

CANOLA Digest

THE SOURCE FOR CANADA'S CANOLA GROWERS

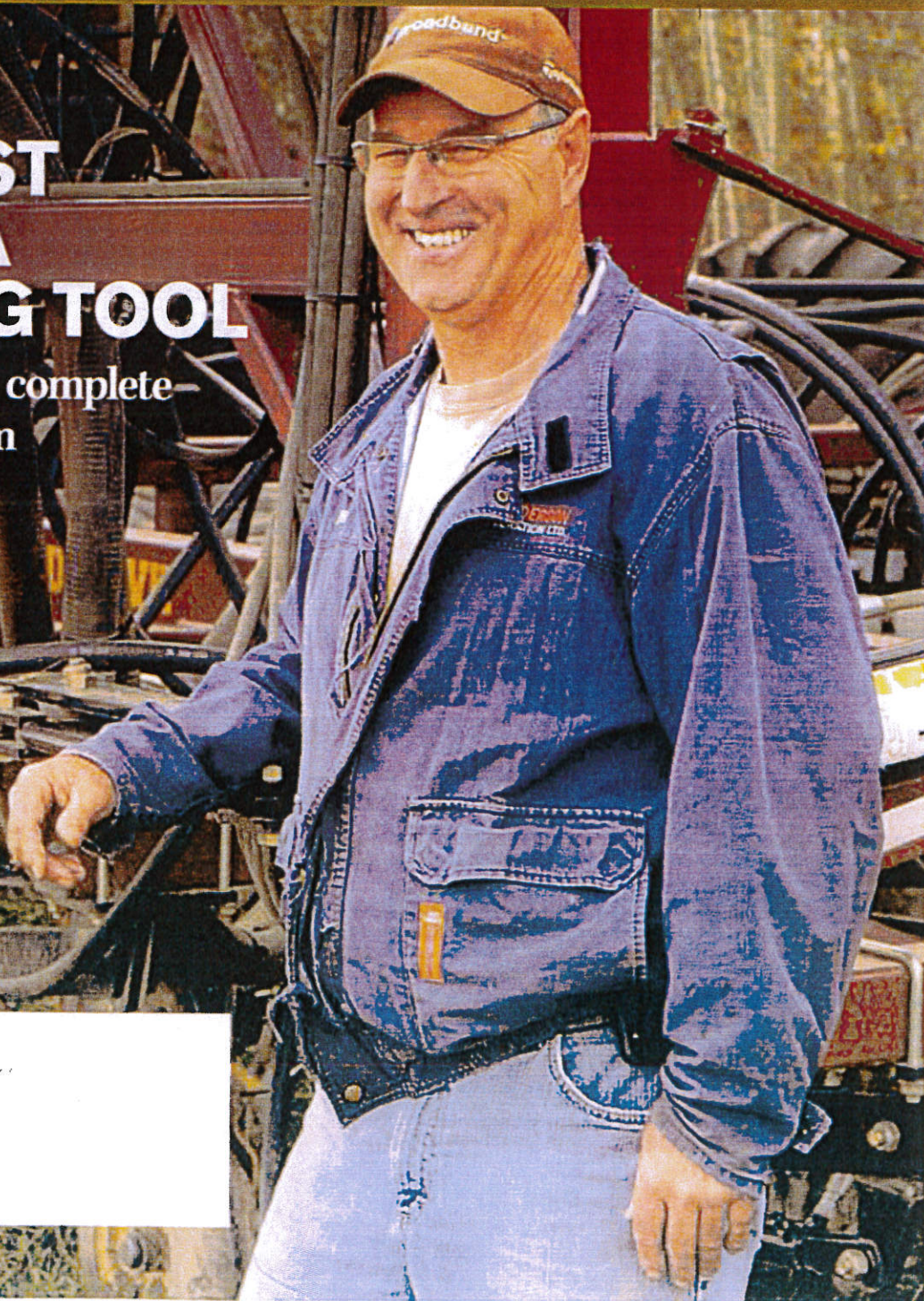
JANUARY 2014

INNOVATION & RESEARCH

Farmers as researchers • Canolamazing meal • More access to Europe

THE BEST CANOLA SEEDING TOOL

...is one part of a complete
agronomy system



This is the third of a four-part series on CARP highlights.

MAXIMIZING PHOSPHORUS EFFICIENCY

By Donna Fleury

Canola crop production is a priority for the grower-funded Canola Agronomic Research Program. This article highlights studies into new slow-release phosphorus fertilizer options, and crop rotation as it relates to long-term sustainability.



24

The Canola Agronomic Research Program (CARP) is funded by growers from Alberta, Saskatchewan and Manitoba to support projects designed to improve canola production and grower profitability and the future of the industry. CARP has been supporting research for almost 25 years across Western Canada. Here are highlights from two recent studies on canola crop nutrition and sustainability.

TESTING NEW PHOSPHATE SOURCES

Phosphorus (P) is an important nutrient for canola production, but excess P in manure is a management challenge and environmental concern for livestock producers. Preliminary results from a recent project at the University of Manitoba show potential solutions that can help both canola growers and livestock producers. The project is extracting struvite from liquid swine manure and testing it as a P fertilizer. Trials show that canola fertilized with struvite yields at least as well as canola fertilized with commercial P products.

Francis Zvomuya and Don Flaten in the Soil Science Department and Nazim Cicek in the Department of Biosystems Engineering, all at the University of Manitoba, are experimenting with the potential use of struvite as a slow-release source of P fertilizer. Struvite has a low risk of salt toxicity if applied in the seed row of sensitive crops such as canola. It contains ammonium-N and magnesium (Mg) in addition to P, and is extracted from the liquid fraction of hog manure using a low-cost, modified waste treatment process that Cicek developed.

Greenhouse canola experiments compared P uptake and use efficiency and seed and seedling toxicity for struvite, monoammonium phosphate (MAP) and slow release polymer-coated monoammonium phosphate (PCMAP). Canola was grown in rotation with wheat to evaluate the residual P effects on each crop at different stages in the rotation.

"We know that canola requires a lot of P for optimum production. However, growers are currently limited to about 20 lb./ac. in the seed row due to concerns

Researchers at the University of Manitoba are testing struvite, extracted from liquid hog manure, as a phosphate fertilizer source. Struvite granules have a low risk of salt toxicity if applied in the seed row of sensitive crops such as canola.

of seedling toxicity," explains Zvomuya. "Our objective was to determine if the slow release of P and NH_4 from struvite and PCMAP would allow the application of higher rates than are possible with MAP, with minimal toxicity to seeds and seedlings and improved efficiency of fertilizer P."

The study included three rates of P – 0, 25 and 50 pounds per acre – placed either in the seed row or as a side-band 1" below and beside the seed row in the first crop.

Canola biomass was harvested at early to mid-flowering. "Previous research showed that the level of biomass or dry matter of the canola crop at flowering is positively related to final grain yield, so we used that as a way to project final yields," explains Zvomuya. "We also

conducted seedling emergence counts to evaluate seedling toxicity. The experiments were equivalent to three crop cycles, so we could also measure the levels of residual P in the second and third crop cycles."

Preliminary results are very promising. "Although we are still finalizing the data analysis, early results are showing that struvite was at least as good as commercial fertilizers in yield, with low seedling toxicity effects at both the regular and high rate of P," says Zvomuya. In fact, he says struvite appeared to give greater yield and P uptake than MAP and PCMAP in the third cycle crops.

"We think that fertilizers such as struvite may present viable options for improving P-use efficiency, allowing growers to apply higher P rates and therefore realize higher yields and improved profitability," he says.

"Additionally, higher seed germination and higher seedling emergence and survival from the use of slow-release P fertilizers, which are expected under uncontrolled field conditions, will improve the return from canola seed."

Zvomuya would like to move to the next phase and conduct trials in field plots to confirm the greenhouse results. The project was funded by CARP, Manitoba Pork Council and Agrium.

ROTATION AND RISK MITIGATION

Growing canola in tighter rotations increases risks and can dramatically decrease yields. In a recent research project, which originated as an Alberta Crop Industry Development Fund (ACIDF) project with CARP support, researchers found that production and economic risks are higher in continuous canola or canola in a two-year rotation, depending on the variety and location.

Neil Harker, a research scientist with Agriculture and Agri-Food Canada (AAFC) in Lacombe, Alberta, led two six-year studies in Alberta, Saskatchewan and Manitoba to determine the agronomic and economic

implications of growing canola in tight rotations. Researchers also wanted to determine crop sequence effects on canola and implications for other factors such as diseases, weed population shifts and insect pests.

The first "all phases rotation" study, which started in 2008 at five sites in Alberta and Saskatchewan, compared continuous canola to canola grown every second or third year in rotation with wheat or barley and pea crops. "The preliminary results, which we expect will be confirmed after the 2013 data is included, show that yields decreased as any of the rotations moved to a more continuous type of canola system," Harker says. "In particular, by the end of three years of continuous canola, the yield decreases were quite dramatic."

The second major experiment, a risk mitigation study, looked at factors that could reduce the risk of growing canola in tight rotations. The experiment was conducted at the same five sites plus an additional one in Manitoba.

"We compared canola-canola-wheat, canola-wheat-wheat, and canola-pea-wheat rotations to continuous canola, but in continuous canola we planted different herbicide-tolerant systems or a mix of seed sources from the same herbicide tolerant system," explains Harker. "The expectation was that by

"Early results are showing that struvite was at least as good as commercial fertilizers in yield, with low seedling toxicity effects at both the regular and high rate of P."

—Francis Zvomuya

rotating herbicide tolerant systems, or by combining different sources of the same herbicide-tolerant system, there would be different disease resistance backgrounds that could help mitigate the risk of disease."

Preliminary results show no substantial benefit to either of those strategies.

"We found almost the same reduction in yield from growing continuous canola whether we mixed cultivars or rotated herbicide-tolerant systems every year," says Harker.

Key management takeaways are that blackleg incidence was lower as long as there was a break between canola crops, and root maggot damage was lower with a minimum two-year break between canola crops. Harker expects that final results, which will be available in 2014, will confirm the preliminary findings. ●

Donna Fleury, P.Ag., is a freelance writer from Millarville, Alberta, specializing in agriculture and the environment.



The phosphorus study compared canola results with struvite (right) and MAP (left) as well as polymer-coated MAP at three rates – 0, 25 and 50 pounds of phosphate per acre – placed either in the seed row or as a side-band.