Problematic soils in sub-humid (dry) parts of eastern U. P. comprising districts of Azamgarh, Mau western part of Ballia, northern part of Ghazipur and Bhadohi have been observed to a greater extent exaggerated. Sodic soils of this state are low in organic matter, nitrogen and available Zn content, low to medium in available P and medium to high in available potassium content.

Ballia district is a part of Azamgarh Division situated in eastern part of Uttar Pradesh. About 10 m ha land of India is degraded due to salts in varying degrees. The worst affected districts of U.P. are those located in lower valley of the Ganga-Yamuna and Ganga-Gomti Doaba with extension right up to Jaunpur and Azamgarh Districts. Huge stretches of these problem soils are lying absolutely barren. The area comprising such types of waste land of the locality is due to faulty soil in high magnitude. The management and crop practices are the main features in farming sodic soil with unproductive land. The indiscriminate use of pesticides, chemicals, and fertilizers exerts influence on adverse changes in bio chemical and physic-chemical imbalance which leads to increase in the incidence of health hazardous and unknown diseases through the toxic residues present in the edible parts.

The integrated use of organic materials and inorganic nitrogenous fertilizers has received considerable attention in the past with a hope of meeting the farmer's economic need as well as maintaining favourable ecological conditions on
long-term basis. The application of organic materials to different cropping systems and their ability to incorporate nitrogen as well as organic matter, may offer opportunities to increase and sustain productivity of cropping system. The integrated nutrient management helps to restore and sustain fertility and crop productivity. It may also help to check the emerging deficiency of nutrients other than N, P and K. Further, it brings economy and efficiency in fertilizers. The integrated nutrient management favorably affects the physical, chemical and biological properties of soils. Integrated nutrient supply involving cumulative use of fertilizers and organic sources of nutrients (Roy, 1992) assumes greater significance in India mainly due to two reasons. Firstly, the need for continuous increase in per hectare yield in cropping system requires the application of still higher amounts of nutrients than being used. Present level of fertilizer availability and economic conditions of large number of farmers do not permit applying them in quantities adequate to meet the total plant nutrient needs at the desired level of productivity. Secondly, the results of several long-term experiments in different cropping systems reveal that long-term sustainability of productivity in intensive cropping system could be achieved only through integration of inorganic and organic sources of nutrients (Singh and Yadav, 1992).

Therefore, possibility of cultivation of non edible aromatic crops on the place of traditional edible crops should be tried. This practice will not hamper the income of farmers on the one hand and health of consumers on the other hand. Keeping these facts in mind the present research programme entitled “To Study the Effect of Inorganic and Organic Sources of Nutrients on Yield and Quality of Lemon Grass (Cymbopogon flexuosus L.)” was undertaken under following main objectives:
1. To study the release pattern of nutrients under the effect of Integrated nutrient management practices.

2. To study the growth and yield attributes of lemon grass.

3. Correlation between the integrated nutrient management treatments suitable for quality based oil.

4. To assess the cost effective treatment for viable growth and quality of the effect of integrated nutrient management practices.

Considering above objectives analyses of the experimental soils was done. Field experiment was conducted for two consecutive years at Agricultural Research form Nidharia in Ballia district (U.P.) during 2007-2008 and 2008-2009 to study the effect of organic and inorganic combinations for cultivation of lemon grass.

The field had been under rice-fallow sequence for over five years. Out of field experiment Agricultural Research form of S.M.M. Town Post graduate college Ballia was also selected for profile study along with different treatments.

Soil samples were taken from soil surface and different depths of the soil profiles. On the basis of pH, ECe, and ESP soils under study have been found to be saline-sodic in nature. In all the soil samples sodium has been found to be dominant soluble cation followed by calcium, magnesium and potassium. Chloride has been found to be the dominant anion followed by bicarbonate, carbonate and sulphate. So far as exchangeable cations are concerned, exchangeable Na was the dominant cation followed by Ca and Mg in almost all the soil profiles. The gypsum requirement of the soils under study varied from 4.12 to 4.61 t ha\(^{-1}\). These soils
were found to be deficient in organic matter, available nitrogen, phosphorous and secondary nutrients such as Ca, Mg, and S.

Effect of organic and inorganic amendments on soil characteristics without transplantation of lemon grass was observed. The pH and ECE of soil treated by amendments after one month decreased whereas organic carbon, macro and micronutrients status of the soil increased.

Field experiments were conducted to study the effect of inorganic and organic sources of nutrients on yield and quality of lemon grass (Cymbopogon flexuosus L.) along with organic and inorganic amendments like farmyard manure, green leaf manure, vermi compost poultry manure and NPK for five consecutive harvestings. It was found that the cultivation of lemon grass with all the amendments and their combinations have beneficial effect on the improvement of experimental soils. The pH, ECE and ESP decreased and, organic carbon, available N, P, K, Ca, Mg, and S increased considerably by the application of all the amendments whether it was organic or inorganic. Maximum improvement in context of physico-chemical parameters and fertility status of the soil was found in lemongrass with T5 (100% N through poultry manure ha⁻¹) indicating thereby superiority of the lemongrass. In other words it can be said that all the treatments have favourable effect on the improvement of experimental soil but effect of T5 was better than all the other per treatments.

It is interesting to note that cultivation of lemon grass with all the treatments decreased the soil salinity and alkalinity when compared to initial soil. Further, lemon grass alone increased the fertility status of soil.

The maximum oil content was achieved in the 5th cutting of the crop. The percentage oil concentration was non significantly varied in the different crop
cutting the percentage oil concentration was directly related to herbage yield of lemon grass. The maximum oil content was observed in treatment T5 followed by treatment T4 and treatment T1, while as recommended dose of fertilizer through NPK as inorganic nutrient sources produced lesser amount of oil than organic nutrient sources based treatments specially poultry manure. Where sources of nutrients was organic sources Poultry manure.

The maximum output were observed in treatment T5 followed by T4, T1, T2 whereas least was observed in treatment T3. Based on the result it was concluded that input materials used for different determinants was all most same. It was only herbage yield & fertilizer cost that made a bit difference on the economics.

The least concentration of oil percentage was observed in green leaf manure based treatment.

Effect of amendments per treatment on the herbage yield was determined. It was found that all the treatments increased the herbage yield. Maximum herbage yield lemon grass increased with treatment T5. Content and uptake of N, P, K, Ca, Mg and S in plants were also determined. It was observed that application of different amendments considerably increased the content and uptake of N, P, K, Ca, Mg and S by lemon grass. Maximum increase in the uptake of N, P, K, Ca, Mg and S was observed with T5 followed by T4, T1, T2, and T3 indicating thereby superiority of T3 over all the treatments. Thus the effect of farmyard manure, green leaf manure, vermi compost, poultry manure and NPK alone or in combination was very useful in enhancing the status of N, P, K, Ca, Mg and S of soil and crops. Based on the findings of the present investigation the following results may be exploited at field scale:
• The cultivation of lemongrass for reclamation of experimental soil has better performance in improving the problem (salt-affected) soils.

• 100% N through poultry manure may be very useful in the improvement of the problem soil and enhancement of soil fertility.

• 100% N through vermicompost performed better in improve the crop yield of lemon grass & increased fertility and productivity of soil status.

Accordingly the farmers of the locality may be advised to grow lemon grass with or without amendments for reclamation of problem soils as proved by present study. The central and state governments are advised to promote and give incentives for the cultivation of lemon grass on farmer’s problem soil.