Available online at
www.agrospheresmagazine.vitalbiotech.org

ISSN (E): 2582 – 7022

Agrospheres:e-Newsletter, (2022) *3*(4), 19-22

Article ID: 377

Linseed: A Prospective Minor Oilseed Crop

Sheela, Mamta Singh, DP Wankhede, BL Meena and Vikender Kaur*

ICAR-National Bureau of Plant Genetic Resources, New Delhi-110012

*Corresponding Author
Vikender Kaur*

Article History
Received: 9.04.2022
Revised: 14.04.2022
Accepted: 20.04.2022

INTRODUCTION

India is among the largest vegetable oil economies in the world next only to USA and China. In the agricultural economy of India, oil seeds are important next to the food grains in terms of area, production and value. India accounts for 13% of the total area under oilseeds in world and 10% of the total oil consumption at the global level. Indian subcontinent is home for diverse oilseed species which have been traditionally used for consumption as well as other industrial and medicinal purpose, however, more focus on major oilseed crops such as rapeseed-mustard, soybean, groundnut and sunflower has rendered many minor oilseeds such as linseed, sesame, niger and safflower neglected. These minor oilseeds have many nutritional, nutraceutical and industrial applications besides they are important for sustainable economic development. Linseed or flax (*Linum usitatissimum*; Family: Linaceae) is one such minor but very important oilseed which has not been exploited yet to its full potential.

Different morphotypes and economic importance: Linseed is an annual herbaceous plant and grows to a height of 30 to 120 cm. Two different morphotypes *viz.* seed/oil type having characteristics such as bushy growth habit with profuse branching, short plant height, small seed size and fibre type having tall plant height more than 80cm, less branching and erect growth habit have evolved for different utilities. The plant has a well-developed tap root system with many lateral roots. The stem is glabrous green with narrow lanceolate leaves. The flower is pentamerous having five petals, five sepals, five styles, five stamens and five carpels. Fruit is an indehiscent capsule in which 8-10 seeds are present inside the locules. The colour of flowers range from various tonalities of blue to purple, violet and white.

Flowers are funnel, tubular, disc or star shaped with semi-twisted, twisted or valvate aestivation. Variability in anther colour ranges from grey, blue, cream to yellow while stamen colour varies from violet, blue to white. Seeds are yellow or brownish in color and may be lustrous or dull. The oil content of the seed varies from 33-45%.

Linseed occupies an important position in world market because of its multifarious trade use. Flaxseeds are rich source of ω-3 fatty acid: α-linolenic acid (ALA) (55%), short chain polyunsaturated fatty acids (PUFA), soluble and insoluble fibers, phytoestrogenic lignans (secoisolariciresinol diglycoside-SDG), proteins and an array of antioxidants. It possesses many vital nutrients and nutraceuticals with promising health benefit for both human beings and animals.

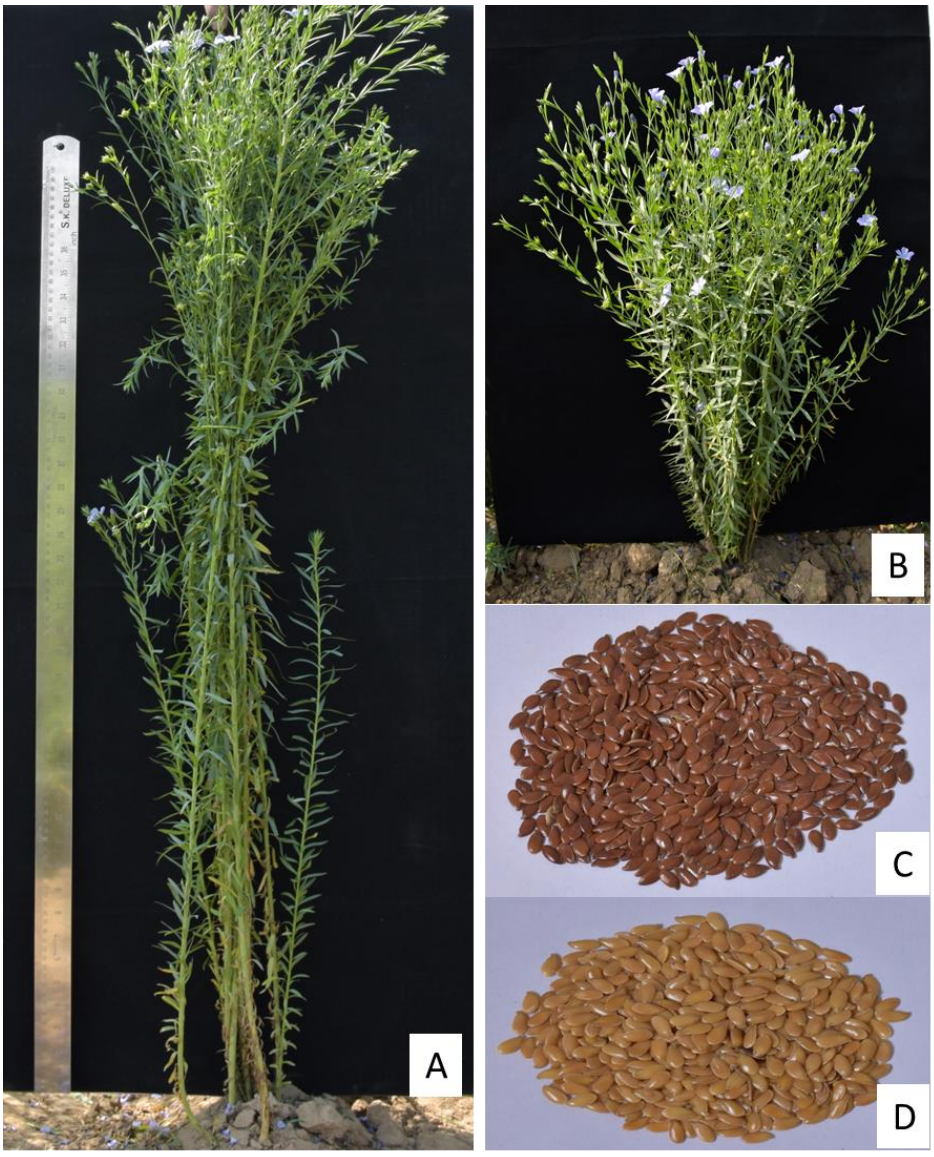

Fig.: The fibre type (A); Oil/seed type linseed (B); Brown seeded flax (C); Yellow seeded flax (D)

It has second highest amount of protein (18-25%) and the amino acid composition has been reported to be equivalent to soybean. It contains eight essential amino acids, *viz*., isoleucine, leucine, lysine, methionine, phenylanine, threonine, tryptophan and valine. Linseed oil is used as drying agent in paints, varnishes, as well as it is used in the manufacturing of hardboards, printers ink, and soap. Medicinal value of linseed lies in

reducing the risk of cardiovascular diseases and certain types of cancer arising due to hormonal disorder such as cancer of mammary glands and prostste gland, lung, colon, ovary, endometrium, hepatocellular and cervix. Flaxseed is also added to animal feed to improve animal reproductive performance and health. Flax fibre is one of the most natural and eco-friendly fibres among all the textile fibres. Flax fibres are known for their more tensile strength, fineness, lustre and durability in comparison to cotton and jute. The fibre is extensively used in the manufacture linen fabric which is known as the coolest fabric in world besides it is used to prepare canvas, carpets, blankets and mats.

Importance of linseed in Indian context: Indian sub-continent is one of the proposed centres of origin of linseed where high biological diversity of genus *Linum* has been reported particularly *L. mysorense*, *L. perenne* have been reported to occur in India. Moreover, one of the two distinct morphotypes of flax *i.e* seed/oil and flax types, the seed type morphological variant has been proposed to be originated in south-western Asia including India. In terms of area under cultivation and seed production, linseed is the second most important *rabi* oilseed crop in India and stands next to rapeseed-mustard. Although linseed plants have several utilites, it is cultivated commercially for its seed and fibre, seed is processed into oil and after extraction of oil, a high protein stock feed is left. About 20% of the total linseed oil produced in India is used by farmers and rest goes to industries for the manufacture of paints, varnish, oilcloth, linoleum and printing ink *etc.* Linseed has an important position in Indian economy due to its wide industrial utility. Besides niche importance in Central India, particularly Maharashtra, Madhya Pradesh, Chattisgarh, it has culinary uses wherein it is consumed as roasted whole seed, salad dressings, chikkis and chutneys etc.

Cultivation: In India, there are mainly three agroclimatic zones of linseed production. Zone I includes states of Jammu & Kasmir, Himachal Pradesh, Punjab, Haryana, Zone II includes UP excluding Bundelkhand region, Bihar, West Bengal, Assam, Jharkhand and Zone III includes Bundelkhand region of UP, MP, Rajasthan, Chhattisgarh, Maharashtra, Odisha and Karnataka states. Main season for sowing linseed is October to November. The crop takes 120 to 150 days to mature depending on the cultivar and region of cultivation. Linseed requires 60-90kg N/ha, 40 kg P_2 O_5/ha, 20 kg/ha S and Zn, half of the dose of N with full amount of P, S and Zn should be applied as basal dose at sowing. The remaining N should be applied with the first irrigation at 35 days after sowing. This crop requires 2-3 irrigations for optimum yields however 80% of the area under its cultivation in India is primarily rain-fed or under utera cultivation. First irrigation should be given at 30-40 days after sowing while second and third just before flowering and at dough stage, respectively. In India, Madhya Pradesh, Maharashtra, Chattisgarh and Bihar are the chief producers of linseed.

Factors affecting linseed production: In India, linseed is grown mostly under rainfed (63%) and *utera* (25%) cultivation practices in low input environments. The crop is manily taken by resource poor farmers under input starved conditions. Besides water scarcity, other abiotic stresses such as salinity and high temperature stress are other constraints impeding its productivity. Among biotic stresses, disease such as wilt, rust, powdery mildew and insect pest linseed budfly are the major constraints resulting in low national productivity (574 kg/ha) as compared to global average (975 kg/ha). Moreover, farmers get benefits from major oil seed crops as these crops are supported by MSP that results in further decline of area and production. As a result, the area under linseed cultivation is facing continuous decline in the country from 19.51 lakh ha in 1981 to 2-3 lakh ha in the year 2020. Due to the availability of other cheaper petroleum products with equally good

ISSN: 2582 - 7022

or some times better drying properties, the widespread use of linseed oil is restricted during recent times in the paints and varnish industries. However, linseed oil continues to be the base stock in medicinal, chemical, pharmaceutical and cosmetic industries as they have renewable, biodegradable properties and are non-allergic in nature along with enriched phytochemical contents.

The way forward: In order to make linseed crop more remunerative and to generate employment, product diversification for medicinal and other industrial purposes of linseed needs to be improved by concerted research efforts. One of the major lines of research is crop improvement programme through recombination breeding using elite germplasm for development of double purpose (oil and fibre) linseed having high yield and stress resistance (both biotic and abiotic) qualities. To overcome the yield stagnation, there is need to identify potential genetic resources for the resistance of flax against major biotic and abiotic stress. In this context, the exploration of diverse germplasm and evaluation of genebank collections is the way forward to ensure long term sustainability of flax production.