

REJUVENATING RANGE / TARGETING SAWFLIES

# THE FURROW

MARCH 2013

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urking quietly in the protective confines of an otherwise pristine crop, wheat stem sawflies make a quiet buffet of yields and lay the groundwork for a messy, frustrating, and costly harvest.

“Sawflies really reduce our top-end yield potential. In bad years, we’ve had crops laid down flat as a sidewalk at harvest,” says frustrated Carter, Mont., wheat producer Dale Schuler.

Adult sawflies have an extremely short lifespan, existing outside the plant for a mere two weeks before laying their eggs in wheat stems. That leaves producers completely without chemical control options.

**Research responds.** Fortunately, Montana State University researchers are answering the call, investigating new ways to foil the damaging pest.

Geneticists, plant breeders, and entomologists are working to manipulate sawfly behavior and improve solid-stem wheat varieties—one of the only control options available. ♪

▶**Large photo:** Marker-assisted breeding is being used to develop wheat varieties that stand up to sawflies. ▶**Below:** Wheat stem sawflies are Montana’s most costly agronomic pest. Also found in Canada, the Dakotas, and Wyoming, they’re increasing in Colorado and other states.

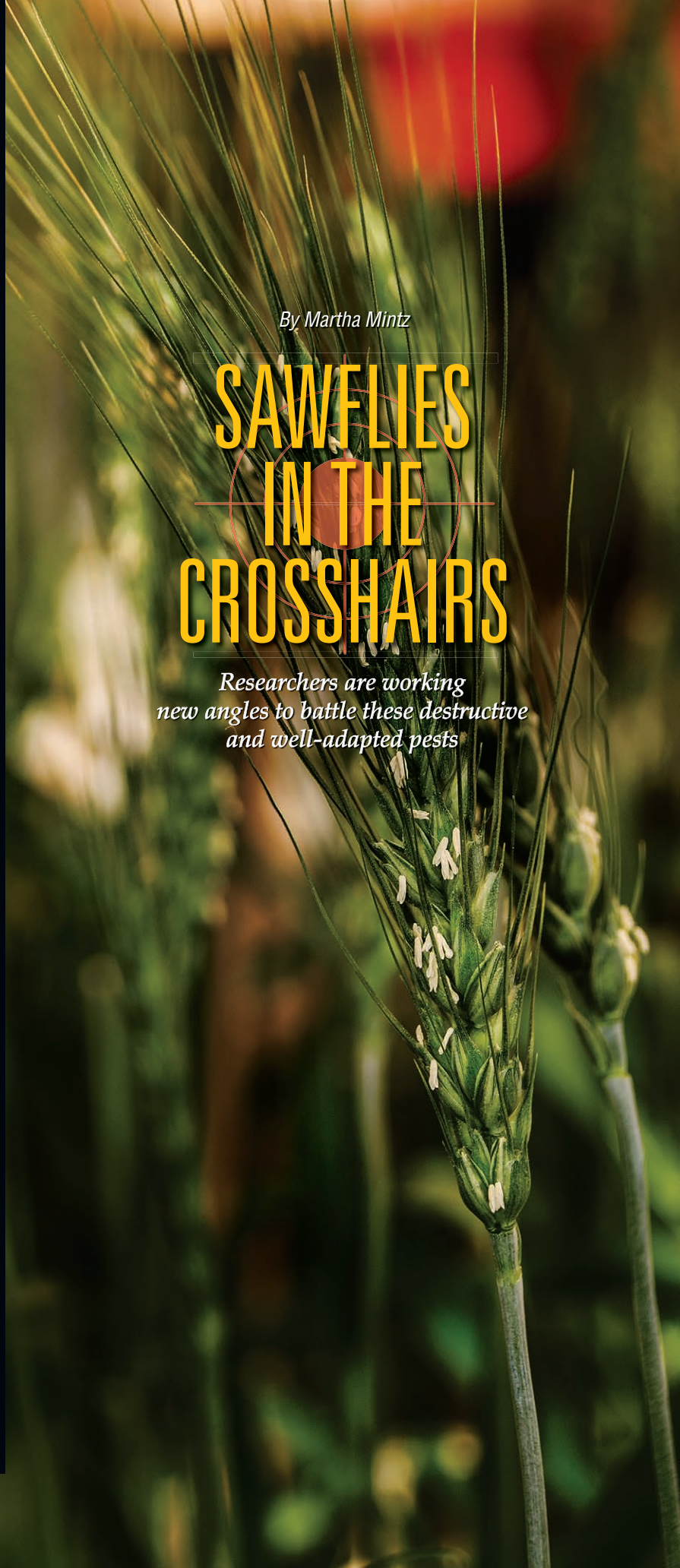


PHOTO: ROBERT PETERSON

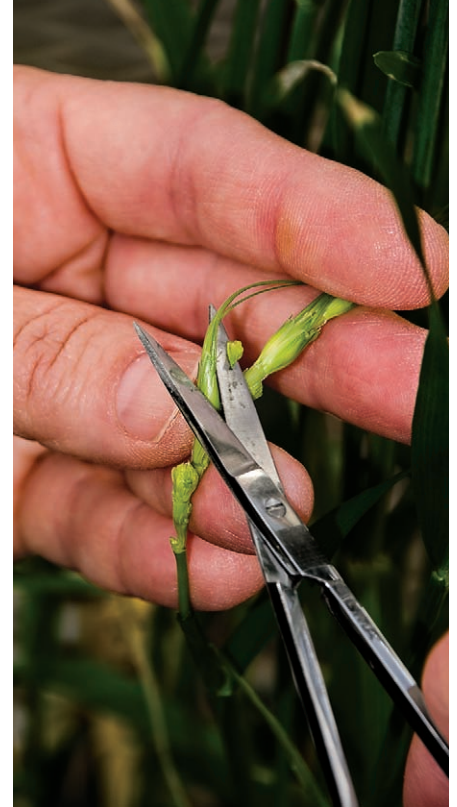
By Martha Mintz

# SAWFLIES IN THE CROSSHAIRS

*Researchers are working  
new angles to battle these destructive  
and well-adapted pests*







►**Above left:** MSU geneticist Jamie Sherman identifies key DNA markers for faster breeding of sawfly resistant varieties. ►**Above:** Wheat varieties with desirable traits, such as solid stems and fewer sawfly attracting compounds, are manually bred year-round at MSU greenhouses.



►**Above:** David Weaver and his research assistant slice open wheat stems to evaluate sawfly and beneficial parasitoid wasp larvae numbers.

“We’re working to find new genes for sawfly resistance and have identified two areas of interest—early stem solidness and production of attractive compounds,” says Jamie Sherman, MSU professor and geneticist.

Solid-stemmed wheat varieties are widely used already because they cause higher mortality rates of sawfly larvae. It turns out, however, that some solid-stem wheat varieties are initially hollow, then fill in later.

“Sawflies infest when the wheat

stem is newly formed,” Sherman says. “We need the stem to be solid early when the eggs are laid, and that’s something we hadn’t really thought about before. We believe we’ve identified a gene that causes newly formed stems to be solid for better control.”

Sawfly-attractive odor components produced by wheat also are under investigation. Some varieties have proven to be more attractive to egg-laying females based on the amount and type of attractants produced.

“We’re taking wheat lines that don’t attract sawflies and are trying to identify the part of their DNA controlling that so we can work it into our wheat breeding program,” Sherman says.

**Fatal attraction.** Attracting sawflies is another option being explored.

“Manipulating sawfly behavior to attract them to an area or variety to lay their eggs where they can’t survive also seems promising,” says David Weaver, MSU entomologist.

Producers who want to take sawfly control into their own hands sooner can look to the past for successful control options such as trap cropping.

“Trap cropping was an effective agronomic technique recommended for sawfly control before World War II,” Weaver says. “Crops like some oat varieties are extremely attractive to sawflies but are completely resistant.

By planting about two seeder passes of a trap crop, which can also be a resistant solid-stem wheat variety, you can focus the sawflies into one area.”

Harvest and tillage operations also can be manipulated to effectively work against wheat stem sawfly by ensuring survival of beneficial, sawfly-killing parasitoid wasps.

“Parasitoid wasps overwinter high in the stem,” Weaver explains. “By not tilling and leaving a third of the stem standing you can save 85 percent of parasitoid larvae, or more than 90 percent if greater than two-thirds is left.”

The wasps are attracted to wheat stems harboring sawfly larvae to lay their eggs. When eggs hatch, the parasitoid larvae kill sawfly larvae before they can do much damage. Weaver hopes to discover what attracts parasitoids to the sawfly-infested stems and use that against the pests.

“Solid-stem varieties have been in use since the 1940s,” Weaver says. “And we’ve already seen sawflies shift their biology to feed on winter wheat. We have to start worrying.” ■