

Food for the World: The Canadian Experience

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INTRODUCTION

Canada has only three per cent of the globe's arable land, yet it is currently the largest per capita donor of food aid in the world, and its total agricultural exports are the second highest. Its 1976 agricultural trade surplus was over \$1 billion.

Both agricultural and fishery resources have played a vital role in Canada's economic growth. It enjoys an efficient agricultural system and a research network that is the envy of most other agricultural nations. Because of its expertise in working with developing countries, it is in a position to play a key role in helping meet the critical world food situation.

Canadian research programs cover all aspects of agricultural practice — from plant breeding to disease and pest control, nutrition and marketing. The development of improved strains of rapeseed, giving Canada both a domestic source of seed oil and an alternative cash crop to wheat, is a conspicuous example of Canadian agricultural ingenuity.

Canada's extensive food aid program started with shipments of wheat to India under the Colombo Plan in the early 1950s. During the last ten years, it has totalled more than \$1.2 billion. To foster long-term world food security, Canada is directing more and more of its talents and resources toward development programs aimed at expanding indigenous production in food-deficit countries.

SOME RESEARCH ACHIEVEMENTS

Agricultural research has led to Canada's gaining and maintaining a significant share of the world market in some agricultural products. Canadian wheat, with its consistently high protein level, is in heavy demand as are Canadian genetic animal stocks. Through the use of artificial insemination, the problems associated with exporting animals themselves for breeding purposes have been circumvented.

RAPESEED

One of the most dramatic successes in Canadian agricultural research has been the development of rapeseed, a crop modified by Canadian scientists to improve its chemical and nutritional characteristics. Rapeseed is the largest oilseed crop in Canada, ranking third in production after wheat and barley. Rapeseed oil is the most widely used edible vegetable oil in Canada, accounting for 39.1 per cent of the domestic market. Canada is the top exporter of rapeseed in the world.

The development of rapeseed began twenty years ago.

Canada needed a domestic source of vegetable oil other than soybeans, which cannot be grown in large quantities in most agricultural regions of the country due to climatic conditions. During World War II, it was demonstrated that rapeseed could be grown in the Prairies, where it was first cultivated to provide a marine lubricant for ships of the Allied navies.

The first extraction plant for edible rapeseed oil was built in Saskatchewan in the mid-1950s. Since then the western-based industry has expanded from 138,000 acres in 1955 to 6,900,000 acres in 1978.

Scientists from industry, academe and government have reduced the erucic acid and glucosinolates in rapeseed, making its oil desirable for human consumption and its protein meal a valuable addition to livestock feed. The high content in rapeseed oil of erucic acid, a fatty acid less easily metabolized in the body than most others, made it undesirable in the human diet. Through research, the entire composition of the oil extracted from the seed was changed, and over a decade plant breeders from Agriculture Canada successfully developed a rapeseed variety yielding oil with a low erucic-acid content. The first breakthrough came in 1968 with the licensing of the Oro variety. It took Canadian farmers only two years thereafter to switch to growing the new rapeseed. The oil now produced in Canada is no more than 2 per cent erucic acid, and often less — well below international standards, which allow a maximum of 15 per cent erucic acid in rapeseed oil for human use.

Research also overcame problems associated with the presence of glucosinolates, a group of hot-flavoured, sulphur-containing sugars that remained in the meal once the oil had been extracted and adversely affected thyroid gland functioning in some animals. These sugars also affected the palatability and nutritional level of meal fed to livestock.

The seed developed to overcome this problem, Tower, was licensed in 1974. It was also known as "double low" because of its low glucosinolate plus low erucic-acid content. Both domestic and export markets are now open to low-erucic rapeseed oil for human consumption and low-glucosinolate rapeseed meal for livestock feed.

The Canadian conversion to rapeseed varieties with low erucic-acid oil has been completed, and the industry is rapidly moving toward a complete conversion to double-low varieties.

Two species of rapeseed are grown in Canada today: *Brassica napus* or Argentine rape, and *Brassica campestris* or turnip rape. Of the *B. napus* types, the most popular low-erucic variety was Midas, developed at Agriculture Canada's Saskatoon, Sas-