



## Camelina - a Relatively New US Biodiesel Source

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So what the heck is Camelina? Until I read that it was used as the greater source of the biofuel component for the test flight of the [Japanese Airlines plane](#) in February, I must confess I had never heard of it. So since it has obviously got some legs (there was a greater percentage of it than of the algae derived fuel) herewith some thoughts picked up as I wandered through some Web pages, seeking more information.



*Camelina in a [Montana test plot](#)*

Apparently camelina came to the United States out of Europe, though it started out in Central Asia and the Mediterranean. In Europe much of the early cultivation of the crop has been replaced with canola fields, and it appears to compete with it as a crop. It arrived [in Montana](#) in about 2004 where it appealed both to farmers – as a source of omega-3 fatty acids, and to researchers who were looking for a source of biodiesel. The early work suggested that it could be sold more cheaply (\$2 a gallon in 2005) than soy-generated biodiesel (\$3 a gallon), but a cheaper price is hardly guaranteed to induce farmers to grow it. The oil has historically been used for cooking, with the meal fed to animals.

Recent interest in the plant was spurred by the [omega-3 content](#):

there is renewed interest in Camelina for its oil which is rich in the omega-3, alpha-linolenic acid (ALA). Ironically, this quality had contributed to its decline, due to difficulties with hydrogenating the highly unsaturated oil for margarine. Linseed (60% ALA) and Camelina (45% ALA) oils are by far the richest plant sources of omega-3.

Rapeseed has lower levels of ALA (10%) and sunflower almost none. Camelina oil is more stable than linseed, due to its natural antioxidants, which also have health benefits in their own right.

It is a branch of the mustard family, and has the benefit over canola in that it is [resistant to flea beetles](#), which are a problem for canola in Montana. Like canola it prefers cooler climates; for greatest yields being planted before the 15th – 20th March in Montana with harvesting in Late June to late July. (Similar dates hold for planting and harvesting in Wales.) Thus in 2006 there were somewhere between 7,000 and 20,000 acres planted in Montana, in 2007 this grew to 24,000 acres. It also has the benefit, over canola, of being able to survive drought and spring freezing. Further there is a winter variety that can be grown in areas with mild winters. The report from [Montana State](#) describes the oil content as:

Camelina oil has unique properties. The oil contains about 64 percent polyunsaturated, 30 percent monounsaturated, and 6 percent saturated fatty acids. Importantly, camelina oil is very high in alpha-linolenic acid (ALA), an omega-3 fatty acid which is essential in human and animal diets and has important implications for human health. The oil also contains high levels of gamma-tocopherol (vitamin E) which confers a reasonable shelf life without the need for special storage conditions.

In comparison to canola (rapeseed) which produces [some 127 gal/acre](#), camelina is reported to produce in the 62 to 100 gal/acre range.

Field trials of production showed a wide range of results from 330 to 1700 lbs of seed per acre, with oil content varying between 29 and 40%. There are however a significant number of varieties of the plant and thus tests have been carried out to determine which might yield the better crop given the Montana growing conditions. Optimal seeding rates seem to be in the 6-8 lb/ acre range, because the small size of the seed (400,000 seeds per lb.) apparently make it more difficult to ensure germination and achieve an optimal plant density of around 9 plants/sq. ft. It does apparently grow better when the ground nutrients are supplemented with nitrogen up to levels of 80 lb/acre.

The Montana report ends with the following

At this point there are many more questions than answers when it comes to camelina production and use. Early experience in Montana has shown that with good management, and timely planting, good crop yields can be attained. As a broadleaf cool season crop, camelina could become a good complementary crop to wheat, providing a needed break from cereals in wheat production. Crop rotation is a great way to reduce disease and insect pressure for any crop, and there are few good economic crop rotation options for wheat in Montana. Weed control is a major limitation to camelina production. Currently there are no herbicides registered for use with this crop, which means rescuing a field that becomes infested with weeds is difficult.

However varieties of the plant produces [its own herbicide](#).

Data on crop production is still somewhat limited since the USDA did not start data collection until 2007, and the [2008 report](#) was issued this April. Production in Montana in 2008 was significantly down (at 12,200 acres) over that of 2007. The average yield was 569 lb/acre, down 4.8% over 2007, though the range from 400 to 1000 lb/acre makes it unlikely that any conclusion can be drawn from those numbers.

The [Welsh report](#) comments on the current extraction process:

Camelina typically contains approximately 35% oil. Cold pressing is not 100% efficient, the proportion of oil extracted being dependant on the type of seed and how well the press is set up.

As an example, a tonne (1000 kg) of Camelina will contain 350 kg of oil, of which the press will extract 250 kg. Cold pressing (40C) is required, because high temperatures will damage the antioxidants. Drought, lack of sunshine during seed formation, herbicide desiccation applied too early, and downy mildew infection may all lower the oil content of the seed.

In Wales they can get up to 1 t/acre.

Oregon is considering [growing the crop](#) after looking at trials in nearby states:

Under dryland conditons in Montana, camelina is expected to yield 1,800 to 2,000 pounds of seed per acre in areas with 16 to 18 in hes of rainfall and 900 to 1,700 lb/acre with 13 to 15 inches of rainfall. Under irrigation, seed yields of 2,400 lb/acre have been reported. Three years of yield trials at Moscow, Idaho show a 2,100 to 2,400 lb/acre seed yield potential with 25 inches of rainfall.

At present there are [restrictions on the growing of canola in Oregon](#):

Oregon officials in 2005 restricted canola-for-oil production in the valley to protect the valley's high-value vegetable seed crops. Officials recently announced they are going to renew the prohibitions.

"I would like to grow canola, but the state interferes with that, too," Van Leeuwen said.

Fears are canola will attract insect pests common to canola and brassica crops and that canola will cross pollinate with cauliflower and broccoli, lowering seed purity and eventually driving vegetable seed contractors out of the valley.

Camelina may overcome some of those concerns.

So my quick look suggests that it about on a par with canola (rapeseed) with some survival benefits over that plant as a crop, that it is only just being introduced into the United States as a

crop and that, while it has potential, and there are some productive strains identified, it is still a little early in the game to know if it will pan out quite as well as the [Biofuels Digest](#) suggests.



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