

A wheat for all seasons -- and reasons

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The seeds may be lacking for perennial wheat to be grown on any significant basis in Texas, but interest is not, according to Dr. Charlie Rush, Texas Agricultural Experiment Station plant pathologist.

From wheat producers and cattle grazing operators to multiple state plant breeders, Rush is finding a groundswell of interest as he begins planting new varieties and starts a second year on his perennial wheat study.

Rush obtained his initial perennial wheat seed stock from Drs. Steve Jones and Kevin Murphy at Washington State University in 2006. Rush's first interest was in the perennial wheat disease resistance research by Dr. Tim Murray, professor and chair of the plant pathology department, and Jones, a wheat breeder.

He will be looking at perennial lines of wheat – wheat that regrows after harvest and may survive for up to five years – for use in dual-purpose grain-grazing cropping systems or as a potential feedstock for the cellulosic bioenergy industry.

Perennial crops by their nature increase carbon in the soil, reduce erosion and improve water quality, Rush said. Perennial wheat also offers the chance for producers to put cattle in the field earlier and graze longer in the spring, while still harvesting grain.

“We’ve been told by producers that having an extra few weeks in March or even early April will be beneficial, because that is when the cattle are putting on the weight,” he said.

With perennial wheat straw being harvested for a bioenergy feedstock, Rush said environmental issues are not a problem. The straw can be cut short and the wheat quickly grows back, so the soil doesn't blow.

"We're just at the beginning of this work," he said. "The perennial lines we've looked at has not been regionally adapted. So that's where we are now. Once we get regionally adapted perennial lines, they will have even greater value."

Rush, as well as Murray and Jones, is joining with Dr. Stan Cox, a wheat breeder with The Land Institute of Salina, Kan. who has been working on developing perennial crops, to do a national study on perennial wheat adaptability. They will be sharing populations of perennial wheat varieties that will be planted in several locations around the country.

Dr. Amir Ibrahim, a wheat breeder and professor with Texas A&M University soil and crop sciences department, and Dr. Brett Carver, Oklahoma State University wheat breeder, also are collaborating in the research.

Carver has been interested in identifying a cool season perennial for several year, primarily for grazing, Rush said. Ibrahim is concentrating on the germplasm traits concerning disease resistance, heat tolerance and drought tolerance.

The studies also are generating international interest, Rush said. He has been contacted by personnel at the Jon Innes Centre in Norwich, England, who want to help the United Kingdom address how agronomic practices affect habitat of and numbers of wild birds. They are looking for low-input perennial cereals and have requested seed from Rush's trials.

In September 2006, Rush planted three replications of 20 lines of

perennial wheat provided by Washington State University, plus seven non-perennial varieties already in commercial production in the High Plains, for comparison.

Additionally, the plots were bordered on one side with a variety highly susceptible to wheat streak mosaic virus and on the other with a highly resistant variety.

Disease screening and forage quality sampling using remote imaging techniques to measure the biomass were completed throughout the growing cycle, Rush said.

The first year of research showed the grazing is as good as any annual wheat, and cattle could have been put onto the plots by mid September, he said. The grain production was about half that of annual wheats, as expected.

In the second year of his research, Rush said things will be headed in three directions. First, there will be the perennial wheat trials around the country.

Second, wheats will be crossbred to get regionally adapted lines, he said. The best annual lines of wheat for this region will be crossed with existing perennial wheat lines to adapt the perennial trait into regionally adapted wheat cultivars.

The resulting crosses that display the best agronomic traits and regrowth will be selected and backcrossed with regional wheats, Rush said.

“This process will continue for about five years and by that time, we will hopefully have some well-adapted perennial wheats that we can begin to increase seed for early field testing,” he said.

The third part of the research is to go back to the first 20 lines of wheat he planted and carry forward the best 11 for further study on agronomic aspects – fertilizer, water, insects and diseases.

“We have to know if it comes back in the second year and is riddled with disease,” he said.

Rush said he will plant the 11 selected lines again in another location, along with letting the original plots regrow.

“We didn’t know if we would get any regrowth here, and we did,” he said.

While the research is exciting and many producers have already contacted him wanting to put out test plots, Rush said it will just take time to get enough seed for on-farm studies.

He also cautioned that this is high-risk research; it is a brand new program for Texas and it may not work in the long run. “This is still very preliminary,” Rush said. “There’s a lot we don’t know about this. That’s what makes it exciting. The potential is huge and that’s what I am looking at.”

Source: Texas A&M University

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