

# Canola and Mustard Biodiesel Feedstock Research

T.G. Chastain, C.J. Garbacik, D.T. Ehrensing, and D.J. Wysocki

*Oregon State University*

**Introduction.** The availability of regionally-produced feedstock oil is an essential element required for the development of a sustainable biodiesel production industry in Oregon. This supply of oil, the feedstock for biodiesel, is influenced by the following factors:

1. Oil yield potential of the feedstock crop
2. Number of acres of feedstock grown
3. Crop production environment
4. Crop management practices
5. Pests
6. Crop price/demand

**Winter Canola.** This is the 3<sup>rd</sup> year of trials on winter canola cultivars and management practices in the Willamette Valley. Spring nitrogen management was examined in the 1<sup>st</sup> trial while the need for irrigation was evaluated in the 2<sup>nd</sup> and 3<sup>rd</sup> trials.

The seedbeds in each trial were prepared in fields that had previously produced grass seed crops. Lime was applied at a 2 ton/acre rate. A starter fertilizer application of 48 lbs N/acre (16-20-0) was made prior to seeding. Treflan was applied and incorporated into the seedbed prior to planting to control weeds, except in the 1<sup>st</sup> trial where Select 2EC was used to control weeds. Cultivars and advanced lines were sown at each year at 6-7 lbs/acre in mid- to late-September in 6-inch rows. Irrigation was applied with our linear system and irrigation treatments in the 2<sup>nd</sup> and 3<sup>rd</sup> trials included:

1. Canola established and grown under rainfed conditions without irrigation
2. Canola established with the aid of fall irrigation, but managed without spring irrigation.
3. Canola established and produced with irrigation as needed (fall and spring).

Depending on the date of planting and the availability of soil moisture, winter canola typically emerged about one week after planting. The first-true leaf appeared on the seedling plants at about 3 weeks after planting. By mid-November in each trial, the crop canopy had closed and the plants were in the rosette stage, the stage of development in which they will over-winter until early spring – around late February. Bolting or stem elongation typically begins shortly thereafter depending on weather conditions. Nitrogen and boron were applied in each year prior to bolting at 100 lbs N/acre and 2 lbs B/acre, respectively. Flower buds are formed by late March and the first blooms appear. Full bloom is reached in late April through early May. Once pollinated, seed filling takes place and the crop is ready for harvest in late June through early July.

Seed yields of winter canola varied among the cultivars and advanced lines tested, and ranged from 2310 lbs/acre to 4819 lbs/acre (Table 1). The variability in seed yield from year to year is primarily attributable to weather conditions experienced in each after establishment and prior to flowering. Over the past three years, our winter canola yields in the Willamette Valley have averaged over 3,100 lbs./acre (163 gallons oil/acre) for all named varieties tested while the best advanced line averaged over 3,600 lbs./acre (189 gallons oil/acre). Irrigation and its timing had no effect on seed yield of winter canola in 2006 or in 2007, but winter canola was quite responsive to spring nitrogen management.

Table 1. Seed yield of winter canola cultivars in the Willamette Valley.

Cultivar	2005	2006	2007	Average
	----- lb/a -----			
Athena	4491	2663 b	2762	3305
Baldur	4650	2383 a	3173	3402
Ceres	3872	2416 a	--	3144
Kronos	4331	2789 b	2471	3197
Virginia	--	--	2988	--
UIC 2.2	4819	--	--	--
UIC 3.1	4525	2829 b	--	3677
UIC 3.5	4185	--	--	--
UIC 4.2	--	3351 c	2635	2993
UIC 4.3	--	3318 c	2602	2960
UIC 4.8	--	2730 b	2310	2520

**Spring Canola and Mustard.** This is our 3<sup>rd</sup> year of research on spring canola and 2<sup>nd</sup> year on mustard. Spring canola is like winter canola in its oil and meal properties but crop yield is much less than winter canola. We have examined several advanced lines and this year, two commercial cultivars Hyola 401 and Sunrise. Both are *Brassica napus* type cultivars like the winter canola that we've tested. Spring canola seed yields averaged 1891 lbs/acre in 2006. The oil yield equivalent is 99 gallons of oil/acre.

Yellow mustard (*Sinapsis alba*) is not a member of the genus *Brassica* like canola and so it does not fall under the production restrictions recently imposed by the Oregon Department of Agriculture. Last year, our yellow mustard trial with the commercial cultivar IdaGold produced 1716 lbs./acre of seed with an oil yield equivalent of 61 gallons oil/acre. Unlike canola, yellow mustard meal is high in glucosinolates, making the meal not suitable for consumption by livestock at this time. However, mustard meal has weed control properties and might be saleable as a bio-pesticide in organic crop production. This year we have added oriental mustard (*B. juncea*) cv. Pacific Gold, for comparison.

While the oil yields per acre are lower for the spring crops than for winter canola, it should be noted that the oil yields do exceed the national average for soybeans (57 gallons oil/acre), the primary source of biodiesel in the Midwestern US.

**For more information:** [Thomas.G.Chastain@oregonstate.edu](mailto:Thomas.G.Chastain@oregonstate.edu)