

Rapeseed / Canola

*Canola article has been submitted by the Canola Council of Canada –
www.canola-council.org*

Origin and History

Canola's roots are firmly planted in an oilseed crop known as "rapeseed". History suggests that ancient civilisations in Asia and Europe used rapeseed oil in lamps. Later it was used in foods and as a cooking oil.

Although the crop was grown in Europe in the 13th Century, its use was not extensive until the development of steam power, when it was found that rapeseed oil would cling to water and steam-washed metal surfaces better than any other lubricant. In fact, the need for Canadian rapeseed production arose from the critical shortage of rapeseed oil that followed the World War II blockage of European and Asian sources of rapeseed oil in the early 1940s. The oil was urgently needed as a lubricant for the rapidly increasing number of steam engines in naval and merchant ships.

Prior to World War II, rapeseed had been grown in Canada, but only in small research trials at experimental farms and research stations. These research trials showed that rapeseed could be successfully grown in both Eastern and Western Canada.

Rapeseed oil for edible purposes was not fully exploited by Western nations until the end of World War II. The merits of the crop as a source of food were acknowledged by the agricultural industry who felt success could be achieved if proper processing techniques could be adopted. Entrepreneurs and researchers in Western Canada made the essential improvements and a food oriented industry, plus a new market, were created.

The first edible rapeseed oil extract in Canada was in 1956/57. This event marked the beginning of a rapidly expanding industry. All of the rapeseed varieties grown produced oils containing large amounts of eicosenoic and erucic acids, which are not considered essential for human growth.

As early as 1956, the nutritional aspects of rapeseed oil were questioned, especially concerning the high eicosenoic and erucic fatty acid contents. In the early 1960s, Canadian plant breeders responded quickly with the isolation of rapeseed plants with low eicosenoic and erucic acid content. In addition to the erucic acid controversy, it was found that the protein meal fraction of rapeseed concerned livestock nutritionists because of the sharp tasting and anti-nutritive glucosinolate which it contained.

In 1974, Dr Baldur Stefansson, a University of Manitoba plant breeder, developed the first "Double Low" variety which reduced both erucic acid and glucosinolate levels. This Brassica Napus variety was the first to meet specific quality requirements used to identify a greatly improved crop known as "Canola". The name "canola" was initially registered by the Western Canadian Oilseed Crushers' Association for reference to oil, meal, protein extractions, seed and seed hulls from or of varieties with 5 per cent or less erucic acid in the oil and 3 milligrams per gram or less of the normally measured glucosinolates in the meal.

In response to a request by the Canola Council, canola oil must contain less than 2 per cent erucic acid and the solid component of the seed must contain less than 30 micromoles per gram of glucosinolates. The statutory definition in Canada makes absolutely no mention of "Canada" or "Canadian". Canola has become a generic term – not just a Canadian term – and no longer just an industry trademark.

The acknowledgement of significant differences between the original rapeseed plant and the genetically improved variety low in erucic acid and glucosinolates, distinguishes canola as a superior plant variety.

CROP PRODUCTION

Area of Adaptation

Canola is a cool season crop that requires more available moisture than wheat, as well as cool night temperatures to recover from extreme heat or dry weather. This crop is best adapted to the Parkland and transition zones of Canada's Western Prairie Provinces. The highest concentration of canola acreage is in the black and grey soil zones of Western Canada.

Although canola grows well in most soil types, it is best suited to loamy soils that do not crust severely and hamper seedling emergence. Good yields can also be obtained when the crop is grown in peat and heavy clay soils.

Acreage

Several domestic and international factors played a major role in the initiation of commercial production and in canola's attainment of such a significant place in the Canadian economy.

An over-supply of wheat in the late 1960s and early 1970s led many farmers to diversify their production. As opportunities evolved for marketing canola, farmers responded. In turn, the industry rose to the challenge of processing and utilising the products and researchers developed better varieties, improved processing techniques and established guidelines for utilisation of the products. Canola is second only to wheat as a revenue generator among crops grown in Canada. Improving Quality is a Constant Focus of Research

Research has helped to provide significant economic returns to canola processors, growers and exporters. Canola breeding efforts have emphasised quality, disease and agronomic improvements. These efforts include increases in seed oil and protein levels, increased seed yield, improved disease tolerance and earlier maturity and the development of integrated methods for the control of insects and diseases.

The focus of significant research activity for the canola industry continues to be the improvement in quality characteristics of canola seed, oil and meal. The development of technology for the dehulling of canola seed is a priority of the canola industry in order to produce a meal higher in protein and energy and lower in fibre. In the plant breeding area, the development of larger, yellow-seeded canola is on-going. Seeds from such varieties are lower in fibre and higher in oil and protein.

Adding to the bright future of canola are recent advances in biotechnology, through which specific plant genes can be identified and incorporated into canola lines to address specific situations such as herbicide and insect resistance. Hybrid development is increasing with the assumption that canola hybrids will significantly out-yield pure line varieties and offer the possibility for specific crosses adapted to regional growing areas.

Research efforts have also improved the market potential of canola through alterations to oil and meal chemistry to suit particular nutritional and/or industrial markets. These technological adaptations will enable growers to realise more income per acre and processors to compete more profitably and effectively with other world sources of oil and protein.

Canada has become a market leader by developing, producing and marketing canola as a world oilseed. This achievement would have been impossible without the canola breeding research that has been conducted by dedicated Canadian scientists who had the support of the government and on-going funding of the canola industry.

Oil Extraction

Canola oil is extracted by rolling or flaking the seed to fracture the seed coat and rupture the oil cells. Canola seed contains approximately 42 per cent oil. The remaining flakes are then cooked to rupture any intact cells which remain after the flaking process.

Flaked and cooked canola seed is then subjected to a mild pressing process which removes some of the oil and compresses the fine flakes into large cake fragments. These fragments are then solvent-extracted to remove most of the remaining oil. The solvent is removed from the oil by a solvent recovery system which ensures a solvent-free oil. This is combined with the pre-pressed or expressed oil to form crude oil which is then passed through a degumming process. After separation of the gums, a semi-refined oil remains.

Meal

The cake fragments which remain after oil extraction are stripped to remove the remaining solvent by injection of live steam into the meal. The final stripping and drying of the meal is accomplished in kettles and the meal emerges free of solvent, containing 1.5 per cent residual oil and having a moisture content of 10-12 per cent.

After cooling, the meal is often granulated to a uniform consistency and is either pelletised or sent directly to storage ready for marketing as a high protein feed supplement for livestock and poultry.

Edible Uses

Shortening, liquid shortening, margarine, salad oils, cooking sprays, mayonnaise, sandwich spreads, coffee whiteners, creamers, prepared foods (cookies, cake mixes, breads) and fried snack foods.

Inedible Uses

Cosmetics, dust suppressants, industrial lubricants, hydraulic fluids, biodiesel, carriers for fungicides, herbicides and pesticides, oiled fabrics, printing inks, plasticisers, suntan oil and anti-static for paper and paper wrap.

Meal

Livestock feed, poultry feed, pet food, fish food and fertiliser.

THE FUTURE

From simple beginnings in the 1940s, many challenges have faced the canola crop. As each obstacle surfaced, the Canadian industry worked diligently to overcome roadblocks to canola's success. Alternative markets were developed, nutritional studies were implemented and extensive plant breeding to modify the genetic make-up of rapeseed was undertaken.

Canola is a highly versatile and adaptable crop which persistently tests the management and marketing skills of growers. There is constant refinement and improvement in Canada's canola from both a research and production perspective. Plant breeders are working diligently to keep canola on the leading edge. Growers are modifying their production techniques to improve quality and to ensure optimum yields. The entire industry is striving toward greater success.

Canola has been and continues to be a revolutionary crop and, as a result, will always be a bright spot for Canada.