PRODUCTION

EARLY SPRAYING SHOWS BENEFITS

Farmers can improve yields by spraying weeds sooner. | **Page 78**

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AGRONOMY | MICROBIALS

Canola to get help from bacteria

ABOVE: It's a long road for a bacterium, from a shovel full of soil through years of screening, before it might be lucky enough to go back into a canola field. Out of a starting group of many thousand different bacterium, only one strain will survive to become the commercialized inoculant. | XITEBIO PHOTOS

RIGHT: Testing in the field is time consuming and expensive, so only a handful of candidates make it to that stage. Testing in the greenhouse allows many generations of the biological agents to be studied each year.

Beneficial bacteria | Where do they come from and how can they be put to work?

BY RON LYSENG
WINNIPEG BUREAU

Researchers at XiteBio Technologies are focusing on commercializing a natural rhizobia to benefit canola. Early field tests show that the Yield+ product increases canola yields by as much as 11 percent.

The company also has projects underway with microbials that will benefit wheat, corn and other crops, said president Manas Banerjee.

"Everything we do at XiteBio is intended to increase agricultural production at a reduced input cost and in an eco-friendly way," Banerjee said. "That is why we only work with naturally occurring microbials and we do not alter their genetic makeup. We use them only in their natural form."

XiteBio Technologies released SoyRhizo and PeasRhizo in the United States in 2011 and in Canada last year.

SoyRhizo has increased soybean yields by three to nine bushels per acre, while PeasRhizo has increased pea yield by an average of 2.2 bu.per acre and lentil yields by as much as 7.9 percent. Both products have proven effective 85 to 90 percent of the time.

In addition to Yield+ for canola, the company is working on biological agents to boost corn and wheat yields.

The process of identifying helpful bacteria starts with shovels of dirt taken from fields that have a reputation for growing healthy, high-yielding crops. Research has proven that soil capable of growing good canola crops has high populations of micro-organisms that colonize the roots and work well with a canola rhizosphere or root system.

The collection comes from all regions where canola is a major crop.

Banerjee said these fields have a variety of micro-organisms gathered around the brassica root hairs. These microbials are specific to the canola rhizosphere, so that gives researchers a good start.

However, a one gram soil sample contains billions of naturally occurring biological residents. The challenge for researchers is to find the one that has the most significant impact on the target crop.

"We might have a few thousand different microbials to begin with, so to narrow that down, we set our criteria for selection. We ask, 'what do we want from these bacteria?' " he said.

"In our work right now with canola, we want to identify bacteria that will make nutrients more available to canola roots. Which organisms do the best job of converting phosphorus to phosphate, sulfur to sulfate and nitrogen in ammonium to nitrate for the plants. We are also selecting for better hormone production.

"We can't see them with the naked eye or touch them, but we know how to culture them in the lab. We separate them out so each bacterium is only tested by itself, never with other micro-organisms, never in a mixture. We repeat these lab tests year after year to weed out the poor candidates and collect data on the good ones."

The tests go on for years in the growth room and greenhouse.

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Any candidate that shows the first sign of weakness is eliminated. Only the strongest and most beneficial candidates survive the rigorous testing procedure.

Testing in the field is more expensive and time consuming. Plot trials don't begin until the number of candidates has been narrowed down to dozens or perhaps hundreds that show potential.

The number is quickly whittled down in plot trial screening to five to 10 bacteria.

This select handful of competitors must then consistently show a yield benefit and ability to survive in trials conducted on fields over a number of years.

"Once we have a clear winner so we can say 'yes, that's the one we want,' then we have to ask if it can be reproduced in bigger volumes and also what about the shelf life," he said.

"Six months shelf life isn't good enough. Once we know it has one year or two years, then we're confident it's worth pursuing. And we can try to scale it up. Can it reproduce into 10,000 or 50,000 litre batches without losing any of those beneficial traits we selected for?

"When we scale it up, it's critical to maintain all the criteria we set in the first place. If you scale up and the candidate loses any of the traits, if it weakens, then it's flushed down the drain and we start over."

For its canola inoculant, XiteBio has narrowed the list down to two or three bacteria that have survived the selection process.

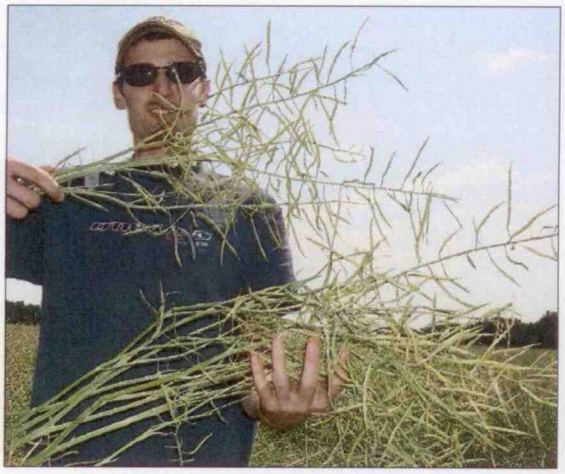
Banerjee said it has taken four years to bring those candidates this close to the final decision, and more testing is still on the agenda.

XiteBio is now working with more than 1,500 bacteria in its culture collection. Banerjee said keeping track of that many living candidates and keeping them healthy can be a costly proposition.

"It costs from $1 million to $10 million to bring a biological ag microbial inoculant to market," he said.

"In comparison, a conventional ag chemical averages about $70 million and a pharmaceutical for people costs up to $4 billion. An agricultural biological agent is less expensive than other products because we don't do any genetic modification. We just select the right natural bacteria we want and then scale it up."

For more information, contact Banerjee at 204-257-0775 or visit www.xitebio.ca.



Ryan Miller says he had an 11 percent yield boost on canola treated with XiteBio Yield+ compared to an untreated plot.

AGRONOMY | INNOCULANTS

Bacteria gives canola big yield boost: farmer

Seeing is believing for North Dakota grower

BY RON LYSENG
WINNIPEG BUREAU

After spending the past five years of its infinitely long life in a scientific lab, this particular bacteria strain is finally back home and hard at work in Mother Earth's dirt.

Having out-performed thousands of its cousins in the Petri dish qualifying rounds, the growth room competition, the gruelling greenhouse event and finally the real world of outside plots, this one specific strain was pronounced the winner and was scaled up to become the XiteBio canola enhancing inoculant known as Yield+.

In 2011 and 2012, the XiteBio Yield+ inoculant gave North Dakota farmer Curt Honeyman canola yield boosts that averaged eight percent.

"Overall, my untreated canola check yielded 1,625 pounds per acre (33 bushels per acre) for the two years," said Honeyman.

"The 20 acre plots I treated with Yield+ averaged 1,940 lb. per acre (39 bu. per acre) for those two years. I'm pretty happy with those results."

Honeyman treated only 20 acres in 2011 and 2012 because it's all the product he could get. Last year he wasn't able to find any product, but this year he has enough to treat his entire 300 acres of canola.

"It's easy to work with. I mix it with my Roundup when I spray at the four or five leaf stage."

Max Miller and son Ryan tried Yield+ on their canola in 2012 when XiteBio sent them enough sample product to treat 10 acres. They were happy with the results and bought enough for 140 acres last year.

The older Miller said they will buy enough for their entire 380 acres of canola this year. He said the liquid is easy to use and mixes well when sprayed with Roundup.

Average yield boost in the two years was 150 lb. of canola seed per acre, or 3.5 bu. per acre.

Miller said there's a bit of a story behind the photo of 20-year-old Ryan taken in 2012 when XiteBio officials drove down from Winnipeg to inspect some of their North Dakota trials.

"Well, Ryan's kind of laid back about stuff. The reps pulled up some plants from the treated 10 acre plot and they were going on and on and on bragging about the root ball and long pods and all that," Miller said.

"Ryan figured it was all just typical salesman BS, so he didn't pay much attention. He really didn't care one way or the other.

"Then we went over to our regular untreated canola and pulled up some plants. They looked pretty poor in comparison. Ryan went, 'holy crap, this stuff actually works.' That's the photo they took that day, with him holding the two samples."