Blended Wheat Varieties Show Their Strength

In some fields of work, uniformity is a symbol of snappy efficiency. But in fields of wheat, planting only one grain variety could leave the entire acreage vulnerable to diseases or insect pests. One solution, says ARS plant pathologist Christina Cowger, is to plant wheat variety blends—mixtures of the seeds of two or more pure varieties.

"Compared to the modern monoculture model, blending wheat varieties is a different approach," says Cowger, who works in ARS's Plant Sciences Research Unit at Raleigh, North Carolina.

Each wheat variety has susceptibilities that can cause fluctuations in yield. For example, some varieties are highly disease resistant but may respond poorly to drought. Or, a variety that is fairly cold-hardy may succumb to certain insect pests.

"In any environment where stresses occur unpredictably, combining pure varieties that have complementary strengths can help stabilize yields," says Cowger.

During the last 4 years, from 10 to 15 percent of the wheat acreage in Kansas and Washington—large wheat-growing states—was planted with variety mixtures, according to experts. Often, growers mix a high-yielding but disease-susceptible variety with a variety that has good disease resistance, though less yield potential.

To assess the advantages and disadvantages of using wheat variety blends, Cowger developed 13 blends from 8 pure varieties. For each blend, she chose two or three pure varieties that would complement each other. She planted the 13 blends and the 8 pure varieties in 3 different North Carolina counties representing the state's sandy, organic, and clay soils. All 21 entries were planted in a 2-year, replicated experiment in each of the 3 representative locations.

Earlier and later maturing varieties were mostly mixed separately, and each blend was made with equal numbers of seeds of each variety. Cowger evaluated yield, test weight, and quality factors in all environments. Where possible, she also studied the blends' response to powdery mildew, leaf rust, soilborne viruses, and other diseases.

For the analysis, she averaged the data over the 2-year period of 2005 and 2006.

The results? "The blends outyielded the pure varieties by an average of 2.3 bushels per acre," she says. "That's a 3.2-percent yield advantage." Blends and pure varieties did not differ in test weight or quality across environments, and blends were either beneficial or neutral with respect to diseases.

Cowger stresses, however, that a blend must be tailored to its planting location for it to be successful. "You have to consider various criteria when choosing varieties to pair in a blend," she says.

Cowger's work demonstrates that blends can be a useful tool for stabilizing yields across the diverse environments of North Carolina.

"These initial results are promising and show the need to continue research on the potential advantages to growers of using wheat variety blends."—By **Rosalie Marion Bliss,** ARS.

This research is part of Plant Genetic Resources, Genomics, and Genetic Improvement, an ARS National Program (#301) described on the World Wide Web at www.nps.ars.usda.gov.

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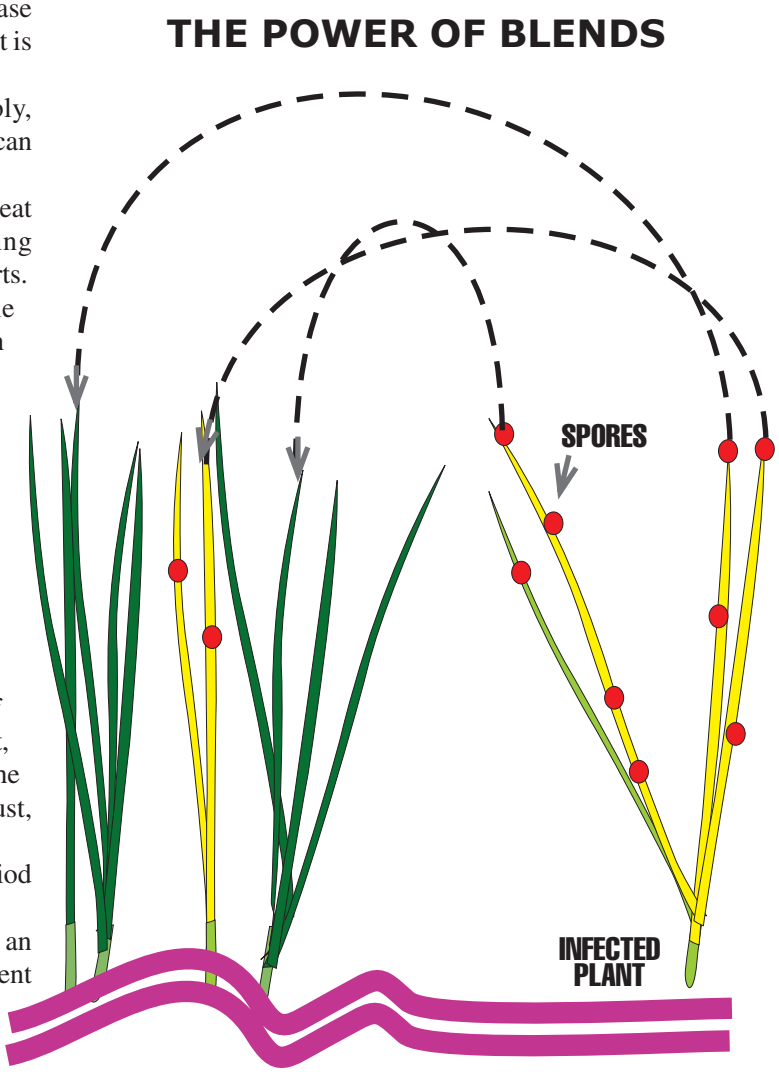

In a mixture (or blend) of wheat varieties planted in a field, one variety may be susceptible to an airborne fungal disease, while the other may not. When a susceptible plant (shown as yellow) becomes infected, the fungal spores produced on that plant are released but many are wasted on resistant plants (shown as green), meaning the spores don't cause an infection. So resistant plants cut down on disease spread by reducing the success rate of spores and by acting as a barrier to the spores.