Taking control of volunteer canola in soybeans

Management takes a multi-faceted approach.

BY VANESSA FARNSWORTH

Volunteer canola in soybean fields is nothing new. When soybeans first started being grown in a serious way in Western Canada 10 to 15 years ago, it wasn't long before masses of attractive yellow flowers became a relatively common sight in the region's soybean fields.

"That first flurry of volunteer canola in soybean was interesting because, back then, it was the only glyphosate-resistant weed in soybean," says Robert Gulden, a University of Manitoba (U of M) weed researcher who has been studying volunteer canola for more than 20 years. "It used to be that when you applied Roundup to the field, all the weeds would be gone. But then some of those volunteer canola plants survived Roundup, so we started seeing fields of various densities. You still frequently see soybean fields with at least a few – and sometimes quite a few – volunteer canola plants."

Herbicide resistance isn't the only issue. Another key contributor is how often soybean and canola are grown by the same producers in Western Canada. This is particularly true in Manitoba, he says, where roughly a third of the acreage each year is planted in canola while soybean acres tend to hover just below the 20 per cent mark.

"Both are major crops, so it's really hard to avoid the problem," Gulden says. "The trick is being as preemptive as we can, knowing the biology of the two species, and then using control measures where needed."

UNDERSTANDING THE PROBLEM

Because canola is a cooler season species, it has the competitive advantage in Western Canada where it grows faster and gains access to resources earlier in the spring than soybean. It also typically grows taller than most soybean varieties, outcompeting them for light and quickly overpowering the crop. The impact on soybean yields can be significant. When Gulden was researching thresholds, he regularly saw 50 or 70 per cent yield losses in soybean due solely to higher densities of volunteer canola.

"Volunteer canola is quite manageable in most of our other crops," says Gulden. "That doesn't mean it's not there, but it's managed quite well with in-crop herbicides." An effective tank-mix partner can also manage it in Roundup Ready or multiple herbicide-resistant soybeans.

Because canola, particularly *Brassica napus*, still retains some weedy traits, it can form seed banks that persist in rotation, and large seed bank inputs have inadvertently been created in the past when seed was lost at the front and out the back of the combine during harvest. The result was many more seeds being returned to the seed bank than a farmer would plant. Gulden notes that while the rate of seed bank decline is roughly 90 per cent per year, it doesn't take a lot of persistence to have a substantial weed problem the following year.

"If people are losing five or six thousand seeds per metre squared – that's what the average was – and we generally plant at 50 or 60 seeds/m², you need a lot of seed bank mortality to not have a full canola crop just with the volunteers," Gulden says, noting that the numbers are probably lower these days due to pod shatter resistance technology. "But we haven't quantified that. From what I've seen anecdotally, that technology works well, and there should be lower seed bank inputs. But that doesn't mean they're zero."

MANAGING THE PROBLEM

There are several ways volunteer canola can be managed. Research found

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LEFT Volunteer canola can have significant impact on soybean yields.

a light tillage pass over the field right after canola harvest promotes greater fall germination. "In most winters, we get effective winter kill and those seeds are taken out of commission," says Gulden. "That doesn't mean you're going to get all of them, but you're going to get a large proportion of them."

Growers can also stack the deck in their favour by establishing soybean stands that are competitive against weeds. "We found that soybeans are more competitive against volunteer canola at a density somewhere around 180,000 soybean plants per acre than when you lower your seeding rates to 140,000 or 150,000 plants/ac," Gulden says. "You don't need to go much above 180,000."

Scouting is key to ensure an issue with volunteer canola is handled early. Multiple herbicide-resistant soybean varieties can further help the cause. "Anytime you have a double-resistant soybean that includes particularly a Group 4 herbicide, be it 2,4-D or dicamba resistance, volunteer canola becomes easier to manage," Gulden says.

RESEARCH IS ONGOING

While a lot of progress has been made on the volunteer canola issue across Western Canada over the years, Gulden is still searching for new and better ways to give growers the upper hand. That includes collaborating with Sally Vail, a research scientist in oilseed breeding with Agriculture and Agri-Food Canada (AAFC) in Saskatoon, Sask., on a project investigating the genetics of secondary dormancy in canola with the goal of reducing seed bank persistence.

Another project Gulden hopes will pay big dividends involves training deep learning networks to recognize specific weed populations. This large-scale project involves multiple crops and a diverse group of researchers. Although it originally had nothing to do with identifying volunteer canola in soybeans, it turns out that's likely to be one of its earlier spin offs.

"Sometimes you get a soybean field that's completely polluted with canola, and spot scouting gives you a good estimate of what's going on," Gulden says. "But oftentimes it's in patches in the field and when you're spot scouting, you miss those patches and have no idea that they're there."

This project could provide a powerful new tool for reliably identifying patches of volunteer canola in their soybean fields early in the season.