2015 Canola Discovery Forum
Top 10 Discoveries
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The Canola Council of Canada hosted the Canola Discovery Forum in Canmore, Alberta, in October 2015. Here are a few forum discoveries to think about as you make plans for 2016 and beyond.

By Jay Whetter

Canola Discovery Forum is designed to, as Alberta Canola Producers Commission director Daryl Tuck said, “discuss new ideas for what should be done and could be done.” The annual event digs into scientific discovery, research needs and new practical applications that will improve production, profitability and sustainability of canola in Western Canada.

Here are the top 10 discoveries:

1. More plants mean less variability. Canola at low plant populations can branch out and produce just as many pods as canola at higher plant populations. Stands with low plant counts can also yield as high as dense stands. But often overlooked in this comparison is the wide range of yield variability that results from lower populations.

Neil Harker, research scientist with Agriculture and Agri-Food Canada (AAFC) in Lacombe, Alberta, demonstrated that while stands of five and 10 plants per square foot can both reach full yield potential, the yield range with five plants is actually 78-100 percent of full potential while 10 plants have a yield range of 92-100 percent of full potential. More plants buffer against plant loss from flea beetles and frost, for example, and a uniform stand of 10 plants will mean the crop is at a tighter range of staging than the bigger, branchier plants with lower populations. This can mean earlier maturity and more uniform staging for harvest timing, and lower harvest losses. Earlier maturity also reduces the likelihood that canola yield will be reduced by heat stress during flowering and podding.

Knowing your plant stand and comparing that to yield results, harvest timing and all-season management is an important step in setting a true profit-driven seeding rate. But as Owen Kinch, SeedMaster field research manager, said at Canola Discovery Forum: “Very, very, very few people actually know what they have for canola plant populations.”

2. Seeding canola at a uniform depth is more challenging than we realize. The common recommendation is to seed canola at a consistent depth of 1/2” to 1”. But as Lacombe, Alberta canola grower Craig Shaw noted at Canola Discovery Forum, the best a precision tool can achieve is 1” variation from shallowest to deepest seed placement, and 1.5” is more common. That means a typical seeding operation will put some seed at 1/2” depth, some at 2” and the rest at all points in between. “We are asking a lot of our seeding equipment,” Shaw said.

A level drill with well-maintained openers and tires is just part of the picture. Fan speed also influences seed depth. Air flow is inconsistent from row to row, and increased air flow required to carry fertilizer often means excessive and unpredictable seed bounce in the row. For improved canola seed placement, we may see a move to metering at the opener, which could improve seed placement down the row and provide consistent air flow in the last stage of seed drop.

3. Are we moving backwards in our application of nitrogen? Mario Tenuta, soil ecologist with the University of Manitoba, asked this question in his presentation. Research in the 1970s and '80s showed that banding of nitrogen (N) helps reduce losses and improve crop uptake, but with time constraints to seed larger acreages and seeding equipment not keeping up with increased N application rates, more growers are applying broadcast fertilizer, Tenuta said. By moving from banding to broadcast, growers are losing value from their N.

Ross McKenzie, crop nutrition consultant who recently retired after 38 years with Alberta Agriculture in Lethbridge, said the best growers can hope for is 70 percent efficiency — as in 70 percent of applied N is actually taken up by the plant. This would be for N side-banded or mid-row banded into the root zone at the time of seeding. His second choice is banding in a separate pass from seeding. In late fall, a grower can band urea or ESN or a combination of both depending on potential for N loss. Broadcast application at seeding has 40-50 percent efficiency if the fertilizer is not incorporated or poorly incorporated. Dribble banding in-crop is 20-30 percent efficient "if you're lucky and get a timely rain after application." Foliar, which McKenzie calls "the biggest joke in town," has five percent efficiency in terms of uptake through leaves.

McKenzie's number one concern is that "very little work" is being done to create up-to-date N fertilizer response information as canola yield potential increases with improved genetics and agronomic management. "We need to be able to fine-tune application at high rates," he said.

4. Growers hear mixed messages about how best to approach variable rate fertilization. This may be part of the reason why adoption is so low. Is vegetation index mapping the key? Or elevation? Electrical conductivity? Yield? Brian Chorney, Manitoba Canola Growers Association director, said in his introductory address, "I talk to three different consultants and get three different points of view on what approach to use. We need a well-researched approach."

Terry Aberhart, grower from Langenberg, SK, Agri-Coach and owner of Sure Growth Technologies, shared his approach. He uses soil electrical conductivity (EC) maps as well as PowerZone maps, which combine up to 30 years of satellite images to create zones for variable rate fertilizer. Using only one year of satellite images can lead to inconsistent results. And when building historical maps for variable rate, vegetative index is not reliable, Aberhart said, because more biomass does not always mean more yield. In low areas that tend to produce a lot of biomass, his experience is that fertilizer in those soils is not limiting and that applying *less* fertilizer can actually increase yields and greatly improve the bottom line for those acres. (For a more in-depth discussion on variable rate fertilizer, see Bruce Barker's full article in this issue.)

5. Genetic resistance to clubroot will not last long under intense canola rotation. Evidence of this is already found around Edmonton where high clubroot pressure and tight canola rotations have led to a rather quick shift in the clubroot population to overcome current sources of resistance. Ralph Lange, plant pathologist with Alberta Innovates - Technology Futures in Vegreville, explained why at Discovery Forum. Clubroot is an "obligate" pathogen, he said, which means it needs a susceptible host to survive. This puts it under "high selection

pressure to adapt". As host resistance improves — through breeding efforts in the case of canola — the pathogen must adapt quickly or survive somehow (as resting spores, for example). If not, the population dies. Clubroot can adapt quickly, Lange said, because it produces many billions of spores per gall and it can recombine its genes readily to quickly create strains that attack resistant varieties. These many, many billions of spores mean more opportunities for advantageous mutations and genetic shuffling to occur, which means the chances of a population shifting to overcome genetic resistance is high.

6. The relation between yield loss and crop injury due to insect feeding is not linear. Yield loss does not increase in step with crop injury. Rather, low levels of insect feeding can actually stimulate the plant to increase yield as a compensation response, said Hector Carcamo, entomology researcher with Agriculture and Agri-Food Canada in Lethbridge. Carcamo also defined two important terms to keep in mind when considering insect management. *Economic injury level* is the break-even point at which the value of the crop damaged by the pest equals the cost of the control action to prevent it. However, the *economic or action threshold* is usually set a little lower to prevent the insect pest from reaching the point of economic injury level. Ideally thresholds should take into account natural enemies, Carcamo said, which would make the action thresholds higher, but this information is rarely available.

7. Swathing a few days later can make a large contribution to yield. Camile Baillargeon, canola grower from North Battleford, SK, said that in 2015, his canola showed a 4-5 bu./ac. increase in yield when swathed at 80 percent seed colour change (SCC) on the main stem compared to swathing at 50 percent SCC. The difference has not been that large in past years, he said, but in 2015, the stand was thinned due to frost and flea beetles. Fewer plants meant more branching, and only 20-30 percent of the yield was on the main stem. By swathing when the main stem had almost complete SCC, it gave side branches more time to fill in.

James Humphris, oilseed crops manager with Bayer CropScience, said eliminating all swathing done before 40 percent SCC on the main stem could single-handedly achieve the Canola Council of Canada's goal of gaining a 2 bu./ac. yield increase by 2025 through improved harvest management. A combination of later swathing and straight combining could work on many farms.

Kevin Serfas sees that potential, but he and his family, who run a large farm in southern Alberta, still swath all their canola. "We have a three-month harvest window in southern Alberta and swathing allows us to use it," he said. By swathing canola, he can harvest about 10 days earlier than everyone else. "Currently I have one combine per 3,500 acres. If straight combining, I'd need a combine for every 2,500 acres." He hasn't totally ruled out straight combining as long as it maintains his harvest window and his combine-to-acres ratio. "Strides in plant breeding will be key to adoption of straight combining," he said, referring to pod shatter tolerance as an example.

8. Well-worn myths about combine function may lead to higher harvest losses. Nathan Gregg, project manager with the Prairie Agricultural Machinery Institute (PAMI), shot down three common myths in his presentation at Canola Discovery Forum:

- Myth 1: Keeping the combine running full will reduce loss. Wrong. In theory, this may improve grain on grain threshing, however Gregg said that years of combine testing have shown that as feed rate increases, free grain and unthreshed losses increase as well.
- Myth 2: Settings for canola will be fine for the entire day and season. Wrong. Check for losses in morning, afternoon and evening as well as crop to crop to see how time of day influences losses. Weeds, crop curing, crop uniformity and even variety can influence losses based on fixed settings.

- Myth 3: Loss monitors show what is thrown over. Wrong. Loss monitors can tell if losses are going up or down, but determining the amount of loss means “you have to get dirty,” Gregg said. Using a drop pan to check for losses coming out the back of the combine is dirty but important work.

With all three of these myths, once you get to know the combine’s breaking point for losses based on load, how losses change based on conditions and what the loss monitor is really saying, growers may not have to measure losses as often, Gregg said.

9. If we grow more canola, we can sell it. “There really is a lot of upside to the vegetable oil market,” said Peter Entz, assistant vice president for Richardson International. “The ceiling is well beyond the canola industry’s 52 by 25 targets,” referring to the goal of 52 bu./ac. average yield by 2025. Entz divided the canola oil market into four sections: food oil, high-oleic low-linolenic specialty oil, biodiesel and non-GMO. “If one of these markets takes off, farmers and the industry can run with it,” he said. Entz’s comments merged well with SaskCanola director Bernie McClean’s comment that the “yield potential of canola is staggering.” On his farm near Medstead, McClean aims for “maximum economic yield,” which strikes a balance between genetic yield potential and a practical use of input dollars.

10. To convert knowledge into action, share it in a way that resonates. Desmond Ballance, senior project manager with LifeLearn, explained that to get a message across — be it the benefits of genetic research, modern farming or agronomic recommendations — keep it simple. Use “bite sized chunks” of information to convert knowledge into action, she said. As a guideline, divide the message into three components. Such as: The problem. The research. The application. And when reviewing presentations, for example, ask: Is it relevant? Is it visual? Is it effective? To get complex or controversial ideas across, find one sentence that explains it, she said, and unless more detail is requested, share that sentence and stop there.