INSECT PESTS OF PULSE CROPS

Insecticides remain essential, but keep an eye on some other insect management approaches that today's researchers are working on.

Dr. Boyd Mori believes that new approaches will deliver benefits to growers.

Over the years, the threat of insect pests has often prompted research that resulted in a new insecticide. To this day, insecticides can be considered a primary line of defence. Whether seed-treated or foliar-applied, the good news is that insecticides are available for many significant insect pests in the key pulse crops.

Meanwhile, times are changing. Despite the many challenges of studying these insects, researchers are looking into new ways of controlling or managing pests. Their work could make these approaches not only possible but practical in the years to come.

For an overview of current issues and priorities in pulse insect research, we asked Dr. Boyd Mori to share his thoughts.

"Insecticide is still the go-to in many cases, but now we're also looking at sustainability," said Mori, Assistant Professor and NSERC Industrial Research Chair in Agricultural Entomology at the University of Alberta. "Beneficials like predators and parasitoids are a growing focus, and host plant resistance is also in the conversation."

When it comes to pests of pulses in Alberta, today's key targets are pea leaf weevil in peas and faba beans, pea aphids in lentils and peas, along with wireworm and grasshoppers. A new wireworm insecticide in 2021 is another example of industry bringing new solutions to the field.

Depending too much on insecticides can have undesirable consequences, Mori noted. Trusted products could be restricted or removed based on new environmental evaluations or even public sentiment, leaving growers with fewer options.

"The grower can save time and money, as well as the environmental load, if they can manage pests by means other than just insecticide," Mori said.

As he sees it, there are several promising avenues for scientists and agronomists to investigate.

Host plant resistance. To Mori, this strategy tends to be under-discussed in pulses, but it's been transformative in a crop like wheat.

"Midge in wheat is a good example," he said. "Researchers found that winter wheat was not as susceptible to midge as spring wheat. They identified a single gene associated with this in winter wheat and moved it into spring wheat. Of course, it's more complicated if you need multiple genes, not just one."

Agronomic strategies. Another way to defend against insects is to vary cropping practices. One defence is to grow a healthy, vigorous crop that is better able to withstand insect feeding.

"Changing the rate of fertilizer can have an impact," Mori said. "Normally, you wouldn't need to fertilize peas,

but doing so could help against an insect like pea leaf weevil."

Beneficial insects. The enemy of your enemy is your friend, they say. In that regard, predators and parasitoids of target insects can potentially be deployed in the grower's cause. Interactions between target and beneficial insects are being studied (see page 18) and this work could yield major improvements in control at lower environmental cost.

The potential of beneficials underlines what Mori sees as a major challenge of agricultural entomology: how to truly understand what's happening in the field.

"If you take a step back and look at the whole system, there's still a lot we don't know," Mori said. "Overall, we need to know more about issues like population dynamics, including how insects overwinter. To try to understand how they overwinter, you're dealing with temperature, snow cover, moisture and other issues. You can try to simulate all that in the lab, but of course, it's different in the field."

Insect forecasting. Organizations like the Prairie Pest Monitoring Network do valuable work aggregating observations about insect pests. This doesn't provide a dependable future forecast for growers, but it's a step in the right direction. Having a true forecasting method would help growers even more.

As Mori sees it, having a viable lineup of insecticides for pulse crops is no reason not to seek a better way. However complex and dynamic the interactions between pests, beneficials, crops and the environment, researchers are digging in and aiming to innovate.

"As a scientist, I like the process," Mori said. "Do the research work, get results and apply what we learn. If we can develop a better toolkit for farmers, it will help them grow their crops in a more sustainable way."

NEW WAYS TO SCOUT AND EVALUATE WIREWORM

Wireworm can be big trouble for cereal growers. This pest's damaging larvae can live in the soil for several years, making them challenging to scout for. Wireworm feeds on multiple crops (pulses included) and has no established economic threshold.

Given that, many growers get their cereal seed treated just in case. In significant wireworm years, that's a sound investment. Some years, it's an unnecessary expense.

Dr. Haley Catton, Lethbridge-based Research Entomologist with Agriculture and Agri-Food Canada, wants to take some of the guesswork out of wireworm management. In a new project starting in 2021, she will study novel monitoring strategies for this pest.

In one, she'll look into using drone-captured imagery for scouting. Thin patches this year in your cereals could indicate wireworms will be a problem next year in a pulse crop.

In another, Catton is excited about the potential of a pheromone newly discovered by Dr. Wim van Herk at AAFC-Agassiz and the Gries Lab at Simon Fraser University. This pheromone attracts wireworms and could provide an effective monitoring shortcut.

"Farmers need an easier way to decide if they have wireworm," Catton said. "We are trying to give farmers new tools and a better decision-making process for this insect."