High Temperature, No Rain, Crops Go On Defense

MU Agronomist Says Heat Stress Takes Yield Toll

COLUMBIA, MO.

Corn leaves are rolling. Soybean leaves are flipping. Crop plants go into a defensive mode against the sun and heat.

"For crops, the drought threat is serious," says Bill Wiebold, University of Missouri Extension agronomist. "Yields drop. Plants die.

"Once corn plants turn blue-gray instead of dark green, they are within about three days of death," he says. Plants defend themselves for a while, but with no rainfall and continued high temperatures, the plants die.

At first, the plants stop filling the ears and pods with grain. Then they go into a survival mode. Soybean plants can set new flowers with late rains. Corn does not.

As the hot, dry weather continues, corn leaves "roll." By rolling, the leaves reduce their exposed surface to sunlight. Also, the air inside the rolled leaves helps them retain some moisture and stay a bit cooler.

Soybean leaves change orientation with the sun to be efficient solar collectors. In normal weather, all leaves are oriented toward the sun for photosynthesis, which manufactures sugars that feed the plant and fill the seedpods.

As the plant becomes stressed, the leaves turn parallel to the sunbeams and stop collecting solar energy.

"You can look right down into the field canopy and see the ground," Wiebold says. "Normally, with canopy closure, you can't see the ground."

As drought stress continues, the leaves flip upside down. The underside of the soybean leaf is more white than green. The white surface reflects sunlight back into the atmosphere.

The big issue now is evapotranspiration. The plants need one-quarter to one-third inch of water a day to keep functioning. With the lack of rainfall, the plants pull all available moisture out of the soil.

Moisture helps cool the plant and moves plant sugars from the leaves to the seeds.

Several things begin to fail all at once when the plant goes into heat stress, Wiebold says.

"Old farmers say that hot weather makes a corn crop. But that is true only to a point. When temperatures get much over 88 degrees, the plants are harmed."

The big hazard is hot nights, Wiebold says. When air temperature remains in the 80s at night, the plants continue respiration instead of shutting down. That plant activity at night, when photosynthesis has stopped, burns sugars that were made during the day.

When sugar creation slows in the hot daytime temperatures and plants burn sugars at night, there is a net energy loss.

Travelers going down the highway can see the impact of the drought in roadside fields of corn and soybeans.

Along I-70, observant watchers already see cornfields turning blue-gray, Wiebold says. In Missouri, crops look excellent north of Highway 36, with dark green corn and soybeans. A few days without rain can change that look. Leaf rolling is already seen.

The corn stalks can look, from afar, to be normal. However, if the corn was hit by hot, dry weather during pollination, the ears may not be full of kernels up and down the cob.

"This may be a rough year to grow double-crop soybeans," Wiebold says. "I've seen some soybean leaves appearing above the wheat stubble. But in this drought, the soybean plants seem to shrink."

Normally, about July 1, double-crop soybeans are drilled into stubble fields left after wheat harvest.

While farmers and their crops don't thrive in hot, dry weather, some insects do.

"Grasshoppers are moving from field edges out into the crops," says Wayne Bailey, MU Extension entomologist. "Grasshoppers eat both corn and soybean plants. I'm getting a lot of phone calls.

"Spider mites are showing up in soybean fields," Bailey adds. "They are tiny and hard to see, but first symptoms might be webbing in a circular patch.

"If you get close, you can see reddish moving dots, especially under upper leaves. Spider mites suck juice out of the leaves at a time when the plants need moisture."

Bailey urged producers to check their soybean fields every day.

MU Extension specialists hold weekly teleconferences with regional agronomists across the state. They exchange crop condition updates.

Specialists can be contacted through local MU Extension centers in each county. Δ