INTRODUCTION
CHAPTER-I
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Among oilseed crops, linseed is one of the important oilseed as it has significant commercial importance. Linseed (*Linum unsitatisimum* L.) is commonly known as flax and it belongs to the family Linaceae. Linseed is originated in South-Western Asia and the Mediterranean area of Europe and is normally grown towards the end of rainy season. The oilseed crops are grown in 5.5million hectares in whole of the universe and out of this, this crop was grown on 274.50 lakh hectares with an annual production of 256.80 lakh metric tonnes during 1998-99 in India (the Hindu Survey of Agriculture 2000).

The main oilseed crops in India rank in the following order-Groundnut, Rapeseed and Mustard, Soybean, Sesamum, Sunflower, Linseed, Castor, Safflower and Niger. Out of these nine crops linseed is an important rabi oilseed crop next only to rapeseed and mustard in India in terms of area as well as production. India has more than 18.76 lakh hectares under linseed with production of about 4.70 lakh metric tones. The area is 32.4% and the production is 18.7% of the world area and production (Rai 1999).

Based on agro-climatic situations the linseed crop is cultivated in following zones comprising different states of India:

1. North-Western region (Zone-I)-Himachal Pradesh, Punjab, Haryana and its adjoining areas of Rajasthan.
2. North-Eastern region (Zone-II)-Uttar Pradesh (Excluding Bundelkhand ), Bihar, West Bengal and Assam.
3. Central Peninsular region (Zone III)-Bundelkhand of Uttar Pradesh, Madhya Pradesh, Rajasthan, Maharasstra, Karnataka and Orissa.

Now per capita consumption of oils and fats per year in India is 4.6 kg as against world average of 7.0 kg (Tomar 1998). The availability of oils and fats in our country is only 12 g per day per head as against a minimum requirement of 18 g recommended by F.A.O. To meet this minimum requirement, the estimated edible oil demand per capita consumption has been assumed at 7.2 kg being the latest official report of consumption (Economic Survey of India 1995-96). Just to meet this minimum nutritional requirement, we shall have to produce one and half times as much oilseeds as the current production. However to meet the demand of our present population of more than one billion, we have to produce double the production.

The consumption of the vegetable oil is assumed as 67.55 lakh tonnes (edible oil 60.05 and industrial oil 7.50 lakh tonnes) against the net domestic supply estimated 58.9 lakh tonnes (oils and fats Review 1995). These figures tell us about the low productivity of oilseed crops in the country. Thus oilseed production has assumed importance in India because of the gap in demand and supply, which forced our country to import vegetable oils to the tune of more than 220 million approximately (Tomar 1998). Unfortunately the gap is continuously widening and causing a heavy drain on the foreign exchange reserve of the country.
Linseed has its manifold uses and therefore it is considered to be important oilseed which makes the economy of the country. Every part of the linseed plant is utilized commercially either directly or after processing. No doubt, linseed is a non edible oilseed crop, yet the seed originally used for extracting oil. According to Sharma (1999) linseed contains following:

Oil 37-43 per cent, protein 20.3 per cent, fat 36 per cent, carbohydrate 29.0 per cent, fibre 4.8 per cent, ash 2.4 per cent, water 6.6 per cent. Linseed oil contains 34.3-65.8 per cent linolenic acid, due to which it dries quickly. Therefore almost 80 per cent of total linseed oil goes to industries.

Out of this a major portion is used in manufacturing paints and varnishes and 11 per cent in manufacturing of linoleum and oil cloth, 3 per cent in printing, pad ink and rest in soaps, patent leather and other products. In some of the countries, linseed oil is used in the process of cementing of roads whereas its oil is used in most of the countries for the synthesis of antibiotics. In addition, linseed cake obtained after extracting oil contains oil 3 per cent, protein 12 per cent, carbohydrate 10 per cent, fibre 31.2 per cent, and water 8.0 per cent (Sharma 1999) is also very useful as animal feed for milch cattle. The cake can also be used as manure as it contains 5.7 per cent nitrogen, 1.4 per cent phosphorus and 1.8 per cent potash. Linseed plant stem yields fibre of good quality, having high strength and durability. The fibre is lustrous and blends very well with wool, silk, cotton, etc. Strong twines, canvas suiting, shirting, carpets and various indispensable products for defence
purposes are manufactured from linseed. After extraction of fibre of linseed the straw is utilized for preparation of straw boards, high grade writing papers and so on. Nevertheless, the rough and strong fibre of linseed is effectively used for preparation of low cost roofing tiles based on convertible polymers. In several countries it is grown for fibre production exclusively. Now, there is more emphasis to evolve double purposes varieties/cultivars which may be capable of producing seed equal to the best seed type and fibre equal to best flax type in the country (Anonymous 1995, Rai 1999 & Sharma 1999).

In Uttar Pradesh linseed is grown in an area of 0.081 million hectare, out of which 56 per cent of the area lies in Bundelkhand region. The average productivity of linseed in Uttar Pradesh is 450 kg/ha while in Bundelkhand region it is only 375 kg/ha (Singh et al. 1998-99).

In Bundelkhand, the crop is mainly grown under rainfed conditions on Mar and Kabar soil on the Conserved Soil Moisture in marginal and Sub marginal lands without applying recommended dose of fertilizers and weed control practices. The linseed crop is also cultivated as mixed with other crops. Farmers of the region often prefer to grow their old varieties and they also not adhere to the correct date of sowing of the crop. These conditions result in low productivity of liseed in this region. Other constraints to productivity is *Utera* or *Paira* cropping of linseed. This is one of the best known dry land practice of utilizing residual paddy soil moisture were tillage is difficult. Linseed is grown in about 25 per
cent of the total linseed area. Under such adverse situations, the average yield is about 150-200 kg/ha which brings down the average productivity to a great extent. The other reasons of fluctuating low production are use of poor quality seeds, non correction of secondary and micronutrient deficiencies and lack of plant protection measures. Besides the above factors, the inherent biological limitations are also responsible for low production. Oilseeds are energy-rich crops, but they are grown under energy-starved conditions. Reddy (1990) reported that one gram of glucose manufactured through photosynthesis produces 0.83 g starch, 0.40 g proteins, but only 0.32 g of fats and oils (lipids). Unless oilseed crops are provided with extra inputs particularly balanced fertilization and micronutrients, one should not expect the same level of production as in case of starch-yielding plants.

According to Tandon and Chauhan (1995), the increase in crop production is the resultant of the integrated approach of the improved technology of crop production like proper time of sowing of crop, use of high yielding suitable improved varieties, plant protection measures, use of balanced fertilizers, irrigation, maintaining optimum plant population and adopting best use of available resources.

No work has been done so far on the performance of group of high yielding improved varieties under different dates of sowing at different level of irrigation under Bundelkhand conditions. Keeping in view the above facts a trial entitled “Studies on the effect of different dates of sowing, varieties and number of irrigations on
yield attributes, yield and quality of linseed (*Linum usitatissimum* L.). The proposed investigation is therefore expected to provide adequate information which may be used profitably by linseed growers for increasing the yield, quality and profit from linseed crop in Bundelkhand of Uttar Pradesh. The trial was conducted for two years at B.N.V. College Research Farm Rath with following objectives:

1. To determine the suitable date of sowing on plant growth, seed yield and seed quality of linseed.
2. To identify a suitable variety for the production of linseed under existing agro-climatic conditions of Bundelkhand region.
3. To find out the suitable number of irrigation for linseed crop to get maximum yield.
4. To study the effect of date of sowing, varieties and irrigation on the growth, yield and quality of linseed.
5. To find out the more beneficial interaction of treatments for maximum return per hectare.
6. To evaluate the total net-monetary gain from various treatment combinations.