

LINESEED: A MULTIFACETED OILSEED CROPK.K. CHAHAL¹ AND S.S. CHAHAL²¹Department of Chemistry, Punjab Agricultural University, Ludhiana (PUNJAB) INDIA²Department of Economics and Sociology, Punjab Agricultural University, Ludhiana (PUNJAB) INDIA

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Linseed (*Linum usitatissimum* L.), the flax plant has been known to be cultivated for linseed since ancient times; it is one of the oldest cultivated plants known to man. The



flax plant was important source of seeds and clothing in early human history. In India it is grown in our country in rainfed as well as irrigated situations. Farmers are not aware of its value addition and utility in terms of dual-purpose cultivars (oil and fiber).

Flax is a small herbaceous annual plant, with striking turquoise blue blossoms and appears very graceful with an erect stem that can reach one to two feet in height. There is normally only a single stem per plant, the stem of the flax is quite smooth, and bears alternate rows of linear and sessile leaves. The seed vessels of the flax plant with their five celled capsules are called bolls. Harvest is carried out when bolls turn ripe; the entire flax plant is pulled out and field in bundles for processing. The bundled plants are soaked in water for several weeks to separate fibre from the stalks, which are spread out to dry and processed into cloth.

Constituents:

Linseed contains 30-40 per cent fixed oil of which 6, 2.5, 0.5, 19, 24.1 and 47.4 per cent are palmitic, stearic, arachidic, oleic, linoleic and linolenic acids respectively. Besides, it contains 6 percent mucilage, 25 per cent protein, and small amounts of linamarin (a cyanogenic glycoside). Linamarin has a sedative effect on respiratory system.

Production performance and constraints:

Linseed is extensively grown in the countries of the temperate and tropical zone. The major linseed-growing countries are Argentina, the USSR, India, the USA, Canada, Pakistan and Australia. India accounts for about 1.9 million hectares, with a seed production of 4.98 lakhs tonnes and occupies the third rank among the linseed-producing countries. Australia and Canada have the highest productivity of about 7 quintals per hectare, whereas India averages 255 kg per hectare which is lowest yield in the

world. In India, Madhya Pradesh leads in yield and acreage, followed by Uttar Pradesh where as Maharashtra, Bihar, Rajasthan, Karnataka and West Bengal also grow linseed in large areas. Madhya Pradesh and Uttar Pradesh together contribute to the national linseed production to the extent of about 70 per cent (www.krishworld.com). The average yield of a pure crop varies between 210 to 450 kg per hectare of seed under rainfed cultivation. The crop in northern India generally gives higher yield than in central and peninsular India. The irrigated crop may yield 1,200 to 1,500 kg per hectare. The productivity of linseed in Punjab is 1010 kg per hectare against national productivity of 415 kg per hectare (www.agricoop.nic.in.)



Linseed, like rape, is sensitive to seed bed conditions, and best emergence comes from a fine tilth. The crop can be very slow to establish in cold weather. Evidence from work in field trials shows that small seeded varieties are less vigorous, and with this avoidance of early drilling is particularly important. Winter varieties of linseed have now been developed and perform well provided the crop is well established prior to onset of winter. Weed control in the young crop is essential. Harvesting can be a major problem with linseed, particularly if the crop is late, incompletely desiccated or lodged. Lodging can be serious in linseed but crops often recover if lodging occurs early in the season. Late lodging severely impedes harvest, with very little bulk in the crop to support itself and allow room for the combine knife to get underneath. Crops must be very well desiccated at harvest to avoid wrapping in the combine, and care must be taken to ensure thorough penetration of the desiccant into the crop. The development of stripper heads has been particularly helpful for the linseed crop, as bolls tend to ripen well before the stems are ready for the combine knife (www.springdale-group.com).

Market potential of linseed:

It has been noticed that traditionally the linseed has been grown for its nutraceutical value and oil. The oil is used in the manufacture of paints, varnishes and linoleum, because of its drying and hardening properties when

exposed to the air and sunlight. Breeders have also produced linseed varieties that give oils with fatty acid profiles that make them suitable for culinary uses. This is because these *linola* types, containing a high proportion of linoleic acid and a low proportion of linolenic acid, have the appropriate stability and shelf life that the industrial types lack. Tests have indicated that these also have a range of industrial applications including specialist oils and inks. A growing market has been identified for whole seed linseed, in baking and in health foods and for this the traditional *high linolenic* varieties are suitable. Linoleum is made of natural materials: linseed oil, resins, wood, cork powder, calcium, vegetable pigments and hessian. There are new interests in this material and the European market is expected to increase in the near future. Linoleum has particular benefits in 'high-tech' situations in being anti-static. One kg of linseed oil is required for each 1m² of linoleum. There is a market for linseed meal as animal and poultry feed. Whole seed is used in the baking and confectionery industries where its health benefits are recognized. Linseed straw also has application in biomass energy burners (www.ienica.net/crops/linseed.pdf).

Cultivation:

Linseed is sown in first fortnight of October with drill or pora at a depth of 4-5 cm in rows 23 cm apart with plant spacing in the row is 7-10 cm under Punjab conditions. Linseed can also be raised without any tillage operation with zero till drill after paddy. The seed-rate is kept at 37.5 kg per hectare. The application of fertilizers and irrigation increases the yield of the crop. The fertilizer dose including 62 kg of nitrogen (136 kg of urea) and 39.5 kg of phosphorus per hectare (247 kg of superphosphate) is recommended. Under irrigated conditions, nitrogen is applied in two splits, half the dose as basal and the other half at the first irrigation, 40 to 50 days after sowing. Two varieties of linseed, LC 2063 and LC 2023 are recommended for cultivation in Punjab.

Cost of cultivation:

The average potential yield of linseed is about 1160 kg per hectare in Punjab. Based on the Package of Practices for crops of Punjab of Rabi crops 2009-10, the cost of cultivation was estimated to be Rs. 22122 per hectare. The gross and net returns were Rs. 31233 and Rs. 9112 per hectare, respectively. If one compares the

gross returns of linseed with toria a main rabi oilseed crop it was higher by Rs. 3188 per hectare in the case of linseed. Despite the fact that the potential yield of toria is higher as compared to linseed. This may be due to the fact that linseed govern higher price as compared to toria in Punjab.

Nutraceutical value:

Nutraceutical is defined as a food or part of food or nutrient that provides health benefits including the prevention and treatment of a disease. There are a lot of unsaturated fats as well as mucilage in the linseed. The presence of these compounds in the plant turns the flax into a highly valued remedy especially for treating many of the intestinal and chest conditions. Seeds consumed can induce a soothing action along the digestive tract and these are best when they are taken whole instead of as jelly or infusion. The whole seeds also tend to draw out toxins from the body and absorb fluid and swell up into a jelly like mass inside the body due to higher mucilage content, in this way, the seeds turn into bulk laxative and help in digestion which is beneficial for the body. Essential fatty acids can also be obtained from the seeds if seeds are split before they are swallowed whole. Topical application of crushed flax seed can be beneficial in the treatment of chronic coughs and bronchitis. Linseed fat is rich in omega-3 fatty acids which prevent coronary heart illness, arthritis and cancer. In order to obtain linseed oil the cleaned flax seed is crushed between heavy steel rollers. The mashed meal is then heated by steam, and the oil is forced in hydraulic presses. Solvent extraction recovers additional oil. Linseed oil is a yellow coloured vegetable oil. Flax seed contains 40 per cent of oil. The pressed cake, which is by-product is rich in protein and is used as a livestock food both for milch and fattening animals. The cake is used as organic manure as it contains 5, 1.4 and 1.8 percent of nitrogen, phosphorus and potash respectively. Linseed oil is used as paint drying oil in varnishes and enamels, putty, printing inks and industrial lubricants. It can be used as water proof and toughen paper and fabrics. It is also used as ingredients in liniments and medicinal soaps as an emollient. Keeping in view the nutraceutical uses and commercial value of this crop, the farmers should grow linseed as there exist is a great potential demand for this oilseed crop in future.

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