



Canola Contributor

From transforming mustard plants into a dryland canola product, to improving overall canola quality, Dr. Gerhard Rakow has made it his life's work to enhance the profitability of canola. This work has earned him the 2003 Plant Breeder's Award.

by Stephanie Fehr

CANOLA IS OFTEN referred to as the Cinderella crop that plant breeders transformed rapeseed into more than 30 years ago. Yet the work hasn't stopped there. Dr. Gerhard Rakow is receiving the 2003 Plant Breeder's Award for his tireless efforts to keep improving this high-value crop, by making it more drought tolerant and improving its utility to the animal feed markets.

Rakow, the National Study Leader for Oilseed Breeding in Canada, is also Head of the Crop Breeding and Diversification Section of the Agriculture and Agri-Food Canada Saskatoon Research Centre. His commitment to canola research has led to many exciting developments in the crop, and has earned him the 2003 Canadian Plant Breeding and Genetics Award, co-sponsored by the Canadian Seed Trade Association (CSTA) and *Germination*.

Rakow has made a tremendous and varied contribution to the canola industry and the breadth of his work is likely the reason he received the Plant Breeder's

Award this year. "The one thing I've heard repeatedly is that Dr. Rakow's research has placed Canadian canola as the world quality leader. Canada's standard for canola is higher than that of Australia and Europe because people like him have made quality improvement a major research focus," says Daryl Males, Manager of Seed and Crop Research at Saskatchewan Wheat Pool. Males, along with Howard Love of SW Seed Ltd., nominated Rakow for the Award. Both individuals worked with Rakow on turning *Brassica juncea*, traditionally a mustard, into a new canola species that produces traditional quality canola seed.

The Amazingly Transformed Mustard

B. juncea has several advantages compared to *B. napus*. For one, mustards are better adapted to dryland conditions than canola, which is a cool season crop, and secondly, they are more resistant to diseases, like

blackleg. However, since *B. juncea* is a mustard, it has a bitter taste attributed to the high level of glucosinolates. Another problem is that it is high in erucic acid, and canola must have less than 2% erucic acid to be considered canola. Recognizing the opportunity for farmers facing dry conditions in the heart of the Prairies, 20 years ago Rakow started exploring the option of breeding with *B. juncea*. "We began investigating the possibility of transforming a mustard plant into a canola plant," says Rakow. "I want to grow a mustard plant that does not grow mustard seed anymore but makes canola seed instead."

This crossing has led to two varieties of *B. juncea* canola, co-developed with Saskatchewan Wheat Pool, that were approved for contract registration in 2002. The varieties, aptly named Arid and Amulet, would have been a boon to farmers this year, but because it is a new crop and because it was a wet spring in southern Saskatchewan, the new canola species did not receive widespread acceptance in 2003.

Congratulations

Dr. Rakow,
Your long term work and dedication towards plant breeding and development of the *Brassica* species has been a major contributor to western Canada agriculture. Both mustard and canola growers have been the unknowing beneficiaries of your long term work. SWP is proud to have been associated with your pioneering work in developing the world's first canola quality *Brassica juncea*, an innovation that is as significant as the very first canola varieties. Thank you for your dedication and commitment to oilseed research.



Congratulations Gerhard!

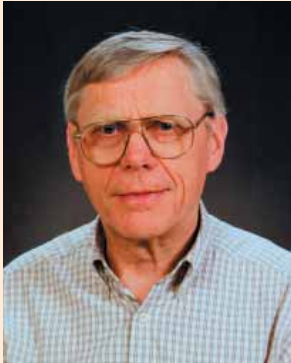
We truly appreciate your innovation and commitment to canola breeding and genetics. Your many achievements have played a vital role in the agriculture industry.



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A Career Snapshot



Gerhard Rakow has had a long and illustrious career. Here are some highlights:

- Plant breeder, Norddeutsche Pflanzenzucht, Hohenlieth, Germany (1973-1981)
- Research Scientist, AAFC, Saskatoon Research Centre (1982-Present)
- Appointed Head of the Crop Breeding and Diversification

Section, AAFC, Saskatoon Research Centre (1993)

- Recipient of AAFC's AgCelle Award as leader of the Innovation Development Team that led to the registration of the world's first transgenic herbicide tolerant *B. napus* canola variety (1997)
- Associate Editor for the *Canadian Journal of Plant Science* for nine years
- Adjunct Professor in the Department of Plant Sciences, University of Saskatchewan
- Member of the College of Graduate Studies and Research, University of Saskatchewan
- Associate member of the Canadian Seed Growers' Association
- Member of the Expert Committee on Fats, Oils, and Other Lipids of the Canadian Agri-Food Research Council
- Member of the Western Canada Canola/Rapeseed Recommending Committee
- Variety breeding and germplasm development for *Brassica napus*, including the development of five canola cultivars
- Development of canola quality forms of *Brassica juncea*
- Development of a new oil and protein crop with *Sinapis alba*
- Development of a potential new canola species in *Brassica carinata*
- Variety breeding in condiment mustard including AC Vulcan, a new Oriental mustard *B. juncea* variety that has 5% higher yield than Cutlass, and AC Pennant, a new yellow *S. alba* mustard variety that has a 10% higher yield than Ochre
- Published 51 major research publications in collaboration with others, and 69 other scientific papers

Rakow's yellow-seeded canola has improved oil content and increased the protein content in canola meal. It is anticipated this will dramatically improve Canadian canola production.

Congratulations, Gerhard!

The Management and Staff of SW Seed



"The heat stress experienced later in the season emphasized the value of *B. juncea* canola as the new canola species significantly out performed *Brassica napus* varieties under these stressful conditions," says Males.

In the early development stage, the potential of crossing *juncea* with *napus* was recognized by a pioneer in canola research. According to Males, "Baldur Stefansson stated 'I think you've got it right developing *B. juncea* as a canola species. I believe we made a mistake when we did our original assessments of what *Brassica* species should be developed as edible oilseeds. *Napus* and *rapa* performed very well in that evaluation year in Winnipeg. In hindsight we should have developed *Brassica juncea* and *Brassica napus* rather than *Brassica rapa* and *Brassica napus*.' He encouraged us that we were on the right path."

It may be the right path with two commercialized lines, but there is still far to travel. Not one to rest on his laurels, Rakow says, "Since these are first generation varieties, still needing much improvement, we need to make newer and better varieties for the future. We always have better material coming along."

The work with mustard isn't confined to *juncea* either. Rakow has also adapted *Sinapis alba*, a heat and drought tolerant mustard, and *Brassica carinata*, another mustard, into canola. All this work in diversifying canola will play an important part in keeping Canada's canola crop much more resistant to diseases. "This is a move away from monocultures which are prone to diseases," says Rakow. "Mustards are known to be much more resistant to diseases typically found in canola, primarily blackleg. That's another advantage to crossing with mustard."



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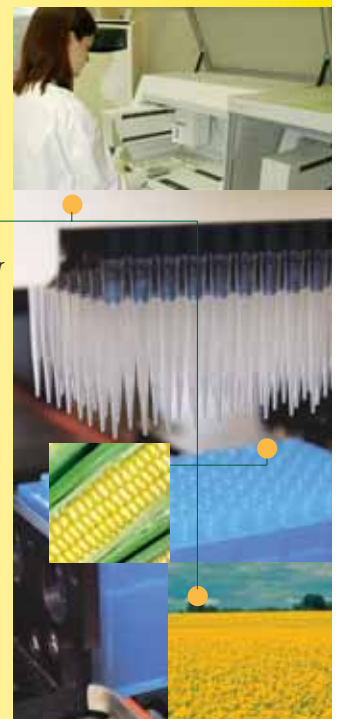
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Colour Shift

Although this is clearly important work in its own right, Rakow considers quality breeding to be potentially his most significant contribution to canola. The focus in the past has been to improve the quality of canola oil. This makes sense because 80% of the total value of canola comes from the oil. However, the meal portion of the seed makes up 60% of the total mass of the seed. "That's a large quantity of meal that has to find a useful home," says Rakow. In an effort to improve the marketability of the meal, Rakow has been working on developing a yellow-seeded canola with better quality characteristics. By increasing oil content in the seed and reducing fibre content, there is more protein content in the meal, which improves the quality of animal feed. This canola type will still be used primarily for oil, but the meal portion will provide added benefits as a feed.

Love, Research Director and part of the Management team at SW Seed Ltd., believes yellow-seeded canola will be a significant contribution to the industry. "For any crop to remain competitive you have to have new and innovative things happening which continue to add value and improve

margins for all players in the chain. Yellow-seeded will do that for the crushers who are the ultimate customers of this product."


While Rakow and his team have developed experimental lines of the yellow-seeded canola, it may still be 5-10 years before commercialization. Although quality has been improved, two areas of research are still needed, namely the development of herbicide tolerance and hybrid varieties. But if all goes according to plan, Rakow would like to convert Canadian canola production to entirely yellow-seeded varieties because of its improved quality.

"Someday we might have a requirement that only varieties with yellow seed can be called canola, or if the quality of a yellow-seeded type is so much improved over black seed we might even have to invent a new name for this quality product that's not canola any more. It will be superior to any other canola produced in the world," says Rakow. "If we can get this, I think we can lead the world in quality breeding of canola again, like we did in the '70s."

International Contribution

Rakow's contribution to oilseed development isn't confined to just Canada

either. He's done work with the International Development Research Centre, a Canadian initiative that helps communities in developing countries through research. As a consultant for the organization, he went to China and India and advised them on oilseed improvement. His work with canola is also known in the developed world. "He's always had good ideas and he's known around the world," says Males. "You can talk to the Swedes, the Australians, and the Germans – they've all benefited from his ideas. If you look at the major programs of the world – he's had a fair impact on them all."

When asked about receiving the Plant Breeder's Award, Rakow is gracious. "I'm honoured to get this award from CSTA, which is primarily a commercial, private company organization, to honour a public researcher. They have their own researchers which do excellent work as well. Picking somebody from outside the organization tells me that I must have done something for the commercial seed business that is of value, and that I did the right thing," says Rakow. "That is satisfying." 

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The Award

The Canadian Seed Trade Association (CSTA) established the Canadian Plant Breeding & Genetics Award to honour a person who has made exceptional contributions to the development of plant breeding and genetics in the private or public sectors in Canada. According to the criteria put out by the CSTA, the recipient must have demonstrated excellence in one or more of the following areas:

- world-class application of the science of plant breeding and genetics;
- applying creativity and commitment to achieving technical success;
- a significant contribution to the advancement of agricultural productivity in Canada and/or abroad.

Nominees do not have to be members of CSTA, but they must have trained for, or practiced, their profession in Canada, although their work may have predominantly benefited international agriculture. The selection committee is made up of three representatives from each of the CSTA Researchers East and West committees and the Executive Vice-President of the CSTA. The panel makes their recommendation to the CSTA Board for ratification. The Canadian Plant Breeding & Genetics Award is co-sponsored by *Germination*.