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

Stripe rust or yellow rust is caused by the fungus *Puccinia striiformis* (Westend). Stripe rust is a serious disease of wheat and barley where cool temperatures prevail during the growing season, but can also be a problem in the Central Plains, during the early to mid-spring. New virulent races appeared after 2000 and have caused losses of more than $150 million per year in the U.S.

Stripe rust can be identified by its yellow appearance in rows on the leaf. These rows can resemble sewing machine stitches. Infected plants become stressed and have a scorched droughty appearance.

Breeding Difficulties

Resistant varieties are a cost effective and environmentally friendly strategy of stripe rust control. Breeding of resistant varieties is a continual process because new races of stripe rust are constantly evolving and overcoming plant resistance. Resistance genes can be race specific, providing resistance to a single race, or non-race specific, providing partial resistance to all races. To provide durable resistance, multiple resistance genes must be incorporated into a variety in a process called gene pyramiding. It is impossible to select for multiple genes in the field. It is also difficult to select for non-race-specific genes. Field selections are often problematic, as they require a certain environment and disease presence that is not consistent from year to year.

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. Wheat CAP members have identified markers located very close to race-specific and durable stripe rust resistance genes. Breeders are now using these markers to pyramid genes into the new varieties. Since it is more difficult for the pathogen to overcome all these barriers simultaneously, the new varieties are expected to have a more durable resistance. With the use of markers, varieties are selected faster without infecting lines and without the confounding influence of the environment.

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