

Last updated: 14th October 2002

FLAX

SEE ALSO LINSEED and EDIBLE LINSEED (SOLIN)

Family: *Linaceae*

Genus: *Linum*

Species: *usitatissimum*



Source: <http://www.cjb.unige.ch.htm>



Source: <http://www.math.iupui.edu/>

Contents

[General Background](#)

[Details of Quality Characteristics](#)

[Current Production and Yields](#)

[Constraints upon Production](#)

[Markets and Market Potential](#)

[Other Information](#)

[Research](#)

[Useful Websites](#)

[BioMat Net](#)

[Contacts](#)

[References](#)

General Background

See the latest EuroFlax Bulletin (June 2002) from the FAO European Co-operative Research Network on Flax and other Bast Plants:

[Front Cover](#)

[Bulletin](#)

Names: Fr.: Lins; It.: Lino; Sp.: Lino; Ger.: Flachs; Dtch.: Vlas; Dan.: Hor; Gr.: Linari; Russ.: Len; Yug.: Lan

Flax is a cool temperate annual herb with erect, slender stems, 80-120 cm tall, taller than linseed (see [LINSEED](#)). A cultivated plant in closely spaced field conditions it has little branching except at the apex. Leaves are alternate, lanceolate and greyish-green with 3 veins. Flowers have five, bright blue or white, petals in a cluster. The sepals are lanceolated and nearly as long as the pointed fruit. The fruit are spherical capsules. The seeds are oval, somewhat flattened, 4-6mm long and are pale to dark brown and shiny.

Linum usitatissimum can be bred with an emphasis on seed (see [LINSEED](#)) or fibre production, the classification of a variety depends on the market to which the plants are aimed:

- | | |
|---------------------------------|--|
| Crops grown for seed: | ‘linseed’ (UK and India), ‘flaxseed’ (Canada), ‘Oil flax’ or ‘seed flax’ (EU). |
| Crops grown for fibre: | ‘flax,’ ‘fibre flax’ or ‘textile flax’ (EU) |
| Crops grown for seed and fibre: | ‘dual-purpose flax’ or ‘flax grown for fibre flax seed’ (EU) |

In the UK populations of around 550 plants per square metre are normally established from sowing rates of around 700 viable seeds per square metre. Large seeded varieties will require around 64 kg/ha while small seeded varieties will require only around 40 kg/ha. This 20 kg/ha difference in seed rate may be a consideration when choosing varieties. In poor seedbed

conditions, seed rate should be increased, especially for the small seeded varieties (NIAB 2001 Oilseeds Variety Handbook, UK).

Data relating seed size to early plant growth and eventual yield show strong trends for faster emergence, thicker establishment and more vigorous early growth from large seeded varieties. However, in trials that established and grew well, no relationship between seed size and yield was found. While yield is not limited by seed size, small seeded crops remain at risk longer if growth is slow after drilling (NIAB 2001 Oilseeds Variety Handbook, UK)

Details of Quality Characteristics

Flax fibre is hollow, able to absorb up to 12% of its own weight in water. It also dries quickly, does not perspire and is anti-static by nature making it equal to man-made synthetic fibres such as fibreglass. The fibres are twice as strong as those of cotton and five times as strong as those of wool. Its strength increases by 20% when wet.

Current Production and Yield

Country	Area Harvested '000 ha	Yield (t/ha)
Belarus	78,000	0.28
Belgium-Luxembourg	12,000	1.08
Czech Republic	10,532	0.59
Estonia	300	0.27
France	54,780	0.69
Germany	199,778	1.69
Hungary	1,749	1.03
Italy	1,000	0.70
Latvia	1,900	0.95
Lithuania	8,800	0.31
Netherlands	3,800	1.84
Poland	506	0.97
Romania	2,000	2.00
Russian Federation	92,440	0.20
Slovakia	2,304	0.57
Spain	18,000	0.89
Sweden	14,100	0.43
Ukraine	26,500	0.23
United Kingdom	74,000	0.58

Source: FAOSTAT Statistical Database Results 2000 <http://apps.fao.org>

Constraints upon Production

L. usitatissimum is sensitive to seedbed conditions and best emergence comes from fine seedbeds. Establishment in cold weather can be slow and early March drillings are usually best avoided. Weed control in the young crop is essential. Flax can be difficult and late-ish to harvest in some years, especially if weather is wet, and particularly in Northern Europe. Lodging can be serious but crops often recover if lodging occurs early in the season, however late lodging seriously impedes harvesting.

Retting is the other major constraint upon production of a high yielding, high quality crop. Dew or wet retting are unreliable in Europe, new fungal sources of enzyme retting are currently being looked into as a solution to this problem.

Markets and Market Potential

Flax is one of the oldest textiles, being tough and durable. In contrast to linseed, flax is grown at very high densities to produce very tall, unbranched stems. High quality fibres are found in the upper third of the stem to the base. The fibre is bast-type (buried within the bark of the stem) and must be retted to release fibres that are then bleached before use. The longer fibres are used for spinning into yarn and weaving, knitting and geo-textiles. Novel applications for shorter flax fibres in non-textile markets now exist, including packaging materials, reinforcements for plastics and concrete, asbestos replacement, panel boards, lining materials for the automotive industry, alternatives for fibreglass and insulation. Flax targeting the non-textile market is a high value crop as it is replacing non-renewable resources, for example plants from the Amazon Basin. The benefit of introducing a new line of flax for industrial purposes means a food crop is not being taken out of production.

Other Information

Flax is a short poorly competitive crop and subject to lodging in wet conditions. It grows well on all well structured, reasonably water retentive soils. It grows best on medium to light soils with an organic matter of 2.3 - 3.0%, optimum pH 5.6 - 6.0. Soils prone to water logging should be avoided, as flax does not possess a vigorous rooting system. A plant population of

500 - 900 plants/m² should be established (50 - 60kg/ha). Flax is responsive to nitrogen but rarely to phosphorus or potassium, however excess nitrogen levels cause production of coarse fibre and a crop more likely to lodge. Dry weather during maturation and harvesting are necessary. Harvesting is usually late August to late September, when the whole plant is dry and stems are yellow. Linen flax must be pulled, turned and retted before it is baled whereas industrial flax is combined, making harvest considerably easier. Flax for the geotextile market requires retting but other market sectors do not require retted flax, making it considerably cheaper.

Flax is particularly susceptible to flea beetle until at 3rd true leaf stage. Several diseases can affect flax causing yield and quality losses. These include *Alternaria linicola*, *Botrytis cinerea*, *Fusarium avenaceum*, *Mycosphaerella linicola*, *Oidium lini*, *Sclerotinia sclerotiorum*, *Phoma exigua* var. *linicola* and *Colletotrichum lini*. Slugs, pigeons and flea beetle can be a serious problem at the seedling stage, particularly in slow growing crops.

Traditional production and primary processing techniques have been developed over a long period of time to produce high value long fibre material for the textile industry. Retting is very weather dependent, interest is being shown in fully controllable enzyme retting techniques, but these are high cost systems, which are only sustainable for high value products.

New production, harvesting and primary processing technology have been developed based on infield chemical and dew retting and non-aligned short fibre systems. This production is directed at new uses. However only now with the changes in EU support arrangements are field management factors affecting end product quality receiving attention.

This new technology has not been universally welcomed in administrative circles of the EC where more traditional production methods based on woven textile end users are preferred. Ideally, from the farm business perspective, both flax and linseed should be considered as the same crop and recognition given that seed, fibre and to a lesser extent shiv, are all co-products. For new applications of fibre where short-fibre is preferred by manufacturers, then dual-purpose linseed varieties could be ideal crops.

Research

Useful Websites

BioMat Net

[Flax and Linseed \(Linum usitatissimum\)](#)

[UK Government Funded R&D on Crops for Industrial and Energy Uses: Section 1 – Industrial Oils and Fatty Acids](#)

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

Contacts

Springdale Crop Synergies Ltd,
Mr Clifford Spencer, Springdale Crop Synergies Ltd, Rudston, Driffield, East
Yorkshire, YO25 4DJ, UK
Telephone: +44 (0) 1262 421100
Website: <http://www.springdale-group.com>

The Flax Council of Canada

Goreham and Bateson (Agriculture) Limited

Robin Appel Ltd., Church Court, Clewers Hill, Waltham Chase,
Hampshire, SO32 2LN, UK
Tel: 01489 896388
Fax: 01489 896602

References

De Rougemont (1989) *Crops of Britain and Europe*. Collins: London

Henriksson, G., Akin, D.E., Slomeczyski, D. and Erikson, K.L., (1998). *Production of highly efficient enzymes for Flax retting by Rhizomucor Pusillus*. Agricultural Research Service: Athens

Available from: <http://www.nal.usda.gov> [Accessed 30th August 2002]

NIAB. (2001) *Oilseeds Variety Handbook*. UK

Smeder, B. and Liljedahl, S., (1996). Market oriented identification of important properties in developing flax fibres for technical uses. *Industrial Crops and Products* 5, 149 - 162.

