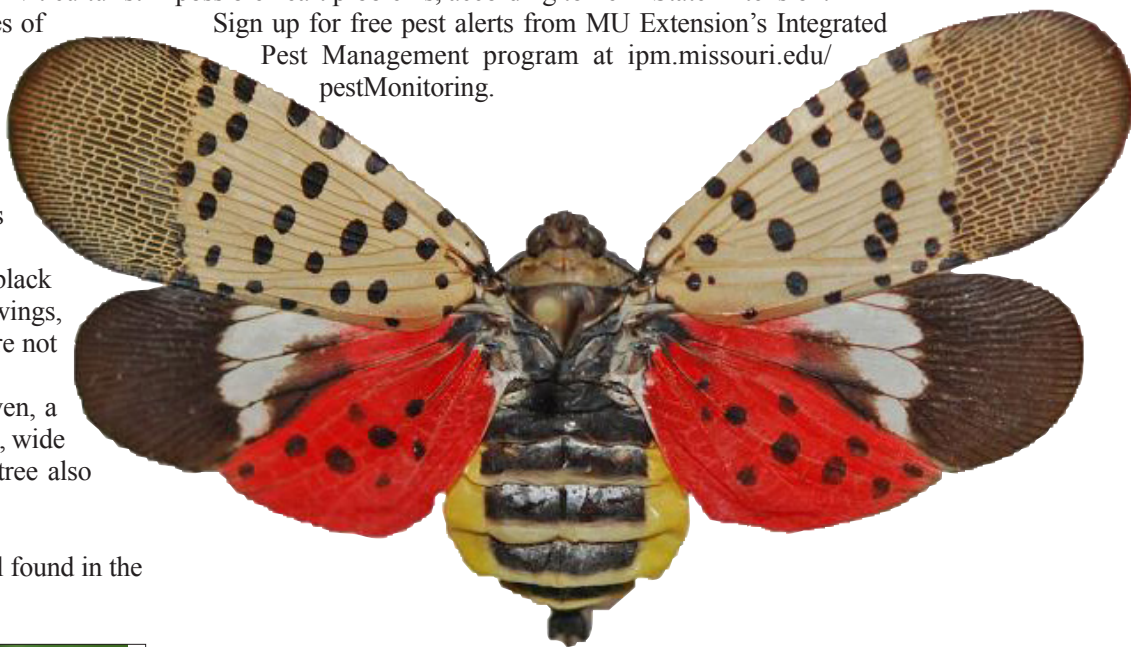
It likes fall feeding on *Ailanthus altissima*, also known as tree of heaven, a medium-sized invasive tree with stout branches that spread to form an open, wide crown. Its flowers are showy and fragrant and it tolerates drought. The tree also enables the ailanthus webworm moth.

What to do if you spot lanternflies

- Do not kill it. The insect contains cantharidin, the same toxic chemical found in the blister beetle.

- Capture it if you can. Lanternflies are jumpers.
- Take a photograph of it. Email to ricekev@missouri.edu.
- Collect a specimen and put it in a vial filled with alcohol to preserve it.
- Take it to your county extension center and note where you found it. GPS coordinates are helpful. The extension center will send it to Rice, who will track its spread in Missouri.
- Use caution when handling tree of heaven; its sap can cause headaches, nausea and possible heart problems, according to Penn State Extension.

Sign up for free pest alerts from MU Extension's Integrated Pest Management program at ipm.missouri.edu/pestMonitoring.



WHEN ITS wings are not spread, the spotted lanternfly is fairly unremarkable in its appearance.

PHoto courtesy Pennsylvania Dept. of agriculture

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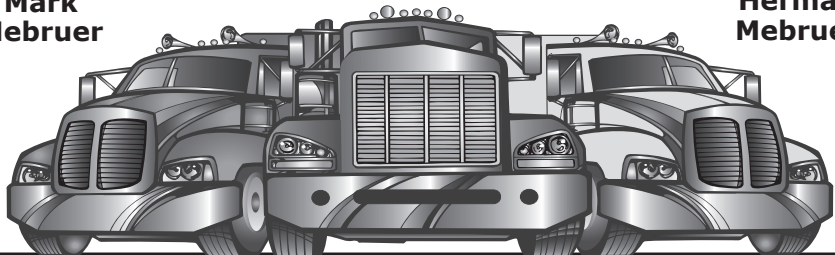
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Can you make cull cows a better profit center?

BY ALAN NEWPORT

BeefProducer.com

Cow culling typically produces poor returns for many ranches, but it could be made more profitable. It's a matter of weighing your costs versus potential returns, combined with better market timing.

First, it's generally accepted cow sales make up only 10% to 20% of ranch income on most cow-calf operations, despite the fact cows typically make up more than half the livestock inventory. We recently addressed one remedy for this with the story "Consider the no-depreciation cow-calf operation," still available online at BeefProducer.com.

A further cure for meager cow returns would be better marketing of the open cows typically sold in the fall at preg-check time. One look at the graph in this story should tell us this is a bad financial or marketing decision, if we didn't already know.

A three-year project by the Noble Research Institute in southern Oklahoma was published earlier in 2019 and showed significant actual profits to be had from keeping open cows in the fall, feeding them and breeding them, then selling as bred

cows at a later date.

In brief, they found feeding on weight without adding a pregnancy did not make for a profit when selling cows in the spring in those three years. However, when they sold heavier, bred cows in the spring, about half the time they made a profit, in some cases a significant profit over feed costs. Their average pregnant-cow profit for that three years was \$68 per head.

In this study, Noble Research Institute used a total of 244 open cows from one of its research farms in 2015-16, 2016-17 and 2017-18.

At weaning time each fall, all cows were weighed, pregnancy tested via ultrasound, and assigned an initial body condition score by certified beef quality assurance research technicians.

Here's the gist of their management and record keeping. Using body condition scores, the open cows were sorted into two management groups:

- a "thin" group with BCS less than 5.5
- a "moderate" group with BCS greater than or equal to 5.5

Each month through the end of

the cow-retention period, cows in both groups were weighed and given a BCS. At weaning time and at the end of the retaining period, the USDA cow grader traveled to the study site and placed a dressing percentage and USDA grade on every cow: lo-lean, lean, boning utility, breaker.

Feed rations were developed for both groups to improve the condition of all cows to a target BCS of 6. The ration for the thin group included a mixture of ground hay (60%

CULL COWS Continued on page 18b

Economic variable	2015-16		2016-17		2017-18	
	Thin	Moderate	Thin	Moderate	Thin	Moderate
Market scenario 1: Sell all cows using slaughter cow prices from USDA AMS Market Reports						
Average cow value at weaning (\$/hd)	719.56	886.85	632.98	691.09	691.18	844.34
Total cost (\$/hd)	358.27	241.92	297.48	235.71	246.39	219.50
Sale value in spring (\$/hd)	918.51	919.78	825.47	832.34	770.61	781.40
Net return (\$/hd)	-159.32	-208.99	-104.99	-94.46	-166.96	-282.44
Market scenario 2: Sell Year 1 bred cattle < 6 years of age via video auction; sell all other bred and open cows at Oklahoma City National Stockyards						
Average cow value at weaning (\$/hd)	719.56	886.85	632.98	691.09	691.18	844.34
Breeding bull cost (\$/hd)	28.27	10.80	13.28	11.70	25.99	15.99
Pregnancy test (\$/hd)	6.00	6.00	6.92	6.92	6.73	6.73
Total cost (\$/hd)	392.99	258.95	318.01	254.63	279.42	242.43
Sale value in spring (\$/hd)	1509.92	1433.76	861.90	971.13	940.16	909.55
Net return (\$/hd)	397.37	287.96	-89.09	25.41	-30.44	-177.22

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CULL COWS

CONTINUED FROM page 17b

alfalfa and 40% grass) fed at rate of 20 pounds per head per day, plus 9.5 pounds of corn per head per day, and

fed seven days a week. The ration for the moderate cows included the same mixture of ground hay, plus 1.5 pounds per head per day of 32% protein cubes fed three days per week.

Two rested breeding bulls were assigned to each group of cows each year for a 60-day breeding season in

an attempt to rebreed the open cows. Each year, bulls were given a breeding soundness exam before turnout on Dec. 1. At the end of each trial in each year, all cows were again pregnancy tested with ultrasound. All cows that tested open were subjected to a secondary blood test to confirm it.

If you'll look at the chart of the Noble researchers' data, you'll see their cow profits declining over the three years as the marketplace moved into the very flat cow market we're now seeing. This is one of the realities of cow marketing.

You also should notice the feed

costs per cow and determine whether your costs for putting on weight would be more, the same, or less. The Noble research crew also noted the returns from selling younger bred cows were greater than selling older bred cows, which should not be news to anyone familiar with cow marketing. They also noted the financial advantage of selling cows in truckload lots, when possible.

The full story is available on the Noble Institute's News and Views from September 2019: bit.ly/noblecow.

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Seasonal utility cow price in the Southern Plains, 1997-2006



SOURCE: PEEL AND DOYE, 2017 ADAPTED FROM CHARTS PREPARED BY THE LIVESTOCK MARKETING INFORMATION CENTER



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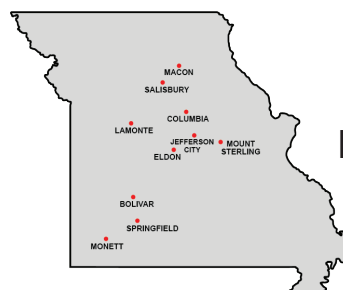
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The benefits of native grasses

BY ELIZABETH STEELE

GREEN IN ALL SEASONS

Tales of an old timer have it that the glades of the Ozarks (native grasslands growing where bedrock is at or near the soil surface), grew grass year-round for livestock and wildlife. The old timer continued that there was no need to feed hay in winter because there was always something green. How can this be when the native grasslands are so well known for their summer grass growth and profusion of wildflower blooms?

One of the famous grasses-of-summer is Big Bluestem. As I write this, a touch of snow still remains on the ground and all of the above-ground parts of the Big Bluestem are brown; it is not collecting any sunlight. It will show no signs of life until it sluggishly wakes up sometime in mid to late April. This grass is classified in a group called warm season grasses, and this group contains other well-known grasses of our grasslands (e.g. Indiangrass, Little Bluestem, Switchgrass, Eastern Gama Grass).

The answer to the old timer's mystery however lies in the fact that there is another class of plants in addition to those grasses-of-summer, known as cool seasons. Take for instance a lesser-known species, Wild Ryes. Peeking out of the snow today is 3-4" of green growth that is actively collecting sunlight. Though it may not be measurably growing aboveground in the snow, it is growing new roots below ground and getting ready for the warmer weather when it will quickly take off and grow.

When both the warm and cool season groups of plants are present, the growing season can be extended from as little as one third of the year to three quarters of the year! This has obvious benefits to both wildlife and livestock: if there are actively growing plants, there is quality forage, and, if the plants are growing nearly year-round, there will be more to eat. In fact, a diversity of plants can produce over 200% more growth than a single high-producing species planted alone!

From the perspective of folks who want to restore a rare and declining habitat (e.g. savanna, glade, prairie) or folks who want to landscape with native plants, there are also benefits to having plants that grow in each season. It reduces the weed competition (Mother Nature will put something there if you don't), takes more carbon out of the air and puts it in the soil (adding carbon to the soil in the form of organic matter is a good thing for the soil and the plants growing in it), and makes for healthier soils (the microscopic creatures in the soil have a more steady food supply with a diversity of plants).

Diversity is as good as it gets!

1 The statement that diverse native grasslands can produce over 200% as much forage as a monoculture of Switchgrass is based on very interesting research by David Tilman and others and published in an article titled "Carbon-Negative Biofuels from Low-Input High-Diversity Grassland Biomass", which is found in Science Volume 314 and published in 2006.

Diversity: Roots in All Depths

Years ago I saw a picture of a man standing next to the unearthed root system of an Indiangrass; the root system must have been twice as tall as the man! "Wow," I thought, "It is no wonder that this grass species does so well in a drought." It can get water that is from 15 feet down in the soil. With that impressive picture in my mind, I continued to think about the advantages this plant has. Not only does it have access to all of that water, but it can get nutrients from that deep as well. Interestingly, some plant essential nutrients are either more abundant or more available to the plant in lower horizons (or levels) of the soil. Deep rooted plants often are very steady in their production. Come what may – be it drought or inches and inches of rainfall – these plants will just keep growing at a steady rate. It is a draft horse. Day in, day out, the horse goes to work in the field. He never wins any races for speed, but he can always be found out there getting the job done. Steady and reliable...it could be the motto of the draft horse and the deep rooted natives.

As I contemplated this, it occurred to me that if all of the plants in the field have deep root systems, then the next door neighbor also has a deep root system and is a direct competitor. It would be better to have root systems of neighboring plants that are different so they can collect water and nutrients from different areas of the soil. Shallow rooted plants have their place. In fact, shallow rooted species tend to be more like racehorses. They respond to moisture rapidly and convert it to growth. However, after the race or when the drought comes, they shut down and quit. They react in a similar fashion to fertility. Whether the fertility comes in the form of dung and urine from wildlife and livestock, the ashes of a fire, nutrients that are recycled from dead plant material or a fertilizer truck the shallow-rooted plants quickly take advantage of these newly found nutrients. The motto of the racehorse and the shallow rooted plants is that when conditions are good, go fast and furious, but otherwise stand and watch the world go by. Many native cool season plants have shallow root systems and consequently respond quickly to the usually abundant rainfall in spring and fall.

In all of the time in the last 30 years that we have spent time on the native grasslands, we have observed that there are dramatic ebbs and flows in the production of everything from leaves to blooms and seeds depending upon the type of root system. From the perspective of folks interested in using native plants for forage, diversity means that the available water and nutrients are most efficiently used to produce the most forage possible.

From a wildlife viewpoint the diversity of root systems means that regardless of the soil water and nutrient conditions, there will be blooms for nectar, seeds for food, plant leaves and other parts for consumption by not only wildlife but also insects that many species of wildlife eat; sometimes the deep rooted plants will be the major producers and at other times the shallow rooted plants will take advantage of the situation to produce the food and habitat. Landscapers can find that a mix of deep and shallow rooted plants will be more likely to provide blooms year in and year out. And, lastly, the folks interested in restoration find that the diversity of root systems is in the design of our native grasslands, and it is a great blueprint to replicate.

Native grasslands have an amazing diversity of root systems: deep vs. shallow, fibrous and spreading vs. tap rooted and penetrating. This diversity lends resiliency to the native grasslands; they can withstand and even thrive following a variety of disturbances. Diversity is as good as it gets!

The Benefits of Grass Diversity

Why is it that when we think of native grasses we only think of the warm season grasses like Big Bluestem, Switchgrass, Eastern Gama Grass, and Indiangrass? There is a rich diversity of native grasses beyond these basic grasses, and including a diversity of grasses has huge benefits, especially when species from different functional diversity groups (i.e. native warm season grasses, native cool season grasses) are included. A diversity of grasses is better for wildlife, soil health, and even forage production.

Soil Health: A very important principal of soil health is diversity. A diversity of plants begets a healthy and diverse assemblage of soil life; these little critters make the glue that holds the soil together, are the recycling center that converts dead plants into nutrients for other plants to use, and an important mediator in the creation of soil organic matter which makes for rich and productive soils that store carbon dioxide. The addition of one grass to the mix is beneficial to soil health, but the inclusion of multiple grasses is even better because each grass species has its own unique suite of microbes associated with it. A second principle of soil health is to have a green, growing plant all year long because the roots of these plants then provide a year-round food source for the microbes.

See **Native grasses**, Page 27B

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Maintain farmer health like you would farm equipment

BY LINDA GEIST
University Extension

COLUMBIA, Mo. — Farmers know that well-maintained equipment is key to success.

Yet they often do not listen to the “check engine” warning signs of stress, says Sean Brotherson, family science specialist for North Dakota State University. Brotherson was the keynote speaker at the recent University of Missouri Crop Management Conference.

“Ag has its own rhythms. It has its own culture,” Brotherson said. When those rhythms go awry, stress can result.

“Health is the most important asset to any operation. If it is the most important asset, it also needs to be the most important priority,” he said.

Many sources of stress, such as weather and prices, are beyond the control of farmers. “You are at the mercy of things,” Brotherson said.

Research from the U.S. Occupational Safety and Health Administration ranks farming as one of the top 10 stressful occupations. The U.S. Centers for Disease Control and Prevention reports that the suicide rate for farmers is 1.5 times the national average.

MU Extension farm health and safety specialist Karen Funkenbusch said that in 2019 farmers faced flood, rains, late planting and uncertainty about commodity prices. Issues beyond a farmer’s control can weigh heavily and lead to depression, anxiety and suicide even in a typical farm season, Funkenbusch said. Debt, illness and injury also add to pressures.



“Farmers, because of their strong and independent nature, often are reluctant to talk about these issues,” she said. “Fortunately, resources are available. If you need help or know of someone who needs help, reach out.”

Funkenbusch leads the Missouri AgrAbility Project, an MU Extension program that works with partner organizations to provide practical education and direct assistance that promotes rural independence.

Funkenbusch offers these suggestions for farmers, ranchers and their families:

- Know the warning signs of stress. Physical signs include headaches, aches of the back and neck muscles, fatigue, labored breathing, weight gain, rising blood pressure, sweating, stomach issues, and sweating. Emotional signs include anger, restlessness, irritability, inability to sleep and relax, increased alcohol or drug use, and withdrawal from other people.

- Slow down.
- Get a physical checkup.
- Seek local resources, including clergy and medical professionals. Talk with other farm families and neighbors.
- Exercise daily. Take regular breaks throughout the day.

Additional resources:

- Missouri AgrAbility Project, AgrAbility.missouri.edu.
- MU Extension Show-Me Strong Farm Families, on Facebook at [ShowMeStrongFarmFamilies](https://www.facebook.com/ShowMeStrongFarmFamilies).
- MU Extension Mental Health First Aid classes help people learn to identify, understand and respond to signs of mental illnesses and substance use disorders in communities.

See Health and wellness on the MU Extension website for related information and resources.

- Farm and Ranch Stress, North Dakota State University, www.ag.ndsu.edu/farmranchstress.

- National Suicide Prevention Lifeline, 1-800-273-8255. Contact Funkenbusch at FunkenbuschK@missouri.edu or AgrAbility@missouri.edu.

DID YOU KNOW?

There’s no way to attribute the invention of beer to a particular individual, culture or time period, but historians believe fermented beverages have a deep history. A very deep history. According to History.com, the first fermented beverages likely emerged when the development of cereal agriculture began roughly 12,000 years ago. Historians believe that the shift from hunter-gatherer tribes to agrarian civilizations based on crops like wheat, barley and rice led to the discovery of fermentation. That discovery paved the way for beer to be brewed. History.com notes that the first barley beer was most likely created in the Middle East, and ceramic vessels that date back to 3400 B.C. were discovered in Mesopotamia. These vessels, which might be considered a precursor to the modern beer mug, still contained some sticky substance that archaeologists believe was the residue of beer. Beer lovers who have ever found themselves loudly touting the virtues of beer, especially after having a few of these beloved beverages, should know that such boasts also are deeply rooted in tradition. The 1800 B.C. “Hymn to Ninkasi,” an ode to the Sumerian goddess of beer, includes a beer recipe.

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Safety tips for parents of young farmers

People who live in cities, exurbs or suburbs may not come across farms very frequently. But millions of people, including children, still live on farms. In fact, in 2009 the Centers for Disease Control and Prevention noted that more than one million children under the age of 20 lived, worked or had a regular presence on farms in the United States.

Protecting children from injury on farms, especially those who perform work on farms, is of paramount importance. The American Society of Safety Engineers offers the following safety tips to parents of children who will be spending time on farms.

- Know and obey the laws. Various state and federal laws are in place to protect young children from farm-related accidents and injuries. Age requirements dictate which jobs children can perform on a farm, and parents should adhere to those requirements. Asking children to do more than they're physically capable of can lead to accident, injury or even death.

- Review equipment operation instructions. Before assigning children a task on the farm, parents should review the equipment operation instructions. Doing so can help parents reacquaint themselves with tools and equipment they may not have used in awhile, and that can make it easier for them to teach kids how to use such equipment. In addition, reviewing equipment instructions may provide insight to parents unsure if their children are old enough to use certain tools.

- Inspect equipment. Before children perform any tasks on the farm, parents should inspect the equipment their children are likely to use to make sure each tool is safe. Make sure tools are in proper working order, as broken or poorly working equipment increases the risk of accident or injury.

- Enroll children in farm safety camps. The ASSE recommends that parents contact their local Cooperative Extension and Farm Bureau offices to enroll children in farm safety camps. Such camps can teach kids safe farming techniques and the proper ways to use age-appropriate tools.

- Set a positive example. Another way for parents to protect their children on the farm is to set a positive example. Parents can do so

in various ways. Using equipment properly, removing tractor keys from ignitions when tractors are not in use and exercising caution when using hazardous materials shows kids the importance of caution when working on farms.

Hundreds of thousands of children perform jobs on farms across the country. Parents who want to teach their kids to farm should always do so with safety in mind.



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Things to consider before building a greenhouse

Avid gardeners may be enticed by the idea of a greenhouse that allows them to explore their passion for plants year-round. While it's true that greenhouses afford this luxury, there are important things to consider before erecting a greenhouse in your yard.

Greenhouses require ample time to maintain. Greenhouses are not self-managing; they require heat, water, venting, electricity, and maintenance on the part of gardeners. Individuals need to determine how much time they have to devote to a greenhouse and then consider their options.

Start by choosing the size of the greenhouse. Many experts, like those at the home and garden information site The Spruce, suggest getting the largest one you can afford and fit into the yard. It is much easier to fill a large greenhouse than try to expand on a small one later on.

Next, consider whether you want to build the greenhouse from scratch or utilize a prefabricated kit that can make easier work of the job. Kits typically contain all of the materials needed, and are easiest for someone who is a construction novice. Look for "grower greenhouses," which are all-purpose options with adjustable shelving and space for growing plants full-term.

The next step is deciding where the greenhouse will be located. The goal is to have a consistent amount of sunlight year-round. A south-facing locale is ideal, and structures should remain north of the greenhouse so they do not cast a shadow on it. The building, cars and technology resource Popular Mechanics advises gardening enthusiasts to take into consideration the angle of the sun during all seasons before choosing a location. Doing so ensures that the sun is not obscured in the winter or fall.

Select a spot that also has ample drainage, as you will not want water pooling up along the sides of or underneath the greenhouse. Raise the greenhouse on footings to alleviate flooding concerns.

Consult with a gardening or agriculture expert about the best way to heat the greenhouse. Options abound with electric-, gas- and propane-powered heating sources. Some systems will require venting. You also will need to know what is available and legal in your area. Check to see if you need a building permit for the greenhouse and any accompanying heating elements.



Once the greenhouse is situated, you can begin to add other items, like benches, additional shelving, hooks for tools, and even an automated watering or misting system.

Greenhouses take commitment, but the reward is the chance to enjoy gardening all year long.

Steer clear.

Work safely.



One of the most important rules of operating machinery is the 10-foot rule. It simply means to be aware of your equipment's height and reach, and keep it at least 10 feet away from power lines.

Whether you're working in the field or moving equipment from one place to another, think and look ahead to be sure power lines are not in our path. The 10-foot rule will help you steer clear of danger.



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Ragged stand better than no stand, says MU Extension agronomist

BY LINDA GEIST

University Extension

COLUMBIA, Mo. – In a year of uneven crop emergence, University of Missouri Extension agronomists say not to count out runts that emerge late. “A late-emerging corn plant is better than no corn plant,” says MU Extension agronomist Bill Wiebold.

In a weekly teleconference of MU Extension agronomists on May 7, reports varied from “no corn in the ground at all” to 40% planted. Regional agronomists expressed concern about uneven emergence of corn in fields already planted.

Yield loss can happen when smaller plants compete for nutrients and sunlight with larger, earlier-emerging plants. Smaller plants likely produce barren or small ears.

Seeds that emerge 10 days behind their row mates lessen in-row yield potential. Studies vary, but agronomists in Wisconsin and Illinois estimated losses at 8-10% in older research, says MU Extension corn specialist Greg Luce.

The numbers remain relevant, Luce says, even though improved precision-planting equipment reduces irregularities. Skips and smaller plants are still likely. “Skips are what you don’t want,” he says. “Doubles are a planter issue and certainly not desired, but they don’t have the negative impact on yield like a skip.”

Luce says uneven emergence happens for several reasons: soil crusting, compaction, inconsistent and especially shallow seeding depth, and differences in soil temperature. Seed-to-soil contact matters as well. This year, cool weather provided fewer growing degree units, which are needed for corn to develop strong root systems and emerge uniformly.

“In a perfect world, we would have a picket fence and the world would look beautiful,” Wiebold says. That’s not the case in 2019, when flooding and excessive rain delayed planting and prompted early concerns of replanting.

But most uneven stands do not warrant replanting. “A ragged stand is better than no stand,” Wiebold says.

Luce agrees that replanting is not justified when only due to uneven stands. “Although uniformity is the goal, the most important factor is the total plant population,” he says. “Too many skips and a low plant count is what calls for replanting.”

The MU Extension guide “Corn and Soybean Replant Decisions” is available for free download at extension2.missouri.edu/g4091, where you can also download MU Extension economist Ray Massey’s updated replant decision-making tool.

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Land that Drinks in the Rain

USED WITH PERMISSION OF HAMILTON NATIVE OUTPOST

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 re-

sult 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 at 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 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 hill-sides 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 prob-

lems 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...



1



2



3

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

*This is not a crop field at the same location; rather this is what is often experienced in tilled cropfields.

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How farmers are using drones

The farmers of yesteryear might not be too familiar with their surroundings if they were to visit a modern farm. While the men and women who made their livings as farmers decades ago would no doubt still recognize certain farm features that have withstood the test of time, they might not understand the inner workings of the

modern farm, particularly in regard to the role technology now plays within the agricultural sector.

Technology has changed agriculture in myriad ways. The methods farmers employ to produce food and improve the efficiency of their operations has changed as technology has evolved. One of the more noticeable changes that's hard to miss on modern farms is the use of agricultural drones.

Drones have been around for decades. Sometimes referred to as "unmanned aerial vehicles," or "UAVs," drones can be utilized in ways that can save farmers money and protect the planet.

- **Monitor crops:** According to senseFly, the commercial drone subsidiary of Parrot Group, drones can help farmers effectively monitor their crops. With a drone flying overhead, farmers can spot and quickly identify issues affecting their crops before those issues escalate into something larger.

- **Soil analysis:** Another potential benefit of agricultural drones highlights their role in analyzing soil. Agricultural drones utilize complex mapping functions to gather data about the soil, including areas where it might be stressed. That enables farmers to develop accurate soil samples that can be used to guide decisions in regard to irrigation and fertilization.

- **Reduce waste:** SenseFly notes that data gathered by drones can help farmers determine the vigor of their crops at various stages of growth. Such information can prevent overfertilization and overwatering, thereby reducing waste and runoff, benefitting the planet as a result.

- **Planning:** Drones can be used to collect data on crop growth and health at various times throughout the growing season. That can help farmers develop accurate predictions regarding harvest quality and crop yield, making it easier for them to plan ahead.

Agricultural drones are one of the many examples that illustrate how technology has changed and will continue to change the ways modern farmers conduct business.



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DID YOU KNOW?

Oxygen is essential for the roots of grass to breathe and grow strong enough to support healthy lawns. But according to the Center for Agriculture, Food and the Environment at the University of Massachusetts Amherst, compacted soil can produce a decrease in oxygen content that can make it hard for roots to thrive. Soil compaction can result from a number of activities, including walking on grass or driving or parking vehicles on grass. When soil is compacted, it breaks into small particles that reduce the amount of pore space in the soil. That makes it hard for water, oxygen and nutrients to get through, threatening the strength of the roots and putting the grass in jeopardy. Aerating a lawn can help homeowners foster strong root growth and healthy grass. When to aerate may be contingent upon local climate, so homeowners who suspect the soil in their yards is compact should consult with a local landscaping professional to determine the best time to aerate their lawns.

Native grasses • from page 19B

If, say, Big Bluestem is the only grass in a planting, green grass is confined to only the warm, summer months. However, the addition of a cool season grass means that there is green grass, and consequently operational roots and happy microbes nearly year-round. And why stop at two species? Each grass species is unique in its growth period; repeatedly we see a certain grass, and think, “Wow, look at the green growth on that beauty,” but in a different year or a different landscape position a different species will catch our eye. At these times, we remind ourselves that no species is the total package, diversity is the answer.

Wildlife: Surely wildlife doesn’t care about grass diversity, does it? We think so. Some grasses produce a nice, meaty seed for birds to eat while others don’t. Some are a larval food for certain butterflies or other insects while others don’t serve this function. Some grasses stand straight and tall, which provides verticality and protection from aerial predators (what raptor wants to risk its eyes or wings near a spiky Wild Rye plant?). Meanwhile others have a softer texture and their leaves fountain over, which creates an excellent hiding spot (who wouldn’t want to hide under the umbrella of a Prairie Dropseed?). Because each grass is unique in its contribution to wildlife habitat, a diversity of grasses will yield a higher diversity of wildlife. Grass diversity also creates a stronger, more stable habitat.

Livestock Forage: If forage production is a consideration, grass diversity will even out production between years. Let’s take our favorite grass plant – maybe Eastern Gama Grass. A certain set of environmental conditions and management will really cause this grass to produce some years. However other conditions result in less stellar performance. Each grass has its unique list of perfect growing conditions, and what is good for one may not be best for the next. Diversifying the grass species, in effect, stabilizes the forage production in drought years and wet years and hot years and cold years and even the average years. An additional advantage of diversity is the increased forage production as compared to a monoculture. Because each grass is unique, diversity lengthens the season of growth (especially when native warm and native cool seasons are both included), results in more efficient root architecture (shallow rooted plants next door to deep rooted plants), and diversity is better able to respond to disturbances such as drought. The sum of all the grasses together is greater than the single best species.

Elizabeth Steele writes blogs for Hamilton Native Outpost, her family’s native grass and wildflower company, as well as managing seed inventories. Hamilton Native Outpost loves sharing about native plants for agriculture and natural resource management.


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