

development

Crop Science: overcoming severe conditions

South Dakota State University scientists must develop varieties of wheat that can tolerate drought, according to molecular biologist Jai Rohila, assistant professor of biology and microbiology. That is the key to making agriculture sustainable.

A two-year \$60,000 grant from the U.S. Agency for International Development gave Rohila opportunity to research drought and heat tolerant germplasm obtained from Alexandria University in Egypt.

“Egypt is growing wheat in drought conditions all the time,” Rohila said. For the project which began in 2011, he collaborates with his counterpart, Sanaa Milad of the biotechnology lab at Alexandria University.

“The long-term goal is to discover the genes for drought and heat tolerance and use them in South Dakota wheat improvement program to make our wheat ready for dry or hot years.” Rohila explained.

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{ For your information }

Farmers Yield Initiative is a coalition of public and private partners with the common goal of protecting the public and the grain industry by supporting plant variety improvement through research, education, certification, and PVP enforcement for your benefit.

story continued from cover

To do this, he and his team analyze the genetic makeup of the Egyptian germplasm and compare it to South Dakota wheat.

“We must identify the genes and utilize them for our wheat to make it grow better,” Rohila said.

“The cell is the center point of any function; if we can improve the fitness of a cell, we will improve the plant,” Rohila said.

The process of discovering the genes includes looking at individual proteins that responsible for the function in a plant cell, Rohila explained. “All this crop improvement occurs because of different genes, proteins and chemicals interact inside the cell to provide it a function, like drought tolerance – it’s not about one gene alone.”

Texas AgriLife Research scientists are on a quest to find where different wheat varieties popular in the High Plains get their drought tolerance.

Dr. Shuyu Liu, Texas A&M AgriLife Research small grains geneticist in Amarillo, is working with a group of scientists on an Ogallala Aquifer Program-funded project to identify key genetic regulators of drought tolerance.

“We are trying to understand the drought-tolerant mechanisms in wheat varieties,” Liu said.

“In this study, we are looking at three widely planted varieties in the High Plains, TAM 111, TAM 112 and TAM 304.

“Based on breeders’ observation, they found that TAM 111 is very good at both irrigated and dryland,” he said. “TAM 112 is much better under prolonged dryland conditions,

such as 2011. TAM 304 is very good under irrigated conditions, but not under dryland.”

Breeders’ observations from the field and the physiological traits collected in the last few years show these three cultivars have different responses to water stress; however, the basis of their adaptation remains unknown, he said.

Determining the mechanisms of adaptation to drought conditions is very important, Liu said, because in 2011 alone, drought stress resulted in the loss of more than 240 million bushels of winter wheat with a cost of about \$1.33 billion in the Southern Great Plains.

“We conducted this experiment in the greenhouse to understand how these three varieties respond to water differently and at different stages,” he said.

Liu said at the same time they have been conducting this greenhouse experiment, all these three varieties have been growing in the field and much data will be collected by the AgriLife Research stress physiology and breeding groups at Amarillo, such as yield and its components and canopy temperature.

“At the end, we will combine the greenhouse data, field data and lab data together to figure out what the difference is for the drought-tolerant mechanism among these three varieties.” he said. **fyi**

1 <http://www.sdstate.edu/news/articles/sdsu-works-toward-developing-drought-tolerant-wheat.cfm>

2 <http://twri.tamu.edu/publications/conservation-matters/2012/may/wheat-drought-tolerance/>

3 <http://agriliferesearch.tamu.edu/>

invest

Higher return Better + quality

The benefits of planting Certified Seed

According to research, certified wheat seed varieties offer growers a greater return than planting bin-run varieties—as much as \$22 an acre or more.

Research in the past several years conducted by Kansas State University shows certified seed pays for itself at a mere 1 bushel-per-acre yield advantage and a market price of \$6.50 a bushel. And according to research by the U.S. Department of Agriculture, certified seed typically out-yields bin-run varieties by 1.2 to 2.5 bushels per acre.

“Growers need to take into account the cost of bin-run seed,” says Darrell Hanavan, executive director of the Colorado Wheat Research Foundation. “Certified seed simply makes greater economic sense.”

“Growers must also consider the hidden costs of planting bin-run seed,” said Hanavan. “Some research has shown random samples of bin-run seed that had 62 percent severe seed damage and varietal purity issues. Plus, growers often must seed at a higher rate to account for lower germination of bin-run seed.”

Research and development by breeders have resulted in improved varieties, which include traits that are appealing. Seed developers focus with the end user in mind so that when the product is finally consumed, it will contain higher proteins, will be healthier for the consumer, and will provide more consistency in the baking process.

When newer varieties of certified seed are developed and marketed, you not only get the newest variety, but you get the best of that variety when you purchase certified seed. The only way to reliably access the traits that you need and require is to utilize certified seed. **fyi**



progress

TAKE IT TO MARKET

{Partnerships to Advance the Wheat Industry}

There are several different ways for a University developed wheat variety to enter the marketplace. Today, there are groups such as the Kansas Wheat Alliance, Oklahoma Genetics, Inc., Husker Genetics, and the Colorado Wheat Research Foundation. We take this opportunity to tell you something about each.

The Kansas Wheat Alliance:
kswheatalliance.org

The Kansas Wheat Alliance was formed with the mission of managing the release of K-State wheat varieties inside and outside of Kansas in a way that allows us to deliver farmer-preferred traits to farmers. K-State has traits in the pipeline, such as the Clearfield® trait, that farmers want to see. These new releases must be managed in a way that complies with the requirements of the trait provider, gives the farmers what they need, and does it all in a way that ensures we're good stewards of the trait, so that everybody benefits. KWA has returned over 80% of the royalties collected to the K-State wheat breeding and research projects in support of future variety development.

The Colorado Wheat Research Foundation: coloradowheat.org

The Colorado Wheat Research Foundation (CWRf) serves as an

important link in the Colorado Wheat Cultivar Program. The foundation works hand in hand with Colorado State University (CSU) to help develop and distribute new wheat varieties. As the university develops new varieties, CWRf takes ownership and works with eligible certified seed growers. Royalties for certified seed are collected by CWRf, and net royalties are returned to CSU to be reinvested in wheat-related research.

Oklahoma Genetics, Inc.:
okgenetics.com

Oklahoma Genetics, Inc. is a nonprofit 501(c) (5) corporation that assembles in an organized manner as a group of interested and capable seed enterprises to promote stewardship and publicize and market the use of improved genetics, traits, and benefits of quality Pedigreed seed and vegetatively propagated materials, but also promotes educational programs and scientific research for the benefit of crop producers/markets, and plant breeding programs to meet current and future consumer demands. The formation of the corporation was necessary to market the new protected BASF Clearfield Technology. OGI is made up of a group of dedicated Oklahoma pedigreed seed producers and processors. The founders of OGI became aware of the need to

form such a corporation to make BASF Clearfield Technology in wheat available for farmers in the state of Oklahoma.

With the establishment of these types of licensing arrangements, producers are able to have a broader choice of varieties. The people who pay royalties will know that the University is investing a portion of that royalty back into tomorrow's wheat varieties.

Husker Genetics, Inc.:
huskergenetics.unl.edu

Husker Genetics is headquartered at UNL's Agricultural Research and Development Center near Mead, Nebraska. Because of the FSD's research association, it is an integral part of the Agricultural Research Division within UNL's Institute of Agriculture and Natural Resources. As a self-supporting, non-profit organization, operating funds are derived directly from sales of foundation seeds and services. Services provided by the Nebraska Crop Improvement Association are utilized for inspection of seed fields. And the expertise of agronomists, plant breeders, plant pathologists, entomologists, and extension specialists are also drawn upon. These important steps bring seedstock from the plant breeder's research plot to the farmer's field. **fyi**

Protected varieties lexicon

A helpful listing of federally protected seed and provider information. Please use this resource to protect yourself and the grain industry as a whole.

AGSECO varieties:
Protection
TAM 113

Colo State varieties:
Akron
Jules
Prowers
Yuma

CWRf varieties:
Above
Ankor
Avalanche
Bill Brown
Bond CL
Brawl CL Plus
Byrd
Denali
Halt
Hatcher
LCS Mint (licensed exclusively to Limagrain)
Prairie Red
Prowers
Prowers 99
Ripper
Snowmass
Thunder CL
Yumar

K-State varieties:
2137
2145
2174
Arlin
Betty
Heyne
Ike
Lakin
Stanton
Trego

KSURF varieties:
1863
Clara CL
Danby
Everest
Fuller
Jagger
Overlay
RonL
Tiger

Limagrain varieties:
Albany
Banton
Hat Trick

Nebraska varieties:
Alliance
Arapahoe
Goodstreak
Husker Genetics Brand McGill (NE01481)
Husker Genetics Brand Overland (NE01643)
Husker Genetics Brand Ribodoux (NI04421)
Husker Genetics Brand Settler CL
Mace
Millennium
NE422T (triticale)
Wahoo

Montana State Univ., PVPA title V varieties:
Bearpaw
Choteau
Decade
Duclair
Genou
Hockett
Judee
Yellowstone
Vida

NDSU Research varieties:
Alkabo
Barlow
Carpio
Dapps
Divide
Elgin-ND
Faller

Glenn
Grenora
Howard
Mott
ND901CL Plus
Prosper
Steele ND
Tioga
Velva

Barley:
Pinnacle
Rawson
Stellar ND

Flax:
Carter

Oats:
Beach
Hi-Fi
Jury
Newburg
Souris
Stark
Rockford

Soybeans:
Ashtabula
Cavalier
ND1005T
NDL00S
Prosoy
Sheyenne
Traill

Edible Beans:
Avalanche
Eclipse
Lariat
ND 307
Pembina
Rio Rojo
Stampede

OK Genetics varieties:
Billings
Centerfield
Duster
Gallagher
Garrison
Guymon
Iba
OK Bullet
Okfield
OK Rising
Pete
Ruby Lee

OSU varieties:
Deliver
Endurance

ORCF 101
ORCF 102
ORCF 103
Norwest 553

SDSU varieties:
Alice
Brick
Briggs
Colt
Darrell
Expedition
Forge
Granger
Ingot
Lyman
Oxen
Russ
Select
Tandem
Traverse
Walworth
Wendy

Oats:
Shelby 427
Streaker
Stallion

Syngenta varieties:
AgriPro Paladin Alpine
AP604 CL
AP401 CL
AP503 CL2
AP603 CL
AP700 CL
AP Badger
AP Legacy
Arcadia
Art
Aspen
Benton
Beretta
Branson
Brennan
Bullseye
Cabernet
CJ

COKER 9152
COKER 9184
COKER 9295
COKER 9312
COKER 9375
COKER 9436
COKER 9474
COKER 9511
COKER 9553
COKER 9663
COKER 9700
COKER 9803
COKER 9804

Cooper
Coronado
Crawford
Cutter
Doans
Dumas
Fannin
Freyr
Hawken
Jackpot
Jagalene
Jenna
Kelby
Knudson
Kuntz
Legion
Longhorn
Magnolia
Malbec
Mason
Natchez
Neosho
Norpro
NuDakota
NuFrontier
NuGrain
NuHills
Oakes
Ogallala
Palomino
Panola
Platte
Postrock
Salute
SY605 CL
SY 9978
SY Gold
SY Harrison
SY Soren
SY Tyra
SY Wolf
TAM 111
TAM 203
TAM 401
TAMCALE 5019
TAMCALE 6331
Tamssoft 700
Thunderbolt
TriCal 102
TriCal 103BB
TriCal 2700
TriCal 336
TriCal 718
TriCal Merlin
TriMark 336
Triticale
W1062
W1104
W1377
W1566
Whetstone

Texas A&M varieties:
Dallas (oats)
Lockett
Sturdy 2K
Tambar 501 (barley)
TAM 113
TAM 202
TAM 203
TAM 302
TAM 304
TAMO 397
TAMO 405
TAMO 406
TAMO 606

Univ. of Minnesota varieties:
Cromwell
Ada
HJ98
Oklee
RB07
Sabin
Tom
Ulen

Spring barley:
Lacey

Application pending:
Rasmusson

UNL varieties:
Alliance
Arapahoe
Husker Genetics Brand McGill (NE01481)
Husker Genetics Brand Overland (NE01643)
Husker Genetics Brand Ribodoux (NI04421)
Husker Genetics Brand Settler CL
Mace

Watley Seed varieties:
TAM 112

Washington State University varieties:
Wheat:
Otto
Glee

Barley:
Elise

protect

Plant Variety Protection Act

What does PVP mean?

The Plant Variety Protection Act, first signed into law in 1970 and amended in 1994, provides patent-like rights to those contributing to the development of new varieties of plants. The benefits are to encourage improvement in plant breeding by encouraging continued investment into tomorrow's wheat varieties. Whoever develops the new variety owns the legal rights to distributing the variety in the marketplace, known as PVP-Protected seed.

Overall, the idea is to encourage private breeders or public universities to continue funding research. With this law, the PVP Certificate owner may charge others who plant the seed a reasonable amount of money called a royalty. With this royalty fee, the owner is allowed to partially recover the early costs of research.

If a person later uses the seed without paying the proper royalty, then the owner of the intellectual property rights may bring a civil lawsuit to put a stop to continued use in what is known as an injunction. Also, the owner may recover damages from an infringer.

Some PVP-Protected varieties also may only be sold as a class of certified seed when the owner claims a Title V protection. **fyi**

Title V Plant Variety Protection Benefits U.S. Agriculture and You

- + Encourages development of resourceful wheat varieties.
- + Ensures better agronomic wheat varieties for producers.
- + Provides genetically pure varieties to the producer through the use of certified seed.
- + Ensures on going wheat variety development by public and private plant breeders.
- + Grants developers patent-like protection from the sale of protected varieties.
- + Promotes agriculture progress in the public interest.

Information on Certified Wheat Seed

- + Most varieties are to be sold by variety name and only as a class of certified seed.
- + Many varieties are the culmination of years of research and testing to provide the best possible combination of yield, disease resistance, and grain quality.
- + Certified Seed fields are first field inspected and then lab tested to meet state seed certification standards, so they're more reliable than brown-bagged seed sold from unreliable sources.
- + Buying certified seed from a licensed dealer is the best choice because the producer will have the highest quality seed and will remain in compliance with the federal and state seed laws.

Tip Line Enforcement Tool

The purpose of the Farmers' Yield Initiative is to educate the public and producers about the need for more scientific research during a time of federal and state funding cuts. Congress designed the PVP and other federal laws to encourage both public institutions and private companies to invest in research and recoup that investment through royalties.

States have state seed certification processes to ensure only the highest quality seed is distributed to producers. Certified seed is a strong and reliable indicator of high quality.

The overwhelming majority of all new seed varieties are federally protected and can only be sold as a class of certified seed.

While many producers respect the laws, there are some who seek to gain an unfair advantage over other producers by working outside of the legal system. One way to level the playing field is to anonymously report those who seek to benefit from new varieties without contributing to the substantial research investments that make them possible.

Please consider submitting a strictly confidential tip to help put a stop to illegal seed trade. You need not identify yourself during the phone call. The caller can remain anonymous, and it is toll-free:

1-877-482-5907.

legal

INFRINGEMENT + CONSEQUENCES

Despite the efforts by the private and public sector to educate producers as to the risk of illegal seed sales, some producers and seed cleaners continue forward in marketing grain as seed without the proper licenses or authority. The following are some lawsuits and settlements that followed the diligent investigation:

Kansas Wheat Alliance & Colorado Wheat Research Found. v. Scott Hooker and Hooker Seed Conditioning, D. Kan., Case No. 2:12-cv-2190 – Obtained \$250,000 consent judgment against Kansas seed conditioner and dealer who illegally conditioned and sold multiple varieties of protected wheat seed over the course of several years.

Syngenta Seeds, Inc. v. Bruce Barlow, BB Enterprise LLC, and Chris Thompson, W.D. Missouri, Case No. 4:11-cv-923 – Obtained \$100,000 consent judgment against seed broker and seed conditioner who both admitted illegal sales of protected soft red winter wheat variety.

Syngenta Seeds, Inc. v. Stuart Cauthon, D. Kan., Case No. 6:12-cv-1346 – Obtained \$100,000 consent judgment against Kansas wheat producer for illegal acquisition and sales of protected wheat seed.

Kansas Wheat Alliance v. Tribune Grain, LLC, Resolved PVP infringement allegations against Kansas grain elevator and seed conditioner for payment by the elevator of \$30,000 and implementation of strict PVP enforcement policy.

Kansas Wheat Alliance v. Charles Beechem, Resolved PVP infringement case against Texas wheat producer and fertilizer operator for illegal sales of protected wheat seed. The case was resolved for payment by infringer of \$25,000.

Watley Seed Co. v. Brett Schaffer and Alan Vogel, Resolved PVP infringement case against Kansas wheat producers for illegal sales of protected wheat seed for payment by infringers of \$30,000.

NDSU Research Foundation v. Mike Rohrich, Resolved PVP infringement case against North Dakota oat producer for illegal sales of protected oat variety. Infringement was admitted and \$15,000 paid in damages.

Syngenta Seeds, Inc. v. Jeff Hering and Charles Willberg, W.D. Texas, Case No. 6:11-cv-260-WSS – Resolved PVP infringement lawsuit against Texas wheat producers involving allegations of illegal sales of federally protected wheat seed. Producers paid \$28,500 in damages to resolve federal lawsuit.

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