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Rapeseed Production Districts in Idaho

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Rapeseed production in the United States has historically occurred in the wheat-pea production areas of the Pacific Northwest. Before 1985, the industrial variety Dwarf Essex was produced on 3,000 to 5,000 acres in northern Idaho. Increased interest in alternative crop commodities and the development of improved varieties of winter rapeseed have increased production acreage of both industrial and edible rapeseed. Much of this increase has occurred without consideration for problems that can arise from intermingling production of both industrial and edible type rapeseed varieties. The purpose of this publication is to clarify recent changes in Idaho law establishing rapeseed production districts throughout the state as a means of avoiding such problems and protecting the potential growth of this industry.

Industrial vs. Edible Rapeseed Production

Rapeseed is an oilseed crop belonging to one of three species (*Brassica napus*, *B. campestris* and *B. juncea*) in the mustard plant family. Oil from this crop has two distinct end product uses: edible oil for human consumption in food products such as margarine, salad and cooking oil and processed food products, and industrial oil for producing synthetic lubricants, varnishes and plastics. The desired composition of the fatty acids which make up the oils for these two uses are distinctly different and are predominately controlled by genetic factors unique to individual varieties. The oil derived from a variety designed for one type of use is not compatible with the other use. The erucic acid content of the oil is the principle characteristic dictating the end-product use of rapeseed oil.

Erucic acid is a 22 carbon, long-chain fatty acid possessing unique characteristics for use in high-temperature synthetic lubricants and as a plasticizer in improved nylons. Current industry standards require a minimum 45 percent erucic acid content in the fatty acid component of industrial-type rapeseed oils.

Erucic acid is not readibly digested in laboratory animal diets. It concentrates in smooth muscle tissue and causes physiological disorders when consumed in large quantities. While no adverse effects from consuming high erucic acid oils in the human diet have been reported, the U.S. Food and Drug Administration currently limits the erucic acid content of edible-type rapeseed oils intended for human consumption to no more than 2 percent of the oil's fatty acid composition.

This difference in erucic acid content of rapeseed oil delineates its use as either an industrial or edible oil. Rapeseed oils with intermediate levels of erucic acid (between 2 and 45 percent) have little or no commercial value.

Rapeseed erucic acid levels can vary under commercial field conditions by cross-pollination between industrial and edible varieties. Cross-pollination is the fertilization of flowers on one plant by a pollen source from another plant. Usually the fertilization of flowers on a cross-pollinating rapeseed plant is accomplished by pollen released from a neighboring plant of the same variety. No change in the erucic acid content of the individual variety occurs. Out-crossing occurs when the pollen source is a plant of a different variety.

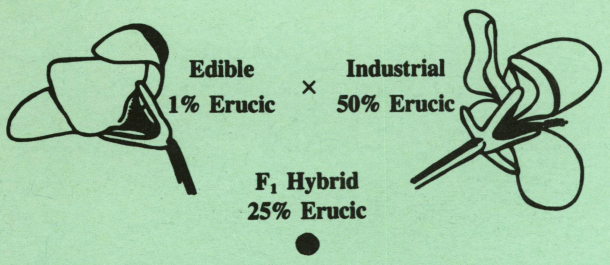

Fig. 1. Erucic acid content of rapeseed resulting from complete cross-pollination between edible and industrial varieties possessing 1 and 50 percent erucic acid, respectively.

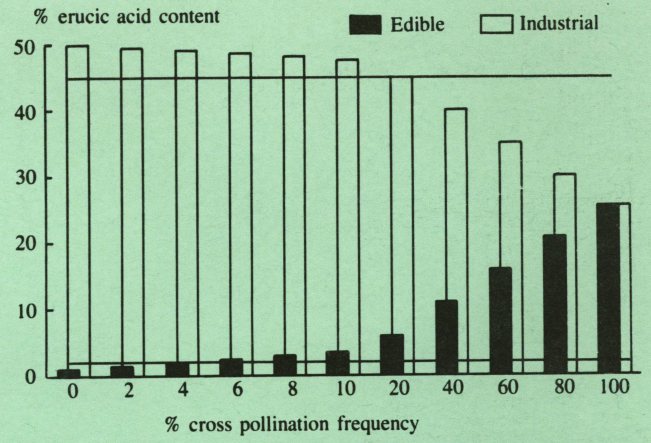

Fig. 2. Variation in erucic acid content of edible (1% erucic) and industrial (50% erucic) rapeseed varieties in response to increasing cross-pollination frequency between varieties.

Fig. 1 illustrates the result of complete cross-pollination between edible and industrial type plants bred to produce approximately 1 and 50 percent erucic acid in the oil respectively. The resulting cross possesses a combination of genetic traits for both low and high erucic acid levels. This combination of traits produces an F_1 hybrid seed yielding only 25 percent erucic acid in the oil. Varietal selection, field location and crop rotation can influence the potential for cross-pollination to occur between industrial and edible varieties, and therefore impact the erucic acid levels present in the rapeseed crop.

Both cross- and self-pollinating rapeseed varieties are marketed in the Pacific Northwest. *Brassica napus* rapeseed varieties are mostly self-pollinated but produce a small percentage of seed by cross-pollination. *Brassica campestris* rapeseed varieties require complete cross-pollination to produce seed. While the inherent risks of cross-pollination between industrial and edible varieties appear greater with *Brassica campestris* varieties, *B. napus* varieties can still incur a significant degree of out-crossing and can readily serve as pollen sources for cross-contamination to occur.

Where production fields of industrial and edible rapeseed are close to each other, pollen dispersed by wind or carried by insect pollinators can result in partial cross-pollination between fields. The impact of cross-pollination on erucic acid levels depends on the frequency of cross-pollination occurring within each crop (Fig. 2). As the percentage of cross-pollination between the two fields increases, the erucic acid content of the oil will rise in the edible type and decrease in the industrial type. The amount or percentage of out-crossing necessary to attain critical erucic acid levels is much smaller for edible type varieties than industrial type varieties.

In the example (Fig. 2), greater than 2 percent erucic acid will result in the oil of an edible type when more than 4 percent cross-pollination occurs with a high erucic variety. While erucic acid levels will decline in an industrial variety with any cross-pollination that may occur with a low erucic variety, greater than 20 percent cross-pollination is necessary to reduce the erucic acid level below 45 percent in the industrial crop. Distances between fields, wind direction and velocity and the level of pollinator activity are a few of the factors mitigating this situation. Concern over possible contamination problems prompted the creation of rapeseed production districts within the state of Idaho. The Idaho Department of Agriculture governs the establishment and enforcement of these rapeseed production districts. Such districts should provide the isolation necessary to prevent contamination and to guarantee continued commercial rapeseed production in Idaho.

Idaho Rapeseed Production Districts

Six rapeseed production districts have been created in Idaho since 1986 (Fig. 3). Each district was established by petition to the director of the Idaho Department of Agriculture by a minimum of five producers within each district. Each district has a 5- to 7-member advisory board that advises the state director of agriculture on possible changes to the rules and regulations pertaining to that district. Changes may involve but are not limited to alterations of district boundaries, identification of rapeseed types suitable for production and establishment of acceptable minimum distances between rapeseed fields within a district. Advisory board members can be appointed for terms of 1 to 3 years and can serve no more than two consecutive terms.

The specific boundaries and restrictions on rapeseed production for each district are:

District I: All land south of the Canadian border and north of U.S. Interstate 90. Only edible type rapeseed varieties may be produced currently in District I.

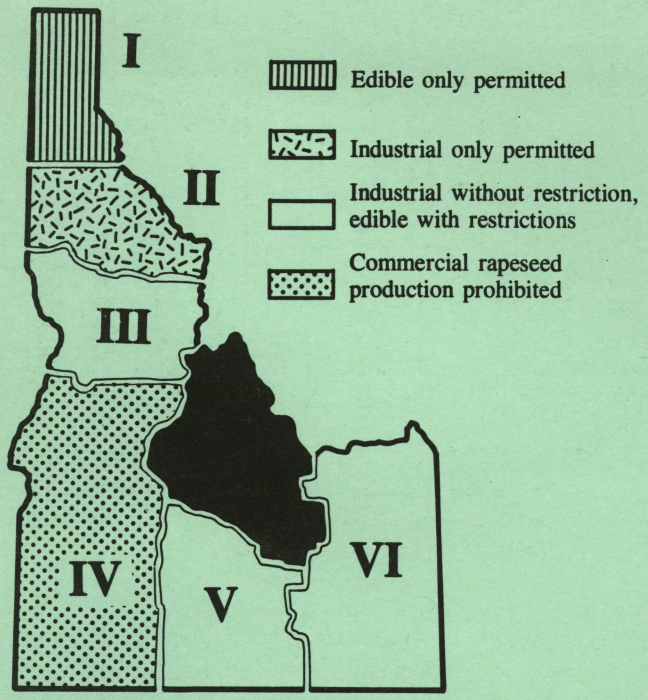

Fig. 3. Established boundaries of rapeseed production districts in Idaho during 1987.

District II: All land south of U.S. Interstate 90 and north of the Clearwater River. Only industrial type rapeseed varieties may be produced currently in District II.

District III: All land south of the Clearwater River and north of the Salmon River. Industrial type rapeseed varieties can be grown in District III without restriction. Edible type rapeseed varieties may be grown in District III under the following conditions:

1. The grower planting edible rapeseed has the responsibility to consult with and obtain written approval from all landowners bordering the field or fields to be planted with edible rapeseed.
2. Edible rapeseed fields must be at least ½ mile from fields planted to industrial rapeseed.

District IV: All land in Ada, Canyon, Elmore, Gem, Owyhee, Payette and Washington counties. No edible or industrial rapeseed varieties may be planted in District IV except for the purposes of research, testing or introduction of rapeseed under trial ground requirements.

District V: All land in Blaine, Cassia, Gooding, Jerome, Lincoln, Minidoka and Twin Falls counties. Industrial type rapeseed varieties may be planted in District V without restriction. Edible rapeseed varieties may be planted in District V under the conditions specified in paragraphs 1 and 2 of District III regulations.

District VI: All land in Bannock, Bear Lake, Bingham, Bonneville, Clark, Caribou, Franklin, Fremont, Jefferson, Madison, Oneida, Power and Teton counties. Industrial type rapeseed varieties may be planted in District VI without restriction. Edible rapeseed varieties may be planted in District VI under the conditions specified in paragraphs 1 and 2 of District III regulations.

Provisions have been made for introducing and testing new rapeseed varieties and allowing rapeseed research on trial grounds. Experimental work with rapeseed is permitted in all districts providing: (1) all research and testing is approved and supervised by qualified University of Idaho personnel and (2) the experimental trial grounds are limited to 2 acres in size for each testing site. Rapeseed experiments in District IV are restricted to University of Idaho Research and Extension Centers.

Enforcement of the rules and regulations establishing rapeseed production districts is the responsibility of the Idaho Department of Agriculture. Authority lies with the state director of agriculture to order the destruction of any rapeseed crop, before blooming, that has not been planted in accordance with these rules and regulations. Failure to comply with a destruction order can result in the destruction of the crop or volunteer plants by a third party with the cost of destruction charged to the owner of the crop in question. Violations can also carry a misdemeanor fine not to exceed $1,000.

Certified Seed Production

The rules and regulations governing rapeseed production districts apply to both commercial grain and certified seed production. Additional location and rotational restrictions beyond district regulations are required for certified seed production. Rapeseed fields producing foundation, registered or certified seed must meet minimum isolation requirements from fields of any other variety, or fields of the same variety that do not meet varietal purity requirements for certification (Table 1). Recommended isolation distances for certain certified classes may exceed those listed in Table 1. Growers interested in producing certified seed should first consult the latest *Idaho Rules of Certification* for rapeseed published annually by the Idaho Crop Improvement Association.

Summary

Rapeseed production districts will help prevent possible contamination problems that may arise from producing both edible and industrial type varieties. Growers and industry representatives must work together for the continued growth of this industry.

Table 1. Minimum isolation distances and rotational restrictions for individual fields producing foundation, registered and certified classes of rapeseed.[1]

Certification class	Isolation distant		Years since previous rapeseed crop
	Fields of cross pollinated varieties	Fields of self pollinated varieties	
	feet		
Foundation	1,320	660	5
Registered	1,320	660	4
Certified	660	330	3
Different generation of same variety	15	15	*

[1]Rapeseed certification regulations in Idaho for 1987, Idaho Crop Improvement Association, Inc., Boise, ID 83705.

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