INTRODUCTION
Vegetables are regarded as an essential constituent of food, being a rich source of carbohydrates, proteins, fats, minerals and vitamins.

In India, the per capita consumption of vegetables is many times more than in the Western countries due to two main reasons; first, the vegetarian food habit of a very large population and secondly, the lower cost of the common vegetables compared with meat, fish, eggs and milk products. Compared to other crops, many vegetables can be grown throughout the year. Some of the green vegetables are ready within a short span of two months only and can be raised profitably twice or even thrice in a year.

In view of these facts and to cope with the problem of "Population Explosion", increased vegetable production should occupy a high priority in our national planning to meet the growing demand. Surprisingly, out of the total area under cultivation, not more than a mere 3 percent is under vegetable production which is totally inadequate to meet the demand. In addition, yield per hectare is also low, due to the old fashioned approach of our farmers who are reluctant to adopt new farm techniques, including the application of requisite quantities of fertilisers. In fact, the reason is not only ignorance but also paucity of funds and facilities.
There is, therefore, considerable scope, for improving yield per unit area at least where soil and climatic conditions are suitable. This could be achieved by proper implementation of policies comprising the adoption of new agricultural technologies by the farmers and a comprehensive and co-ordinated system of provision of (i) inputs (including fertilisers), (ii) credit and (iii) facilities for marketing and storage by the Government. The task of bringing about effective change is complicated by the fact that most Indian farmers are poor and possess very small holdings (smaller than two hectares).

Aligarh is located in the western part of Uttar Pradesh. This state has an area of 2,94,411 sq. km. and population of 11,08,62,013. It has taken giant strides in agricultural production during the last decade and is producing surplus wheat, pulses, oil seeds and sugar cane; but the same can not be said about vegetables other than potato (Kala, 1976). Due to high soil fertility and assured irrigation, Aligarh is well suited for vegetable production. Marketability is also not a problem on account of dense population, proximity to large cities (eg. Delhi and Agra) and good road and rail transportation facilities.

Research work on mineral nutrition of various crops carried out at Aligarh during the last two decades has received
wide recognition in botanical and agricultural circles. However, it is mainly concerned with cereals (Afridi and Samiullah, 1973 a,b; Samiullah and Afridi, 1975; Afridi et al., 1978 b, c, d; Qaseem et al., 1978; Abbas et al., 1979; Afridi et al., 1979; Ahmad et al., 1981, 1982; Inam et al., 1982 a,b; Abbas et al., 1983 a,b; Ashfaq et al., 1984 and Inam et al., 1985), medicinal and aromatic plants (Wasiuddin et al., 1979; Wasiuddin et al., 1982; Afridi et al., 1983 a; Afaq et al., 1984; Samiullah et al., 1984 and Afaq et al., 1985), oil crops (Naqvi et al., 1977; Afridi et al., 1978a; Parvaiz et al., 1982 a,b; Samiullah et al., 1982; Afridi et al., 1983b; Parvaiz et al., 1983; Samiullah et al., 1983, 1984; Mohammad et al., 1984, 1985; Samiullah et al., 1985 and Mohammad et al., 1986) and pulses (Samiullah et al., 1982; Akhtar et al., 1984; Samiullah et al., 1984, 1985 and Akhtar et al., 1986) but vegetables have not received the attention they deserve.

A critical study of available literature reveals that practically no research work on the mineral requirements of most of the vegetables grown in the region has been undertaken. It may be added, however, that some references are available on researches undertaken in other parts of India with regard to the fertiliser requirements of brinjal, cauliflower, okra, potato and tomato.
It was, therefore, considered desirable to include selected vegetables in this continuing programme of research at Aligarh. To start with, two root crops, namely radish and turnip, were selected for intensive study. Both belong to family Cruciferae, are equally popular among growers and consumers and are well suited for multiple cropping.

As vegetable crops are known to consume large quantities of fertilisers, that constitute the most costly of the inputs required for their cultivation, it is necessary to work out the precise optimum dose for each variety grown in a particular agro-climate to avoid wastage and ensure maximum productivity. It is also well established that nitrogen gives much better results through split application than when the same dose is applied only once at the time of sowing. It is, therefore, highly desirable to establish the best method of application in each case. Lastly, our past experience of the efficacy of supplemental foliar application of fertilisers for higher productivity and better quality of the crops, coupled with economy of fertilisers in some cases, makes it worth while to test its feasibility for vegetable production as very large quantities of fertilisers are generally required for traditional cultivation.

To achieve these aims, it was decided to undertake eight field trials, four on radish and four on turnip:
(1) to study the growth and yield of one popular local variety and one improved variety of each crop grown with varying nitrogen doses applied at sowing to select the better performing variety for the remaining experiments.

(2) to establish the best mode of basal nitrogen application for the better yielding variety of each crop on the basis of growth and yield.

(3) to investigate the relationship between applied nitrogen levels and NPK uptake in these experiments.

(4) to compare the performance of the better yielding variety of each crop grown with various levels of nitrogen applied by top dressing and foliar spray to establish if fertiliser economy could be achieved thereby.

For this purpose, two varieties each of radish and turnip were selected for the eight field trials planned according to standard agricultural designs. The details of each field trial are given below:

**Experiment 1.** Effect of three levels of basal nitrogen, applied at sowing, on growth, yield and NPK contents of leaf and root at three intervals in two varieties of radish namely, Local and Pusa Rashmi.
Experiment 2. Effect of three levels of basal nitrogen, applied at sowing, on growth, yield and NPK contents of leaf and root at four intervals of growth in two varieties of turnip namely, Local and Snow Ball.

Experiment 3. Effect of various levels of basal nitrogen applied in one or more splits on growth, yield and NPK contents of leaf and root at three intervals in Pusa Rashmi variety of radish.

Experiment 4. Effect of various levels of basal nitrogen, applied in one or more splits, on growth, yield and NPK contents of leaf and root at four intervals in Snow Ball variety of turnip.

Experiment 5. Effect of various levels of nitrogen, applied by top dressing or spray, on the yield characteristics of Pusa Rashmi variety of radish.

Experiment 6. Effect of various levels of nitrogen, applied by top dressing or spray, on the yield characteristics of Snow Ball variety of turnip.

Experiment 7. Effect of various levels of spray nitrogen on the yield characteristics of Pusa Rashmi variety of radish.
Experiment 8. Effect of various levels of spray nitrogen on the yield characteristics of Snow Ball variety of turnip.

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