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Making Canola Even Better

by Peter Newton

Canola, a type of rapeseed bred in China, Egypt and Canada, produces what is considered the purest of oils used to prepare foods for human consumption.

Now, agricultural researchers in these three countries are teaming up to improve canola's resistance to pests and disease, with support from IDRC. The Chinese and Canadian scientists are working to improve crop quality, while in another project, Egyptian and Canadian researchers are developing a biological pest control agent.

The two projects are intended mainly to boost canola production in China and Egypt, but they have also brought benefits to Canadian canola production. China and Canada are already the two largest producers of canola in the world.

The first project is led by Dr Liu Chen Qing of the Crop Research Institute in Wuhan and Dr Fang Guang Hua of the Shanghai Academy of Agricultural Sciences. Plant pathologist Dr Roger Rimmer of the University of Manitoba worked with his Chinese colleagues, sharing techniques, ideas, and germplasm. The collaboration resulted in higher quality canola in China and plants resistant to diseases common in western Canada.

ESSENTIAL CROP

Existing Chinese varieties of rapeseed are high in two substances: erucic acid -- which causes abnormal heart development in rats and is considered harmful to humans -- and glucosinolates found in the rapeseed cake once the oil has been extracted. Glucosinolates are harmful to animals. Since rapeseed is China's second most important oilseed crop and is also a livestock feed, improving its quality is essential to feeding both humans and livestock.

Canadian breeders developed rapeseed varieties that are "double low." This designation means they are low in erucic acid and in glucosinolates. "The Chinese have received a lot of expertise on how to breed for quality. We've supplied them with equipment and the technical knowledge to handle it so they can use the equipment for routine selection for low erucic acid and low glucosinolates," says Dr Rimmer. In return Dr Rimmer received Chinese rapeseed germplasm. It will help increase Canadian rapeseed's resistance to diseases such as Sclerotinia stem rot caused by a fungal pathogen. Chinese varieties are also known for their high resistance to root diseases.

The second project finds Dr H.S. Salama of Egypt's National Research Centre teamed with insect pathologist Dr O.N. Morris of Agriculture Canada. Their primary goal is to reduce the use of chemical pesticides that can leave toxic residues in edible plants, thereby compromising the health of consumers and agricultural workers. The researchers developed new strains of *Bacillus thuringiensis* (B.t.) as a biological control agent against insects that destroy canola in Canada and cash crops in Egypt.

NATURAL PESTICIDE

B.t. is a disease-producing bacterium found readily in nature that only affects insects. It is not toxic to people or other animals and is environmentally safe. Sprays are prepared from the bacterium itself. The forestry sector in Canada currently sprays a commercial B.t. product to battle spruce budworm. The city of Winnipeg uses a B.t. product to control mosquitos that can carry encephalitis, which causes inflammation of the brain. Both of these products are produced in the United States. B.t. has not been used on agricultural crops in Canada because the available commercial strain is not as effective nor as economically competitive as chemical pesticides.

The Canadian and Egyptian team, with funding from IDRC, has developed new, more effective strains of B.t. The new strains can be produced in large quantities at lower cost than the commercial strains. In Canada the different strains are being tested against the Bertha armyworm, a major canola pest. In Egypt the new strains have been tested against pests that attack soybeans and groundnuts, two important cash crops.

The new B.t. strains had to be developed specifically for each country's climate, environment and insect species. "The Egyptians developed their own strain, tested it and found it to be effective. The big problem is to be able to produce it on a large scale," says Dr Morris. A feasibility study shows that Egypt would be able to produce its strains of B.t. on a commercial scale. There is no doubt that China and Egypt have both benefited from this research. But Canadian researchers have greatly enhanced their own knowledge in the process. "The quality of canola oil [in Canada] is now second to none," says Dr Rimmer.

FOR MORE INFORMATION, CONTACT:

Liu Chen Qing
Crop Research Institute
Wuhan, People's Republic of China

Dr Roger Rimmer
Canola Breeding Program
University of Manitoba Winnipeg, Manitoba R3T 2N2

Dr H.S. Salama
National Research Centre
Laboratory of Pest Control and Plant Protection
Dokki, Cairo, Egypt

Dr O.N. Morris
Agriculture Canada Research Station
195 Dafoe Road Winnipeg, Manitoba R3T 2M9

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