

Canadian Canola and Rapeseed Developments - 1991

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A. 1991 Canola Crop Developments.

3.27 million hectares of canola was seeded in Canada in the summer of 1991. This represents a significant acreage close to the record of 3.63 million hectares seeded in 1988. Snow and rainfall in late April delayed 1991 seeding in many regions of Western Canada. However, cool, wet conditions were prevalent in many canola growing areas in June and July favouring excellent crop growth. In spite of wet weather, disease problems did not cause extensive damage. In 1991, yields averaged 1320 kg/ha in comparison to 1270 kg/ha in 1990 and 1070 kg/ha in 1989. The total production in 1991 was a record of 4.303 million tonnes, an approximate 28% increase over 1990 production, and surpassing the record of 4.288 million tonnes produced in 1988. In 1991, canola acreage was represented primarily by the *B. napus* cultivars Legend and Westar and by the *B. campestris* cultivars Horizon, AC Parkland and Tobin.

Seed quality, as assessed by the Grain Research Laboratory of the Canadian Grain Commission, is excellent for the 1991 crop. The majority of the 1991 western Canadian canola crop has been grading as number 1 (top quality). The oil content of this seed is, on average, 41.9%, which is approximately 0.5% higher than the 1990 crop and close to the 10 year average of 42.0%. The oil content of 1990/91 cargoes averaged 41.1% in October of 1991 and is expected to increase during the 1991/92 shipping season. Protein levels of top grade 1991 canola averaged 38.7%, the same as in 1990, and higher than the 10 year average of 38.2%. The protein content of 1990/91 export cargoes averaged 39.0% by October 1991 and is expected to remain at this level. The average level of aliphatic glucosinolates in the dry, oil-free seed residue is 18 micromoles/gram, lower than the level of 20 micromoles/gram in the 1990 crop and the ten year average of 25 micromoles/gram. Total glucosinolates,

on the wholeseed basis, are averaging 14 μ moles/gram. On average, new varieties of both *B. napus* and *B. campestris* are showing reductions in glucosinolates.

In the 1991 crop, the erucic acid levels were 0.5% of the total fatty acid composition which is lower than the 10-year average of 0.8%. The levels of the saturated fatty acids, palmitic and stearic remain below 6%. The level of free fatty acids in Western Canadian canola remain very low, with average levels of 0.3%.

B. Canola and Rapeseed Breeding Developments

Canadian-based breeding programs to develop superior spring *B. napus* and *B. rapa* (*B. campestris*) cultivars for traditional markets continues at five public institutions, Agriculture Canada at Saskatoon and Beaverlodge, and the Universities of Manitoba (Winnipeg), Alberta (Edmonton) and Guelph, Ontario. In addition, there are five private companies with breeding programs in Canada, including Allelix Crop Technologies, a subsidiary of Pioneer Hi-Bred International, King Agro, ICI Seeds (formerly Garst Seed Company), Svalof, and the Alberta Wheat Pool. The main effort of the private breeders is to develop superior hybrid cultivars of *B. napus*. Three hybrid cultivars are presently available commercially in Canada and several others will likely be submitted for registration in February of 1992. Both the self-incompatibility (SI) and polima CMS systems are being used as pollen control mechanisms. King Agro has obtained a patent on the use of the SI system for the production of hybrid *B. napus* (patent 5,043,282). The cost of producing hybrid seed continues to be a major constraint to widespread use, particularly with the present severely depressed economic position of Canadian grain producers.

Market testing of the low linolenic (<3%) oil from the cultivar Stellar continues, and strains with better yield potential and oil levels are presently in official trials. *B. campestris* strains with very low total glucosinolate contents are also in official testing. Feeding studies with meal from this material has indicated that reductions in total glucosinolates to very low levels will further enhance the nutritional quality of canola meal. An open pollinated *B. napus* strain from Agrigenetics possessing an oil content four actual percentage points above the Westar check cultivar is also in official trials. If agronomically acceptable, this line could set a new quality standard for canola.

Specialty oils for production under contract remain a major focus of several private companies, but to date only the high erucic (>50%) and high palmitic (>10%) strains from public breeding institutions have entered official trials. Both Allelix and Agrigenetics report success in the development of high oleic (>80%) canola mutants. Canada is considering modifications to its Seeds Act which would accommodate contract production of specialty *Brassica* oilseeds as well as ensure that the composition and quality of the traditional crop is not compromised in any way.

Losses due to the blackleg disease continue to increase despite the introduction of more tolerant *B. napus* cultivars. Fortunately, strains with strong tolerance to the disease, combined with acceptable maturity dates, have now entered official trials.

The development of herbicide resistant *B. napus* plants continues. It is expected that transgenic lines with tolerance to Roundup (Monsanto) and Ignite (Hoechst) will join the Imidazolinone tolerant mutants from Allelix in the 1992 official trials.

In the last five years, the Canadian processing industry has been pressing breeders to give equal weight to both protein and oil content when selecting superior lines. The difficulty in obtaining accurate and affordable protein results has now been addressed with the purchase by several research programs of nitrogen analyzers that rapidly measure the nitrogen content of gases released from seed or meal samples by combustion (pyrolysis). This technology has been shown to have advantages over current chemical methods in terms of accuracy, labour requirements, costs, maintenance and environmental factors. Research sponsored by the Canola Council of Canada has shown that nitrogen combustion analyzers yield less variable results on standard reference and sample material and higher nitrogen recoveries than the Kjeldahl method.

C. Canola Council of Canada Research Programs

The Canola Council of Canada co-ordinates research programs in the areas of canola utilization, varietal development and agronomy, for the Canadian canola industry in addition to its programs of market development, crop production and public awareness. Of the Canola Council's total funds, approximately 47% is being spent on canola research.

The Canola Council currently provides three specific sources of research funding including the Canola Utilization Assistance Program (CUAP) and the Canola Varietal Development Program (CVDP) which are directed and administered by the Research and Technical Committee, and the Canola Agronomic Research Program (CARP) which is directed by the Crop Production Committee. The research programs of the Canola Council are supported jointly by the industry and by the Canadian government. Industry funds are collected by a voluntary levy from crushers and exporters and through producer check-off funds. Government funds are secured by either grant or contract.

The Canola Council of Canada has recently published the «9th Project Report - Research on Canola Seed, Oil and Meal». This document provides general information on the Canola Council of Canada and the Canola Utilization Assistance Program. The CUAP provides funding through an annual grant from Agriculture Canada, Ottawa, for research that addresses the opportunities and constraints for canola products in the marketplace. The 9th Project Report contains the final reports of 57 investigations conducted within the CUAP between the years 1984 to 1990. Reports are organized under the general categories of canola seed, canola meal and canola oil. Copies are available free-of-charge by contacting the Canola Council of Canada.

The Canola Varietal Development Program is a research program co-ordinated by the Canola Council of Canada to supplement the development of superior canola cultivars through traditional breeding techniques and biotechnology. Research is conducted at Agriculture Canada Research Stations and universities across Canada.

Projects that have been recently funded in the CVDP address the development of canola cultivars with characteristics including: cultivars with unique quality, specifically low linolenic acid; yellow seeded *B. napus*; blackleg resistant *B. napus*; early maturing *B. napus*; very low glucosinolate *B. napus*; the development of haploid technology for *B. campestris*; and *B. campestris* cultivars with resistance to white rust, root rot and blackleg diseases.

In Canada, new cultivars available to producers must be registered with Agriculture Canada after three years of testing in co-operative yield, quality and disease trials. Newly registered spring *B. napus* cultivars include two hybrids, Hyola 401 and HC-120, with approximately 11% yield advantage compared to Westar. Newly registered *B. campestris* cultivars include Reward, with higher oil and protein levels than Tobin; Goldrush and Eldorado, both of which yield approximately 3.0% higher than Tobin and are superior in protein and oil, respectively. Additionally, a high erucic *B. napus* cultivar, Mercury, was registered in 1991.

In the area of agronomic research (CARP), the Canola Council of Canada provides funding assistance for research designed to improve the protein and oil content and average yields of western Canadian canola thereby reducing the unit cost of production. The program is co-ordinated by the Canola Council of Canada and funded primarily through producer commissions. In the western Canadian provinces of Alberta and Saskatchewan, producer funded commissions have recently been established to fund agronomic and varietal development research and market development initiatives. This funding represents a much welcome revenue source for Canadian research efforts.

An effective and economic method to predict and protect against sclerotinia disease has been developed by Dr. Robin Morrall, plant pathologist at the University of Saskatchewan, with funding assistance provided by the Canola Council of Canada. The test kit consists of a series of photographs illustrating the different forms of sclerotinia, the appearance of sclerotinia colonies at different growth stages, and other fungi that are commonly associated with petals. An identification key is used with the photos which enables growers to determine how many

of the petals sampled were infested with sclerotinia. A manual is included which outlines the complete testing procedure. The petal test kit allows producers to determine the number of infested petals, estimate the percentage of petal infestation, and use this value to determine the potential for disease development in the crop. A video has been produced to cover all stages of the procedure, including using the manual. The petal test kits have generated a very positive and enthusiastic response from canola producers, breeders, agronomists and extension workers.

The Canola Council of Canada co-ordinates, through the Crop Production Committee, canola production centres in a number of locations through western Canada. The purpose of these centers is to demonstrate practical canola production technology at the farm level as well as to showcase new varieties. The response to these centers has been very favourable.

D. Eighth International Rapeseed Congress

Saskatoon, Saskatchewan in Western Canada was the site for the Eighth International GCIRC - Rapeseed Congress held July 9th to 11th, 1991. The congress was very successful with 650 delegates attending from 37 countries. The theme of the Congress «Rapeseed in a Changing World» was addressed by three keynote speakers, Dr. Alex McCalla, Dr. Gerhard Röbbelen and Mr. Roy Carr. Approximately 180 papers were presented in oral sessions and 220 were displayed as posters. Sessions included breeding, agronomy, physiology, processing, chemistry, nutrition and economics. Congress proceedings are available to non-delegates for a fee of \$ 75 Cdn. from Dr. McGregor of Agriculture Canada Research Station, 107, Science Crescent, Saskatoon, Saskatchewan, Canada S7N 0X2.