1. **INTRODUCTION**

India has a wide range of diverse agro-climatic conditions for growing different vegetables. Vegetables production in India has increased to a level of 146,554,000 metric tonnes from an area of about 84,95,000 hectares (Anonymous 2011). Among vegetables, pea and okra are two most sustainable vegetable crops grown in India. Garden Pea (*Pisum sativum*) is very common nutritious vegetable grown for both fresh and dried seed. It can be consumed either fresh, canned, pulse, frozen or in dehydrated forms. Pea being a leguminous crop fixes nitrogen symbiotically with rhizobium bacteria and thus has low nitrogen requirement (Jensen 1989). Being nitrogen fixing legume, its value has long been recognized as a soil fertility building crop. Okra, (*Abelmoschus esculentus* L.) is a multiple use crop. It is grown practically in all agro-ecological zones mainly for its immature fruits which are eaten as cooked vegetable or added to soups. The crop is cultivated widely in Uttar Pradesh, Bihar, West Bengal, Orissa, Assam, Andhra Pradesh, Karnataka and Tamil Nadu and consumed by common man in all the states. The immature fruits are used as vegetables. Dried seeds are nutritious food. It contains upto 20% protein and the fibre from okra canes is a possible paper pulp source, while the dried canes are a fuel source. In the country, pea and okra are cultivated over an area of 3,70,000 hectares and 4,98,000 hectares with an annual production of 35,17,000 metric tonnes and 57,84,000 metric tonnes, respectively (Anonymous 2011).

Himachal Pradesh has rich biodiversity and varied agro-climatic conditions which are highly suitable for growing different types of vegetables round the year. Presently, in the state pea and okra are being grown in an area of about 18,930 ha and 2,242 ha with annual production of 2,02,521 and 26,235 metric tonnes, respectively (Anonymous 2011). In economic terms, these are among the most profitable vegetable crops in the state. The productivity of pea and okra is 10.8 and 11.4 tonnes ha\(^{-1}\) in the state, respectively. To further improve their productivity, balanced plant nutrition has an imminent role, for which use of organics along with inorganic sources of nutrition can be an option.

The fertilizers have played a prominent role in increasing the productivity of crops in the country. But continuous and imbalance use of fertilizers caused deterioration of soil
health. Integrated nutrient management is in fact most important component of the production technology to sustain soil fertility and crop productivity in the future. The basic concept of integrated nutrient management system is the maintenance of plant nutrients supply to achieve a given level of crop production by optimizing the benefits from all possible sources of plant nutrients in an integrated manner, appropriate to each cropping system and farming system (Mahajan and Sharma 2005). The advantage of combining organic and inorganic sources of nutrients in integrated nutrient management has been proved superior to the use of each component separately (Palaniappan and Annadurai 2007). Organic manures improve soil physical, chemical and biological properties and thus enhance crop productivity vis-à-vis maintain soil health. Organic manures contain plant nutrients though in small quantities, in comparison to the chemical fertilizers, the presence of growth hormones and enzymes make them essential for improvement of soil fertility and productivity. In addition to this, the organic manures help in improving the use efficiency of inorganic fertilizers (Singh and Biswas 2000). Through the supply of essential micronutrients with organic manures also helps in plant metabolic activity especially in the early vigorous growth of plant (Anburani and Manivannan 2002). The organic sources available presently in the country could meet nearly 1/3rd of total nutrients required to achieve the target of agricultural production. Given, the organic resources constraint, the use of organic is supplementary rather complimentary. Therefore, integrated use of organics and inorganics is a noble system of plant nutrient use for sustaining soil health and crop productivity.

Furthermore, these vegetables grow best when the pH of mineral soils is between 6.2 and 6.8. Depending on the severity of the soil acidity, the aboveground plant growth may appear slightly stunted to very spindly. Acid soils usually have problems associated with aluminium, iron and manganese toxicity, low nutrients status, nutrients imbalance and multiple nutrient deficiencies.

Liming is a common method for raising soil pH and ameliorating phytotoxicity in acid soils. Effects of liming on soils include increased soil pH, Ca and Mg saturation, neutralization of toxic concentrations of aluminium, increase in CEC, higher absorption and hydrolysis of Ca$^{2+}$ and Mg$^{2+}$, increased P availability and improved further uptake of other nutrients by plants.
For increasing the productivity of pea and okra further and maintaining soil health, integrated nutrient management can be a better option over alone use of organics and inorganics. Negligible systematic study has so far been conducted on integrated use of fertilizers and organic manures specially vermicompost in pea-okra system in the state. Hence, an attempt was made to develop integrated nutrient management package for economical productivity of pea and okra in terms of yield, nutrient uptake and quality. Therefore, the present investigation entitled “Effect of integrated nutrient management on yield, quality and soil properties in pea - okra system in an acid Alfisol” has been formulated with the following objectives:

i. To study the effect of integrated nutrient management on yield and quality of pea and okra.

ii. To study the effect of integrated nutrient management on uptake of nutrients at different growth stages.

iii. To monitor the changes in soil properties due to integrated nutrient management.

iv. To work out the economics of the system.