

# Surprise discovery: Virus may benefit drought-stressed wheat

By JOHN O'CONNELL  
Capital Press

MOSCOW, Idaho — A University of Idaho researcher has discovered wheat plants raised in a greenhouse under simulated drought stress somehow got a health boost when exposed to barley yellow dwarf virus.

UI entomologist Sanford Eigenbrode, postdoctoral researcher Seth Davis and other colleagues published two papers in 2015 on the bizarre phenomenon. They studied hormonal changes that occur in drought-stressed, infected wheat plants — which may help explain the counterintuitive plant response.

Eigenbrode made the discovery during broader research regarding how aphids affect drought-stressed cereal crops, with funding from USDA's collaborative Regional Approaches to Climate Change for Pacific Northwest Agriculture grant.

"The virus infection actually mitigates the effect of drought," Eigenbrode said. "Plants with barley yellow dwarf under drought stay greener longer."

Barley yellow dwarf virus, which is spread by aphids and typically reduces cereal yields dramatically by stunting roots and hindering a plant's ability to absorb water, was widespread throughout Idaho in 2015. Eigenbrode said the greenhouse test involved a single wheat variety — the soft white spring club wheat JD, developed by Washington State University — and plants were 15 days old when they were exposed to infected aphids. He has a grant application pending with USDA to further investigate his observation with additional varieties and under different conditions.

Eigenbrode advises growers to do all they can to avoid the virus, noting infected plants under any conditions still have poor yields relative to healthy crops receiving adequate water. But he believes the discovery could have long-term ramifications



Courtesy of David Lundquist, CHS Inc.

University of Idaho entomologist Sanford Eigenbrode, pictured in his greenhouse, has discovered drought-stressed wheat plants stay green longer than other drought-stressed wheat when infected by barley yellow dwarf virus.

tions for plant breeders seeking to better understand drought tolerance. He's sent his findings to researchers with Limagrain Cereal Seeds, hoping they'll help look into them in greater depth.

"If you can understand the mechanism or the physiologic effect the virus is having, you may be able to use that information to design a better plant, or exploit that mechanism to bring better drought tolerance to the plant," said Jim Peterson, research director with Limagrain.

Hans Hayden, a dryland grain farmer in southeast Idaho's Arbon Valley, has noticed that extra nitrogen and a turn toward wetter weather can help crops recover from barley yellow dwarf, but he's never seen evidence of infection being beneficial.

"I've seen the absolute opposite in my lifetime," Hayden said. "I've seen (drought stress) adding up and making (infection) worse."

UI cereals pathologist Juliet Marshall is also surprised by the findings, noting, "You have a dwarfing of the root system. Access to water would be even more limited."

Eigenbrode's REACCH grant-supported research has also focused on tracking populations of an aphid called MFC,

which was common in England but was once hard to find in the Pacific Northwest. Since 2011, he said the aphid has proliferated and is now found at 90 percent of the sites he's sampled in Oregon, Washington and Northern Idaho. It has not been found yet in Southern and Eastern Idaho, he said.

Eigenbrode said MFC doesn't like corn but can feed on wheat, barley, oats and native Idaho grasses, and it loves African wire grass, another invader that has dramatically increased its regional populations recently.

Fortunately, Eigenbrode said his testing has confirmed MFC isn't a vector of the most common type of barley yellow dwarf in wheat, but he's found the species can weaken plants and make them more susceptible to bird cherry oat aphid and other aphid vectors of the virus.

# Producers tout agritourism as a way to diversify farm income

By TIM HEARDEN  
Capital Press

REDDING, Calif. — Rancher Bill Burrows' farm was about to go broke in the 1980s, and he needed to do something to save it.

So after going to a couple of workshops and conferences on sustainability, he held a barbecue for friends and community members on his ranch in western Tehama County, Calif., and asked his guests for ideas.

The brainstorming session led Burrows to start a hunting club on his property that now generates 60 percent of his operation's annual income.

"It's amazing what people will pay for a good outdoor experience," Burrows said, adding that he charges as much as \$2,500 for a three-day blacktail deer hunt and \$900 for a two-day wild bore hunt.

The ranch, which runs cattle, meat goats and sheep, has also hosted an annual "Stewardship Day," during which local residents and agency officials learn about resource management.

Burrows was among several producers highlighting the opportunities to attract what he calls the "blacktop jungle people" — city dwellers who yearn for trips to the country — to farms during a class on agritourism Jan. 6 at the McConnell Foundation offices in Redding, Calif.

The class will have two more full-day sessions, Feb. 10 and March 16. Similar



Tim Hearden/Capital Press

Rancher Bill Burrows talks about his effort to set up a hunting club on his property in western Tehama County, Calif., during a University of California-sponsored class on agritourism Jan. 6 at the McConnell Foundation in Redding, Calif.

three-part classes hosted by the University of California's Division of Agriculture and Natural Resources are underway in Quincy and Modesto.

Penny Leff, who coordinates the UC's small farms program, is in her fourth year of conducting the classes to generate interest among growers in diversifying their incomes through agritourism, which could range from community gatherings and U-pick operations to lodges for overnight stays.

Her classes include testimonials from farmers who have introduced agritourism

components into their operations, how to assess a farm's suitability for agritourism, how to manage cash flow and how to deal with local ordinances and obtain insurance.

Agritourism has been growing in popularity in the last decade, as the 2012 Census of Agriculture found the number of U.S. farms hosting some form of attraction for city dwellers rose by 42 percent from the 2007 census.

Leff said she conducts surveys of participants in her classes and has found that most stick with the agritourism programs they began after taking her class.

"It's slow," she said. "It takes years for people to develop these opportunities. ... But most of the people who took the class were moving forward in developing their programs."

Among the producers sharing their experiences Jan. 6 was Becky Klinesteker, who worked with her sisters to open a roadside store and tasting room for her family's Bianchi Orchards in Los Molinos three years ago. The walnut farm now has a vacation rental and hosts weddings.

"We're not trying to go huge," Klinesteker said. "We want to keep it small. ... But we do want to do more weddings."

Burrows said the opportunities for growers to earn income through agritourism will only increase as consumers focus on buying local, natural foods and want to know where it comes from.



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