CHAPTER - 1

INTRODUCTION
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Edible oils form one of the basic components of food by virtue of their high nutritive content. This importance of oils and fats was recognised early in various human civilisations. However, oilcakes, a by-product of oil extraction process, given to cattle and poultry as a source of protein ever since domestication was undertaken, have been recommended for human consumption only recently. Oils and fats furnish 2.5 times more calories by weight than carbohydrates. The fatty acids in edible oils also provide the human body a medium for the transport of vitamins.

In India, oils and fats are utilised mainly as a cooking medium. Besides, they are also used as such in the manufacture of cosmetics, hair oils, lubricants, acids, paints, soaps, toileteries and varnishes and in the form of oilcakes as manure and pesticide.

Oilseeds occupy an important place in India's economy, being next to food grains as a farm commodity, accounting for about 10 per cent of 142.6 million hectares of cultivated land. Production of oilseeds in India is the third largest in the world. She ranks first in the production of groundnut and sesame but is a poor second where rapeseed-mustard and castor seed are concerned.
India accounts for a tenth of the world output of vegetable oils and fats. However, viewed in the global context, India has the dubious distinction of showing the lowest average yield inspite of having the highest acreage under oilseeds. At 736 kg, India's yield per hectare is much lower than the national averages of the other countries, including Nigeria - 1,615.38; United States - 1,474.58; Argentina - 1,153.49 and China - 1,148.55 kg/ha (Anonymous, 1983).

Until the Second World War, India was a leading exporter of oilseeds and vegetable oils, and was reasonably self-sufficient even as late as the 1960's. However, production of oilseeds has failed to keep pace with increasing domestic and industrial demands in recent years. To meet this situation, the Government has adopted the policy of imports of edible oils on a massive scale since 1977, the quantity imported during 1977 to 1983 being 0.7 to 1.2 million tonnes every year. The magnitude of the import has now reached such an alarming scale that it accounts for over a quarter of the total edible oil consumption in the country.

This recurring shortage of edible oilseeds has compelled the Government to plan a multipronged strategy for their development indigenously. This includes, breeding of high yielding varieties and introduction of non-traditional oilseeds such as soybean and sunflower; exploitation of new sources, like cotton seed and rice-bran; and of new techniques particularly
in the solvent extraction industry. In addition, more incentives and better facilities for increased productivity and procurement have been provided. Measures to check the diversion of edible oils to soap and other industries have also been adopted. Yet, the desired break-through in oilseed production, comparable to that in cereals, is still to be achieved.

Production of oilseeds fluctuates widely from year to year due to the vagaries of the weather, as only 8 per cent of the total area under oilseeds is irrigated (Anonymous, 1983). A substantial part of the rainfed area under oilseeds consists of marginal lands. Even otherwise, the farmer does not give the same weightage to oilseeds as to cereals. In fact, they are mostly grown as interculture. Use of poor quality seed diminishes productivity further. Pests cause considerable losses both at the early stage and at crop maturity. Poor post-harvest technology, lack of marketing support and of proper storage and processing facilities also have an adverse effect.

In addition, cultivation of oilseeds has been considerably neglected due to high priority accorded to cereals. As it is not possible to bring much more land under oilseed cultivation, the only alternative left is to increase the per hectare productivity. To improve the situation, high yielding varieties should be evolved and adopted. However, with the release of new varieties of crops, it becomes imperative to work out for each agro-climatic
region the precise package of farm practices to ensure full exploitation of their genetic potential as species, and even varieties, differ considerably in their requirement of inputs, including fertilisers (Millikan, 1961; Langer, 1966).

Generally, high yielding varieties of crop plants consume large amount of fertilisers. In addition, much of the soil-applied fertilisers is rendered unavailable to the plant as it grows because of many factors, including leaching, 'fixation' and decomposition. It has been reported that upto about 50 per cent of the soil-applied nitrogen remains unutilised by crop plants (Anonymous, 1971). Moreover, fixation of applied phosphorus (upto about 70 per cent) in the soil is also very common (Russell, 1950). To overcome this situation, other techniques like top-dressing are generally adopted. Similarly, foliar application of nutrients has proved very efficient and economical for crop plants (Boynton, 1954; Wittwer and Teubner, 1959; De, 1971; Afridi and Wasiuddin, 1979; Afridi, 1983). At Aligarh, considerable work has been done by Afridi, Samiullah and their associates during the last decade on various aspects of mineral nutrition of a number of crops. Research on oilseeds has yielded particularly encouraging results, specially with respect to foliar application of nutrients (Naqvi, 1976; Naqvi et al., 1977; Afridi et al., 1978a; Parvaiz, 1980; Parvaiz et al., 1982; Afridi et al., 1983; Mohammad and Samiullah, 1983; Parvaiz et al., 1983; Samiullah et al., 1983).
With the above facts in view, it was decided to undertake a more extensive varietal trial on mustard, which accounts for about 16 per cent of the edible oil production in the country (Anonymous, 1980). It was also decided to investigate ways and means to effect economy of fertilisers. Six field experiments were conducted during 'rabi' (winter) season between 1980 and 1983 to study the yield and quality characteristics of mustard with aims outlined below:

1. To select the better performing varieties of mustard (showing greater adaptability to local conditions) out of ten high yielding genotypes recommended for cultivation in Uttar Pradesh.

2. To select the optimum dose of supplemental foliar nitrogen with and without phosphorus and sulphur applied to Varuna (a locally popular variety) at two levels of basal nitrogen and phosphorus with a uniform dose of potassium.

3. To select the optimum combination of leaf-applied phosphorus and sulphur for Varuna under two basal regimes of nitrogen and phosphorus with potassium added uniformly.

4. To compare the efficacy of supplemental foliar application with top-dressing and to select their optimum combination with basal nitrogen for Varuna grown with a uniform dose of phosphorus and potassium.
5. To evaluate ten mustard varieties grown with sufficient basal nitrogen, phosphorus and potassium supplemented with the optimum dose of leaf-applied nitrogen, phosphorus and sulphur selected on the basis of Experiments 2-4.

6. To compare the response of six varieties (selected for their better performance in Experiment 1) to the optimum dose of foliar nitrogen, phosphorus and sulphur applied as supplement under two basal regimes of nitrogen and phosphorus with uniform potassium.

The statistically analysed data of these experiments and the conclusions drawn from them are discussed and presented in this thesis.