What is Wheat CAP?

Coordinated Agricultural Project for Wheat is a multi-state, multi-institution project, funded by USDA/CSREES dedicated to the genetic improvement of US wheat through research, education and extension.

The Problem

Stem rust (black rust), a disease of wheat caused by the fungus *Puccinia graminis*, has plagued mankind for thousands of years. A world-wide problem, sporadic epidemics in the U.S. have resulted in yield losses of 200 million bushels in a single year. The fungus has a complicated life cycle requiring a primary host (wheat), and a secondary host (common barberry). During its life cycle, the fungus produces five spore stages. It is thought that red spores can travel on wind currents over long distances to infect wheat. In modern times stem rust has been controlled by growing resistant varieties that carried a few race-specific genes. In 1999, a new virulent race of stem rust emerged in Uganda called UG-99 that infects most current resistant wheat varieties by overcoming the most common resistance genes. In fact, the USDA-ARS cereal disease lab found that 80% of Hard Red Spring varieties grown in the Northern Great Plains are susceptible to UG-99. UG-99 has already spread to the Middle East and South-East Asia and could spread throughout the world. Growing susceptible varieties can insure the spread of UG-99 with devastating impacts on economies and food supplies. Traditionally, wheat breeders select for resistant varieties by exposing them to disease. Traditional selections are being done in Africa. However, to be ready in the U.S. with resistant varieties, a more efficient means of selection is needed.

A Solution:

Marker Assisted Selection

The molecular technique that uses markers to track genes is called marker assisted selection (MAS). In MAS, markers are used as flags to help breeders select the best gene combinations. Almost 50 stem rust resistance genes have been identified. All but one of these genes is race-specific. To have broad resistance several of these race-specific genes must be incorporated into a variety. Markers have been identified for several of these genes to facilitate breeding. Markers have also been identified for the one non-race specific gene. Wheat CAP members are working to identify more resistance genes for UG-99.

What is the Wheat CAP doing?

The Wheat CAP has established marker assisted selection in 25 public wheat breeding programs. We will continue to use MAS to improve wheat disease resistance, yield and quality.

for more information, please visit: http://maswheat.ucdavis.edu