Canola in the Valley

Science sheds light on a heated topic.

By Gail Wells
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Carol Mallory-Smith, an Oregon State University weed scientist, studies cross-pollination between plants such as canola and broccoli.
Photo by Lynn Ketchum.

Some scientists might relish seeing their research at the center of a vigorous policy dispute, but Carol Mallory-Smith is not one of them. "I try to stick to the science and stay out of the spotlight," she says.

Mallory-Smith is a weed scientist with Oregon State University's crop and soil science department. She is fascinated with how plants hybridize, how they spread their genes and cross-pollinate.

Such study might suggest tranquil scenes of birds and bees and a gentle breeze. But, no. Mallory-Smith's interest in cross-pollination has led her to investigate the flow of genes between genetically modified crops and their conventional counterparts. And that has propelled her into one of today's hottest environmental controversies.

"I didn't intend to get into these political issues," she says. But as a scientist at a public land grant university, her work is used by policymakers to shed light on such heated public debates.

Mallory-Smith is a careful and precise speaker, neither overstating the science nor backing away from its implications. In a situation where feelings run high, she is regarded as an unbiased spokesperson for the research—a straight shooter, neither a demonizer nor a booster of genetic modification.

But sometimes the grenades of controversy hit uncomfortably close to home. Currently, research by Mallory-Smith and her OSU colleagues has become Exhibit A in an agricultural tempest raging in OSU's backyard. The dispute is pitting specialty vegetable and vegetable-

seed farmers in Oregon's Willamette Valley against grass-seed farmers who want to grow canola, a rotation crop that can yield a profit as a source of both food and fuel.

Canola seed produces an oil that can be used for fuel or for cooking. Photo by Lynn Ketchum.

Canola is a member of the sprawling Brassica family, which includes good-for-you vegetables like cabbage, cauliflower, kale, and broccoli. Canola can cross-pollinate with some of these crops and with their weedy wild relatives. That worries some vegetable-seed growers who must assure the genetic purity of their seeds. And because the Oregon Department of Agriculture makes no distinction between genetically modified and conventional canola (both are legal crops) the valley's organic farmers worry that they won't be able to sell their products as organic if they're cross-pollinated with genetically modified canola.

The Oregon Department of Agriculture permits canola to be grown in three areas east of the Cascades, and, since 2009, in small patches on the valley's fringe. At the moment, no canola is grown in the heart of the valley except by special research permit. The state's restrictions on canola date from 2005, when OSU scientists, including Mallory-Smith, reported many scientific unknowns and potentially high risk of allowing canola into a neighborhood of high-value specialty seed farms.

The state is now proposing a changed rule that would allow limited acreage in the valley to be planted in canola under specific conditions. Although this is only a proposed rule, to be decided in 2013, it worries specialty seed farmers. Canola is "an aggressive and persistent weed that can and will outcross" with related Brassicas, says Nick Tichinin, a Polk County farmer whose company, Universal Seed Co., supplies vegetable seed to a worldwide market of vegetable producers and home gardeners. "We're introducing a new pest into a currently closed system."

The Willamette Valley is a great place to grow seeds—wet, mild winters encourage plant growth while dry, warm summers help set seed. One of just a handful of places in the world with a similar climate, the valley produces much of the world's Brassica seeds, accounting for $25 million annually. Unlike canola, specialty seed crops are painstakingly bred and tended, says Tichinin. "We are part of a unique, little-known, essential, and now jeopardized, worldwide seed supply chain."

Canola is a relatively new crop in eastern Oregon. In this Hermiston field, a swather cuts the seed crop in advance of the combine.
Photo by Lynn Ketchum.

Bringing a rampant Brassica like canola into the valley, says Tichinin, would risk contaminating their crops— an entire seed lot will be rejected if a tiny proportion is not the true variety. And contamination with engineered genes could drive organic growers out of business, he says.

On the other side of the debate are the grass-seed farmers, who are looking for a good rotation crop. “Canola is fantastic for rotation,” says Kathy Hadley, a Polk County farmer and member of the Willamette Valley Oilseed Association. “It does all the things a rotation crop is supposed to do: utilizes different nutrients in the soil, reduces disease pressure on your main crop, and allows you to use a different chemical regime to control weeds. It has a taproot that breaks up the soil pan and provides a good soil structure for no-till agriculture.”

And, unlike most other rotation crops, canola is profitable. It can be made into both a food-grade oil for cooking and fuel for biodiesel. Oregon law requires that diesel fuel contain 5 percent biodiesel. And governor John Kitzhaber’s 2012 energy plan calls for replacing 20 percent of Oregon’s fleet vehicles with cars and trucks that run on alternative fuels, including biodiesel.

Is Oregon’s agricultural Eden big enough for both canola fields and specialty-seed operations? How can science shed light on this heated debate?

“The biology of the plant makes a big difference,” says Mallory-Smith. “Is it cross-pollinated or self-pollinated? If cross-pollinated, is the pollen carried by wind or insects? And if a cross occurs, how viable are the hybrid offspring?”

Mallory-Smith and her OSU colleagues are working on questions like these. When the precautionary no-canola boundary was established in 2005, the Oregon Department of Agriculture (ODA) relied on the scientific advice of OSU researchers. Preparing to revisit the issue in 2010, ODA commissioned a full study from a team headed by Russ Karow, head of OSU’s crop and soil science department.

In addition to reviewing existing studies on canola, the team, which included Mallory-Smith, conducted field trials in the valley under a special research permit. These trials included plantings on Kathy Hadley’s farm in 2008 and 2009.

Pests and diseases common to many Brassica varieties were present in the trials. And the researchers found that canola seeds stay viable in the soil for two or three years, raising the risk that canola could become a weed in subsequent crops or along roadsides and waterways.

As with many scientific studies, the team noted that the research “resulted in as many questions as answers.” Confirming the presence of insects and diseases led to the question of how these might spread from field to field and how long pests might persist. Confirming that the seed could stay viable for years led to the question of how farmers or regulators might control maverick canola plants along roadsides and field edges. And because plants have to flower at the same time to cross-pollinate, the researchers questioned if using plants with mismatched flowering cycles might limit cross-pollination.

“Given the potential risk,” the researchers concluded, “precaution suggests not allowing canola production at this time.” ODA opted to keep the 2009 precautionary rule, but reopened the case in 2012.

The researchers continued their work. In a report released in 2012, Mallory-Smith and OSU colleagues James Myers and Michael Quinn addressed additional risks posed by genetically engineered canola. They researched pollen movement and concluded that pollen from a large field of canola could overwhelm a small planting of, say, Siberian kale, which is highly compatible with canola.

Honeybees, such as this one pollinating organic broccoli in the Willamette Valley, could be a vector for cross-pollination between vegetable-seed crops and canola. Photo by Lynn Ketchum.

They looked at studies from other researchers on transport of seed by humans, birds, rodents, and insects, and concluded that canola could become a persistent weed problem in a subsequent crop, in areas adjacent to fields, and along roadsides. And they cited a Canadian analysis of canola seed that had been certified as non-transgenic, but found that 24 of the 25 tested lots contained transgenic seeds.

Caution, the researchers conclude, is still the watchword. “This study provides strong evidence that it will be difficult to prevent the introduction of transgenic canola into an area even if there [were] a provision to only allow conventional canola production in the Willamette Valley.”

The canola debate moved to the state capitol in September of this year, when farmers on both sides made their case. Science can do much to shed light on such controversial issues, but science cannot make the decision. That is the responsibility of the policymaker.

It is not easy to stand by and watch warring factions argue about your work. But having contributed the best science she can, Mallory-Smith stresses that the outcome is not up to her. “The decision-makers are listening to the science, and they understand the science,” she says. “They have to make a regulatory decision based on what they see as the greater good.”

Read the full story at http://oregonprogress.oregonstate.edu/winter-2013/canola-valley

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