

Feeling The Heat



PHOTO: RITA BRHEL

2012 Drought Let Researchers Work On Heat-Tolerant Crops

BY RITA BRHEL
P&D Correspondent

The drought of 2012 wasn't the longest dry spell the area has seen, but it was one of the more devastating weather events because the lack of rain combined with extreme heat. By this time last year, grass had turned brown and crispy, trees were dropping their leaves and entering dormancy, producers were selling whole herds of livestock as pastures were grazed down to the dirt, and the crops were clearly not going to make yield.

There was nothing that could be done to save last year's corn and soybeans at the time, but researchers wasted no time gathering roundtables to discuss plans for helping producers to prepare for another hot summer, the likely result of global warming. Universities and seed companies alike have redoubled their efforts to produce more heat-tolerant varieties.

All plants are sensitive to heat, but different plants stop growing at different temperatures. This spring, Michael Salvucci, a plant physiologist with the U.S. Department of Agriculture's Agricultural Research Service at the U.S. Arid-Land Agricultural Research Center in Maricopa, Ariz., successfully isolated Rubisco, a protein that all plants use in photosynthesis and that is particularly heat sensitive.

"You need to know what the protein looks like to understand how it works," Salvucci said.

Photosynthesis is the plant version of animal digestion, the life process by which plants combine carbon dioxide with sunlight and soil nutrients. When it gets too hot for a particular plant, Rubisco literally unravels, rendering the plant unable to photosynthesize and the plant stops growing and dies. If this plant is an agricultural crop, the crop stops growing and dies, and the small or absent harvest reflects that lack of Rubisco.

Scientists have been trying to isolate Rubisco for decades, but it is extremely unstable. To crystallize Rubisco, scientists could then study it and find ways to manipulate it to create more heat-tolerant crops. Salvucci was able to capture Rubisco by working with the creosote bush, a prolific shrub found in

the Arizona desert and a plant with one of the most tolerant heat thresholds.

Producers are more likely to be familiar with varieties boasting drought tolerance rather than heat tolerance. Seed companies have long been developing hybrids better able to withstand dry conditions, such as Syngenta's Agrisure Artesian technology that reportedly helps corn be more moisture efficient.

"This year, corn farmers faced one of the worst droughts in decades, inflicting incredible water stress on crops and significantly impacting yields," said Duane Martin, commercial traits manager at Syngenta Seed in Raleigh, North Carolina. "In extensive field trials, our Agrisure Artesian technology performed extremely well in these conditions and showed that it will serve as a cost-effective solution to help maximize corn production in less-than-ideal growing conditions."

But developing crop traits for drought tolerance and heat tolerance are two different goals, and Syngenta, just as is the case with other corn companies, are much more ahead at developing drought-tolerant varieties than varieties that can withstand extreme heat conditions forecasted to come more frequently due to global warming.

"There is a lot of concern about how climate change will affect crop, but we know almost nothing about thermal tolerance in corn," said Mitch Tuinstra, an agronomist with Purdue University in West Lafayette, Ind. He is studying heat-tolerant genetics in tropical corn varieties and how they can be incorporated into U.S. hybrids. Pioneer Hybrids is among the seed companies in partnership with Tuinstra's team.

Another researcher, Marilyn Roossinck, a plant pathologist and environmental microbiologist with Pennsylvania State University's Center for Infectious Disease Dynamics in University Park, Pa., has found that certain plant viruses affect various vegetables' ability to tolerate stress, including drought and temperature — and it's in a good way. She refers to other studies that show a symbiotic relationship between viral and fungal diseases and their host plants, including a fungus that lives on tropic panic grass, which

grows in Yellowstone National Park in geothermal ground at 125-plus degrees Fahrenheit. Neither the grass nor the fungi can survive, however, in the same environment if separated from one another. Roossinck found through her research that it's actually a type of virus that coexists with the fungi that boosts heat tolerance in it and the tropical panic grass.

"I noticed that all of the samples from the geothermal soils had a virus, so it seemed worth it to take a deeper look," she said. "A virus is absolutely required for thermal tolerance. If you cure the fungus of the virus, you no longer have the thermal tolerance."

Roossinck hopes this information will help the agricultural industry grow harder crops.

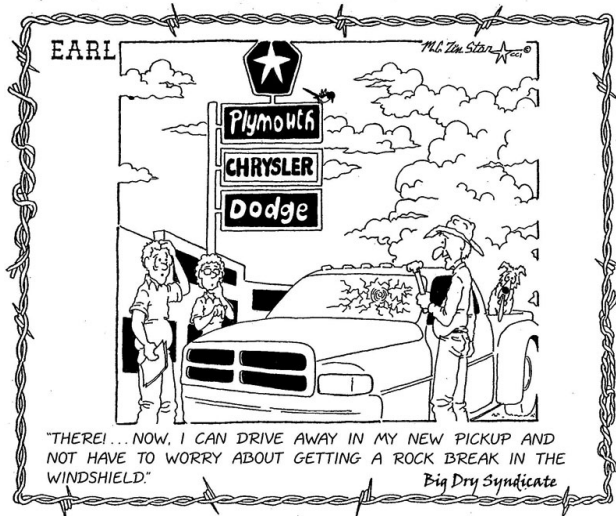
Another researcher, Dirk Hays, a cereal grain developmental geneticist with Texas A&M University in College Station, Texas, is studying how leaf wax contributes to heat tolerance in wheat by comparing U.S. wheat lines with those in India and Bangladesh.

"We've found leaf wax can result in up to a 25 percent increase in yield," Hays said. "The higher wax keeps the plant cooler and reduces the amount of water the plant uses to keep itself cool."

While it seems that research into heat-tolerant crops are all over the map, with no clear direction of how research results will collaborate with the commercial sector, what each researcher seems to have in common is looking abroad at the world's hottest regions to see what it working there in terms of agricultural crop production.

"It's imperative that we stay ahead of global climate change and improve the adaptation of crops to increased high temperature stress, especially during the vulnerable reproductive stages," Hays said. "Their crops are probably better adapted to heat stress than ours are."

In addition, "the growing interest now in genetic plant breeding is to package together traits, find optimal root or leaf structures and patch those into a cultivar that gives you ideal performance."



Noxious-Weed Workshop In Niobrara

NIORARA, Neb. — The Northeast Nebraska Resource Conservation & Development (RC&D) Council and the Northeast Nebraska Weed Management Area will be hosting a free workshop on noxious weed control on Wednesday, Aug. 21 at the Niobrara State Park Lodge, Niobrara, Neb. The event is open to the public and begins with registration at 9:30 a.m. and will conclude by 2:30 p.m.

Lunch will be provided. Farmers, ranchers, and others interested in learning more about noxious weeds and their control should make plans to attend.

This workshop, "Focus on the Future of a Weed-free Horizon," will feature a variety of speakers discussing the types of noxious weeds and those on the "watch-list" found in the area, methods of noxious weed control in pastures, fields and in wildlife habitat sites. A special presentation by the Niobrara Public School's Purple Loosestrife Project group will be given on their efforts. Funding for the workshop is provided by a grant from the Nebraska Environmental Trust.

The RC&D Council is a non-profit organization here to serve the needs and interests of the citizens of the area.

For more information about this event, other RC&D projects or activities, see www.nenercd.org or call 402-582-4866.

Eco-Friendly Farm Tour Aug. 22

Anyone interested in getting a first-hand look at eco-friendly cattle feeding operations should consider attending the Bon Homme feedlot tour, a free public tour on Aug. 22. The tour will start at 10 a.m. on the James Kokes farm approximately 4 miles west of Tabor on Highway 50.

The Natural Resources Conservation Service (NRCS) will have engineers and agronomists on site to discuss the design, construction, and implementation of a Comprehensive Nutrient Management System. Options on obtaining funding to assist with the construction of animal waste storage systems will be presented by NRCS program specialists and the Lewis & Clark Watershed Implementation Project.

Lunch and refreshments will be sponsored by Kokes Ag Service and the Bon Homme Conservation District. During lunch, a soil health demonstration will be presented.

At approximately 1:15 p.m., a second facility tour will begin at the John Vleck farm located on Highway 52 and the junction of 420th Avenue (5 miles south of Tyndall, 3 miles east on Highway 52).

Call the NRCS or Conservation District office if you need more information, 605-589-3232, ext. 3.

Stock Dog Event Set For State Fair

SIoux FALLS — The South Dakota Stock Dog Association will entertain fairgoers on Aug. 28-29 in Huron while also helping to make wishes come true for kids across the state facing life-threatening medical conditions.

Free-will donations and the proceeds from an auction, which includes a trained stock dog, will benefit Make-A-Wish® South Dakota during this year's South Dakota State Fair.

Sheep trials will take place on Aug. 28 starting at 9 a.m. in the Hippodrome with the finals following at 6 p.m. On Aug. 29 cattle trials begin at 9 a.m. in the North Arena, followed by the finals at 6:30 p.m. in the Hippodrome.

Make-A-Wish kids and their families will be the special guests of the Stock Dog Association on Aug. 29 and will be present at the finals.

The dog being auctioned off is Loui, a one-and-a-half year-old male border collie. Loui is trained for livestock work. All proceeds of the dog auction will benefit Make-A-Wish South Dakota.

For more information about the Stock Dog Association Finals at the South Dakota State Fair please contact Tim Naasz at 605-207-0229 or Kelly Jackson at 605-350-0845 or visit southdakotastockdog.com. For more information about Make-A-Wish South Dakota please contact Paul Krueger, president and CEO, at 605-335-8000.

DENR Reminds Irrigators To Avoid Overspray

PIERRE — The South Dakota Department of Environment and Natural Resources (DENR) reminds irrigators to check their center pivots to ensure they are operating properly and are adjusted to spray only upon land authorized for irrigation by their water permit.

"It is important that irrigators do everything they can to avoid overspraying onto nearby roads or neighboring properties," said DENR Secretary Steve Pirner. "Irrigation overspray can damage roadways, lead to unsafe driving conditions, and impact neighbors."

A water right holder is not allowed to waste water or operate an irrigation system in violation of state water law, which includes spraying water on land not covered by the water permit. Irrigation systems and especially end guns must be consistently checked to make sure it is not applying water to where it is not allowed. Irrigators who fail to prevent overspray can be subject to fines or required to appear before the Water Management Board for possible suspension of their right to irrigate.

South Dakota has nearly 5,200 active irrigation permits authorizing irrigation of up to 865,000 acres.

Bridge Loan Program Set

PIERRE — The South Dakota Department of Agriculture (SDDA) announces a Bridge Loan program available for Farm Service Agency (FSA) approved applicants.

The Bridge Loan program is designed to provide interim financing for FSA applicants approved for loans to purchase land when FSA funding is not available at the time the applicant wants to proceed in closing the land purchase. The SDDA loan is structured for monthly interest only payments until the funding is available at FSA and the FSA loan is closed.

SDDA does have the ability to extend the term for up to two years. If, for any reason, FSA does not fund the loan, SDDA will term the loan out over 10 years. The current interest rate for the department's loan is 4 percent and borrowers are required to pay all closing fees.

For additional information and details on the Bridge Loan program or any of the financial programs offered through the S.D. Department of Agriculture, contact Terri LaBrie, Finance Administrator at 605.773.5436 or http://sdda.sd.gov.

Physical Therapist Needed

Birth to Three Program serving Mitchell, Sioux Falls, Yankton, and Vermillion looking for part-time Physical Therapist to work with infants and toddlers. Regional travel required, flexible schedule available. Experienced PTs as well as new graduates with PT license are encouraged to apply. Interested candidates please contact the Birth to Three Program at 605-773-3678.

COUPON

YANKTON MALL

DC Lynch Shows

Riverboat Days

Carnival

8 Rides for \$10

1 Ticket Per Ride - except Zipper (2)

Additional coupons available from mall merchants

Friday, Saturday, Sunday
Aug. 16, 17, 18

20th Annual BULL-A-RAMA

SATURDAY, AUG. 24, 7:00PM

Clay County Park Rodeo Arena
(2 miles west of Vermillion on Timber Road)

TICKET INFORMATION:
ADULTS: \$12 Gate/\$10 Advance
SENIOR CITIZENS: \$10 Gate/Advance
AGES 7-12: \$6 Gate/Advance
AGES 6 & Under: Free!
TICKETS AVAILABLE AT:
In Vermillion: Hy-Vee, Pump'n Pak, Freedom Value Store
In Yankton: Western Trails & Hy-Vee

5 Open Class Bulls
(NO MAIN EVENT RIDERS)
For Registration
Call Linda Hawley
605-202-0194
by August 19

5 Steer Riders
Ages 9-13
15 Mutton Busters
Ages 5-8
For Registration stop by
the Pump-N-Pak
parking lot
Sat., Aug. 24
10am-12pm

DANCE
with the Clay Creek
Deaf Cowboy Band
FIREWORKS
by
Fireworks
Unlimited

Sponsored by: Budweiser, Hy-Vee, KMP Trucking,
Yankton Daily Press & Dakotan, 104.1 The Wolf-WNAX,
Polaris, Premium Best Transport, Western Trails,
Jones Ace Hardware



Raising Money for Charity
One Buck at a Time!

Saturday, August 24
10am-12pm

Bull Stops Here!! at the Pump-N-Pak lot in Vermillion. There will be Bulls, Bull Fighters, Clowns, Bull Riders, Horse Rides, Giveaways & Raffles. Register for Mutton Bustin' and Steer Rides.

Saturday, August 24
Starting at 7pm
20th Annual BULL-A-RAMA

Sunday, August 25
Cowboy Church Service at 10am
Starting at 12pm take a trail ride along the Missouri River with lunch to follow.
Free-will donation.

More Information at:
www.bullarama.org