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## **GOLD OF PLEASURE (FALSE FLAX)**

**Family:** *Cruciferae*

**Genus:** *Camelina*

**Species:** *sativa*



Source: ECInetwork – Austria <http://www.btgs1.ct.utwente.nl>

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### General Background

Also known as German sesame or Siberian oilseed.

**France** = Cameline cultivee, **Norway** = Oljedodre, **Denmark** = Sæd-Dodder, **Finland** = Ruistankio, **Germany** = Saat-leindotter, **Spain** = Camelina pilosa.

Gold of pleasure has been grown in Europe for centuries and in the Iron and Bronze ages was an important agricultural crop. From the Roman empire to the discovery of gas and electricity, this oil was the favourite one used in oil lamps and also a common edible product. *Camelina sativa* belongs to the same family as oilseed rape, the Cruciferae, but is a different genus.

Gold of Pleasure is an annual or over wintering herb originating in the Mediterranean to Central Asia. It has branched smooth or hairy stems that become woody at maturity and range from 25 - 100 cm high. Leaves are arrow-shaped, 5 - 8 cm long with smooth edges. Each stem bears many small yellow flowers each with 4 sepals and petals. The seeds, borne in pear shaped, capsules are 0.7 - 2.5 mm in diameter, orange to brown in colour, and result from self-pollination, although they can be cross pollinated by visiting insects.

The plant is native to Eastern Europe and Southwest Asia where wild weedy forms survive. The plant appears very adaptable to climate and soil type, it has been shown to be allelopathic. Camelina is primarily a minor weed in flax and not often a problem in other crops. It does not have seed dormancy.

### Details of Quality Characteristics

Recent studies have shown that the natural oil produced by Gold of pleasure seeds contains an excellent balance of useful fatty acids, including some rarely found in other oil crops (e.g. omega 3 and essential fatty acids). The oil from gold of pleasure also contains a high content of tocopherols with a unique oxidative stability.

Seed oil content averages at 37% by weight.

**Fatty Acid Composition** (Source: <http://www.gie-sprint.com/goldof.htm>)

**Saturates**

Formula	Name	%
C16:0	Palmitic	3-8
C18:0	Stearic	2-3
C20:0	Arachidic	0-2
<b>Total Saturates</b>		<b>7 – 14 %</b>

**Monounsaturates**

Formula	Name	%
C18:1	Oleic	12-27
C20:1	Gadoleic	9-17
C22:1	Erucic	1-3
<b>Total Monounsaturates</b>		<b>26-41%</b>

**Polyunsaturates**

Formula	Name	%
C18:2	Linoleic	16-25
C18:3	Alpha-Linolenic	30-42
<b>Total Polyunsaturates</b>		<b>46-64%</b>

**Others**

Name	%
Eicosenic	16.4
Eicosadienoic	2.0
Eicosatrienoic	1.0
Other	2.1

**Analytical Characteristics**

Appearance	Clear bright yellow oil
Colour (Lovibond 5" cell)	2.0 red max
Odor	virtually no odor

Acid value (mg KOH/g oil)	0.2 max
Peroxide value (meq/kg oil)	2.0 max
Refractive index at 40°C	1.4700-1.4750
% free fatty acid	0.25% max
Iodine values (Wijs)	145-170
Saponification value	180-195

( Source; <http://www.gie-sprint.com/goldof.htm> )

### Current Production and Yields

#### **The area of *Camelina sativa* grown on set aside land in the UK**

Year	Area under production (ha)
1996	5
1997	5

Source MAFF 2000, from the IENICA Summary report for the UK 2000. These figures are based on information submitted under the Arable Area Payment Scheme and do not take into account any industrial crops grown without support.

#### **The area of *Camelina sativa* grown on set aside land in Germany**

Year	Area under production (ha)
1993	95
1994	138
1995	66
1996	17

Source IENICA Summary report for the European Union 2000.

The following countries have also expressed scientific interest in *Camelina sativa*. Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Spain and the UK (IENICA 2000).

In recent years *Camelina sativa* was cultivated in Austria on about 50 ha set aside land as a raw material for liquid biofuel production. On good soils, 2,600 kg/ha (wet weight) were harvested. (<http://btgs.ct.utwente.nl/eeci/countries> )

Camelina is already grown as an oilseed to a limited extent in the UK (e.g. In Devon, UK (south) on 8 April 1986 yielded 1.7 tonnes of seed per ha in August (5), and at Reading, UK yields from winter sown plots show a 30-40% yield advantage over spring sown plots (3).

There have been scattered hectareages in Europe mostly in Germany, Poland and the USSR. Some attempts were made in the 1980's at germplasm screening & plant breeding (e.g. Enge & Olsson, 1986). Some Camelina is already being grown on set-aside in Germany.

Research carried out by Agegnehu, M and Honermeier, B on seeding rates and nitrogen fertilisation on *Camelina sativa* Crtz, found that the maximum yield was 2.28 tonnes/ha (120kg/ha nitrogen, 400 seeds/m<sup>2</sup>.) The oil content ranged from 37% to 43%. The amount of saturated fatty acids in the fatty acid compositions comprises about 8%. Linolenic acid had the highest part of the polyunsaturated fatty acids with 35%.

### **Constraints upon Production**

Gold of pleasure has been shown to be easy to grow and relatively undemanding in inputs. The small seed size (c. 1.5 mm) may cause handling difficulties at sowing. Straw from the crop is stiff and lodging resistance/stem stiffness high at normal fertilizer levels [4].

Trials in Austria found that, with relation to establishment, production and fertilizing, camelina showed to be a low input plant. A series of field trials were conducted over a three year period (1996 – 1998) in Ireland, as part of an EU-sponsored research program across four countries. The objective was to establish the potential of winter hardy varieties of camelina, grown without the use of herbicides, fungicides or pesticides, as a commercial source of a high quality oil for human consumption. The study showed that winter Camelina cannot produce an economic yield in Ireland where the use of herbicides and fungicides are excluded. The mild, wet winters in Ireland result in very high levels of weed competition. The resultant wet canopy encourages high levels of disease infection and creates conditions where excessive lodging occurs early in the season resulting in difficult harvesting conditions and low yields.

## **Markets and Market Potential**

Over 50% of the fatty acids in cold pressed Camelina oil are polyunsaturated. The major components are alpha-linolenic acid (omega-3-fatty acid, approx 40%) and linoleic acid (omega-6 fatty acid, approx 15%). These fatty acids are known to reduce the LDL-cholesterol level in the blood and are good for heart and cardiovascular health. The oil contains many natural antioxidants, such as tocopherols, which make the oil stable and is well suited for use as cooking oil. The vitamin E content of Camelina oil is approx 10mg/100g. Camelina is now being marketed by Camelina Ltd as a functional food in a range of products from pure oil, salad dressing, relish to seeds and crushed oilseed cake. Because of the health effects, technical stability and almond-like tasty aroma camelina oil may be an important food oil for the future.

Research has also demonstrated further benefits of the oil.

1. In skin care products such as body lotions, bath foams and creams.
2. In the production of soaps and soft detergents.
3. In the production of interesting lipopeptides and lipoaminoacids.
4. As a replacement for marine oils due to its similar fatty acids
5. Trials have been undertaken in Austria to test the effectiveness of Camelina as a raw material for liquid biofuel.
6. As a source of natural anti oxidants.

Much of that currently produced is used in the preparation of cosmetics and paints. Camelina has also been found to be a potential low cost crop for green manuring. Traditional uses of the oil include as an illuminant and for cosmetic purposes while the stems were used for making brushes, packaging and thatching temporary buildings. Additional uses for the green crop as fodder and the seed for fattening poultry, whilst the protein rich pressed cake was a valued livestock food.

The oil could also be used as an adjuvant oil for agrochemical sprays. It could be used as an inexpensive cover crop and for ornamental plantings. It has been used in research areas to provide soil cover and competition and prevent seed mixture between adjacent plots [2].

From 1995 to 1998 the Department of Plant Production of the University of Helsinki, Finland, participated in an EU project in which the adaptation and crop management of *Camelina sativa* to different agro ecologies in the EU area was studied. Based on the knowledge and the innovations generated during this study Camelina Ltd was founded in 1998 and the company began contract farming in 1999. Camelina is now being marketed by Camelina Ltd as a functional food in a range of products from pure oil, salad dressing, relish to seeds and crushed oilseed cake.

### **Other Information**

It is best sown in the surface inch of the soil in a firm fine tilth. Winter sown crops are likely to give higher yields than spring sown crops and it is best adapted to cooler climates where excessive heat during flowering is not encountered. UK (ADAS) experience shows *C. sativa* to be relatively unresponsive to inputs. Its drought avoidance characteristic might make it better suited to drier regions than other oilseeds. However, excessive moisture and no disease control for winter varieties has been found to lead to increased lodging and disease susceptibility from trials carried out in Ireland (Crowley 1998).

Groupe Limagrain in France have done much research and development work into Camelina. To summarize their activities on this species, their subsidiary GIE SPRINT has released 2 A2P's varieties onto the French Catalogue – one winter type, EPONA and one spring type, CELINE. Their production and marketing (grain, oil and eventually meal) is done by GIE SPRINT which is also developing production and marketing of high erucic acid rape (HEAR) varieties, line seed and sunflower.

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See also the [Groupe Limagrain web site](#)

## Research

Agronomic investigations of *Camelina* have been carried out in both Europe (Marquard and Kuhlmann 1986, Crowley 1998, Agegnehu and Honermeier 1997) and North America (Robinson 1987). Unique agronomic features such as the compatibility with reduced tillage and cover crops, competitiveness with weeds or winter surface seeding are emphasised by Putman et al (1993). *Camelina* has the potential as a low cost crop for green manuring. Breeding research and genetic improvements of *camelina* were initiated during the 1980's. Advanced lines have been developed which are now available as a base for further improvement. In studies carried out by Vollmann et al (1996) new lines of *Camelina* are reported. The genotypes tested were derived from a recombinant program, which mainly focused on the improvement of agronomic performance of *Camelina* as an alternative and low-input oilseed crop for Central Europe. A considerable increase in 1000-seed weight was achieved by Vollmann, however this seems to be of low immediate value due to the drastic reduction of both oil content and seed yield which makes further cycles of recombination necessary.

The influence of seeding rate and nitrogen fertilization on yield efficiency and formation of yield components of *Camelina sativa* was investigated over three years by Agegnehu, M and Honermeier, B. 1997. The maximum yield of all treatments was 2.28t/ha (120kg/ha nitrogen, 400 seeds/m<sup>2</sup>). The formation of yield components

branches/plant, pods/plant and seed weight/plant was reduced by sowing at a higher seeding rate. The oil content ranged from 37% to 43%. The amount of saturated fatty acids in the fatty acid compositions comprises about 8%. Linolenic acid had the highest part of the polyunsaturated fatty acids with 35%.

Winter Camelina grown in Ireland was also very susceptible to both *Botrytis* and *Sclerotinia*. Chemical control of these diseases will be necessary if acceptable yields are to be achieved.

### **Useful Websites**

<http://www.gie-sprint.com/goldof.htm> Gold of Pleasure

<http://www.camelina.fi> Camelina Ltd

<http://www.btgs.ct.utwente.nl/eeci/countries> EECInetwork Austria

<http://www.teagasc.ie/research/reports/crops> Teagasic project report 4320 'Evaluation of Camelina sativa as an alternative oilseed crop.

### **BioMat Net**

[Gold of pleasure \(Camelina sativa\)](#)

[FAIR-PL97-3884 - CTVO-NET Chemical-technical utilisation of vegetable oils](#)

[Crops for Textiles/Fabrics/Cordage](#)

[Crops for Detergents](#)

[Crops for Pharmaceuticals/Cosmetics](#)

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