Cereals form the staple food of huge population of Indian subcontinent. These include rice, wheat, maize, barley, oats and various millets. Rice-wheat is the major crop sequence in India. It occupies an area of 10 million hectares and contributes about 60 per cent of total food grain production (Anonymous, 2002). In Himachal Pradesh, rice and wheat are grown in about 50 per cent of total cropped area and accounts for 43-49 per cent of total food grain production (Anonymous, 1998). The average productivity of this cropping sequence is 1.4 t/ha, which is very low as compared to that of adjoining states i.e. Punjab (8.74 t/ha), Haryana (7.76 t/ha) and U.P. (6.3 t/ha) (Narang and Virmani, 2001). In addition to other reasons, the lower yields may also be attributed to inadequate and imbalanced use of plant nutrients as revealed by the present low nutrient consumption (N + P$_2$O$_5$ + K$_2$O) rate of 49.4 kg/ha and vitiated ratio of N : P$_2$O$_5$ : K$_2$O (4.2:1.3:1) (Anonymous, 2005). Also because of poor purchasing power, farmers of Himachal Pradesh are not in a position to pay for costly chemical fertilizers, so in general, the total requirements of the nutrients of this intensive and exhaustive cropping sequence is not met.

India accounts for 2.2 per cent of the global land and 16 per cent of world population. The greatest challenge facing mankind in the 21st century is to produce the basic necessities of food, feed, fibre, fuel and raw materials from
0.14 ha or less land per capita. The green revolution in India has increased the yields tremendously, however, it served as a mixed blessing, as on one hand ambitious use of agrochemicals boosted the food grain production and on the other, it destroyed the agricultural ecosystem. No doubt, the use of chemical fertilizers is the quickest way of boosting crop production, but their increasing prices, soil health deterioration, sustainability and pollution considerations in general have led to renewed interest in the use of organic manures. However, it is not possible to supply all the nutrient requirements of crops wholly through organic manures, so there is a need to have a relook on the issue as a whole, in which use of chemical fertilizers and organic manures is one single aspect. So integrated plant nutrient management system has been developed.

Integrated plant nutrient management system aims at achieving a harmony in the use of chemical fertilizers in conjunction with organic manures, crop residues, green manures, use of biofertilizers and other locally available nutrient sources for sustaining soil health on long term basis without any deleterious effect on soil health and environment. In India, nearly 7000 million tonnes of organic materials such as farm wastes, kitchen wastes, dairy and industry wastes are produced every year, which has a large potential for production of organic manures, be it by composting or vermicomposting (Bhaiday, 1994). There are also huge amount of unwanted weeds such as Lantana, Eupatorium, Ageratum, Parthenium etc., which contain higher levels of nutrients (Bhardwaj et al., 1988; Vasanthi and Kumarswamy, 1999), but these
have shown alarming growth and have spread very fast in cultivated lands, pastures, wastelands, along road sides, irrigation channels etc., which can otherwise be converted into useful manures by vermicomposting.

One of the fastest and effective ways to recycle these organic materials is vermicomposting by which the organic wastes can be vermistabilized into vermicompost. Vermicomposting is an eco-biotechnological process that transforms energy rich and complex organic substances into a stabilized humus like product called vermicompost. In vermicomposting, the capacity of feeding and excretion of earthworms is exploited to degrade organic materials and convert it into high grade manures i.e. vermicompost. Aristotle called earthworms “the intestine of earth” and considered them as agents to restore soil fertility. Nutrients present in worm casts are readily soluble in water and are easily available to plants. Vermicompost is rich source of macro- and micro-nutrients, vitamins, enzymes, antibodies, growth hormones and immobilized microflora (Bhawalker, 1991). Vermicompost also stimulate plant growth and help in preventing plant diseases (Szczech and Brzeski, 1994; Surekha and Rao, 2000), besides increasing the quality of produce (Singh and Rai, 1998). The egested casts can be used to improve the fertility and physical characteristics of soil and potting media. The mucus associated with the cast being hygroscopic absorbs water and prevents waterlogging and improves water holding capacity (Bansal, 2005). Moreover, vermicompost is cheap and sustains crop yield without deteriorating soil health. So vermicompost can be effectively integrated with inorganic fertilizers for enhancing rice and wheat yields in rice-wheat cropping sequence.
Keeping in view the above facts, present investigation entitled, “Studies on integrated nutrient management through vermicomposting in direct seeded Rice-Wheat sequence” has been carried out at the experimental farm of the Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur during 2003-2004 and 2004-2005, with the following objectives:

(i) To find out the suitable level of vermicompost in direct seeded rice-wheat sequence;

(ii) to find out the effect of vermicompost with different proportions of NPK fertilizers in direct seeded rice-wheat crop sequence on yield and nutrient uptake; and

(iii) to study the economics of various treatments under investigation.