

# WHEAT CAP

## FACTS: Greenbug

*Jackie Rudd and Jamie Sherman, March 2007*

### What is Wheat Cap?



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

**The Problem** - The greenbug is a type of aphid that infests wheat, barley, oats, rye, corn, sorghum, and forage grasses. It is distributed worldwide, and it is the most economically damaging aphid in wheat of the southern Great Plains, causing over \$100 million damage per annum in that crop alone. Greenbugs cause damage by piercing leaves with mouthparts, secreting toxins that kill tissues, and sucking plant juices. A light to moderate infestation can cause yield loss, as well as increasing the crops susceptibility to diseases. Infestations can occur throughout the growing season because of the greenbug life history (Fig. 1). Greenbugs have short life cycles that can produce numerous young so that under the right climatic conditions populations can very quickly balloon. These conditions include mild dry winters that favor insect survival and reproduction, as the greenbug usually does not have a separate overwintering stage in the Southern Great Plains. Pesticides have been used to control greenbugs, but the expense to growers and the environment (including loss of natural insect predators of the greenbug) makes them a less attractive means of control. However, a lower cost and more consistent strategy of control could be provided by breeding new varieties with resistance to greenbug feeding.



*Greenbugs at various stages of development on a wheat leaf.*

**Breeding** - Resistance genes have been identified in wheat that are effective against certain greenbug biotypes. However, emerging biotypes, known as virulent, could overcome resistance genes currently deployed in the field. Breeding efforts must be continual to keep up with the ever evolving greenbug biotypes. Wheat CAP member Jackie Rudd and his group have been working hard to identify new resistance genes that are effective against virulent greenbug biotypes.



*A severe outbreak of greenbug in 2002 devastated this breeding nursery in the Texas Panhandle and only resistant wheat survived.*

### Greenbug: High Capacity Reproduction

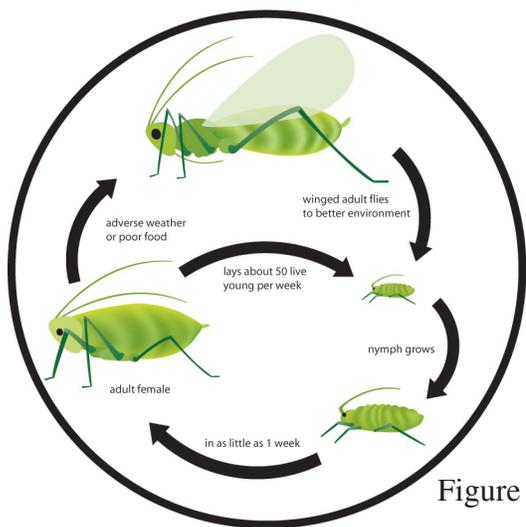


Figure 1

**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. Rudd's group identified markers for several greenbug resistance genes that can be used for wheat breeding. Markers allow breeders to choose the best resistance gene combinations that are most effective against the common greenbug biotypes in any given region.

### 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.