INTRODUCTION

The wheat and rice crops are the major sources of food grain throughout the world. In India rice cultivated over 43.3 million ha yields 81.3 million metric tonnes, while wheat covering 26 million ha gives 69.3 million metric tonnes of grain (1996-97 data, IASRI-ICAR, 1998). The average yields of rice and wheat were 1879 and 2671 kg/ha during 1996-97. Traditionally, rice was the predominant crop in the eastern and coastal regions while wheat was grown mainly in the north-western and Indo-Gangetic plains. However, with improved irrigation facilities, improved agricultural technology, the market forces and agro-climatic suitability of the Indo-Gangetic plains for cultivation of rice, especially the scented Basmati types, the wheat-rice cropping system has gained popularity over the past about two decades and now covers more than 10 million ha. Wheat is grown during Autumn-Winter (Rabi) while rice serves as a remunerative crop in the rainy (Kharif) season. The wheat-rice cropping system, thus became profitable.

However, in many areas the factor-productivity of both the crops declined after a few years of cultivation causing great concern amongst the farmers and agricultural scientists. Various factors related to nutrients and physico-chemical aspects of soil could be responsible due to the similarity of the crops, the biomass produced and the typical cultivation practices in
rice. The two crops were previously thought to have few diseases and pests in common but over the years shifts in pest scenario have been observed. A number of weeds like, *Echioncloa* spp. and *Phalaris minor*; insect pests such as *Scirpophaga incertulus, Mythimna separata, Sesamia inferens, Cnaphelocrosis* spp., *Pyrilla perpusilla, Odontotermes*, leaf hoppers etc. and the foliar diseases became more severe. Little attention was paid to nematodes. This cropping system would provide food and moisture for a longer time during the year for nematodes capable of reproducing on both the crops. On the other hand, it might be detrimental to nematodes specific to either wheat or rice and lacking the capability to survive water-logging in rice.

In this region the wheat crop is known to be damaged by cereal, cyst, lesion, spiral, lance, stunt and ear-cockle nematodes, whereas the rice crop is mainly damaged by rice-root, lesion, spiral, lance and stunt nematodes. Until recently, it was believed that there were no common major plant-parasitic nematodes infecting both wheat and rice and therefore, the plant-parasitic nematodes were ignored in this cropping system. However, recent investigations by Gaur and his colleagues (1993-1995) have revealed that at least two species of root nematodes, *Meloidogyne triticioryzae* and *M.graminicola* are prevalent in some areas under the wheat-rice cropping system. *Meloidogyne graminicola* was earlier thought to be confined to north-east, east and southern coastal zones where it causes severe losses to
rice. *Meloidogyne triticoryzae* was described as a new species by Gaur et al. (1993a). These nematodes were found to cause losses to both wheat and rice under Delhi conditions and also were able to multiply on a number of graminaceous weeds prevalent in these crops. At present the distribution of these nematodes in north India seems to be limited. However, if not effectively controlled, there is a serious risk of their spread/growth in larger areas.

A number of chemical, physical, cultural and biological methods are known to control various plant-parasitic nematodes. However, these cannot be directly adopted given the peculiarities of the wheat-rice cropping system. Further, normally no single method of nematode control is sufficient to provide long term, practically feasible, economical and environmentally safe strategy to manage nematodes. Hence, attempts are necessary to understand the population dynamics, pathogenesis, survival and the operating biological and environmental factors and to undertake research on the development integrated nematode management strategies to suit the particular cropping system. Therefore, investigations, were undertaken within the laboratory, green-house, microplots and real fields situations with the following broad objectives:

1. To study the survival of *M.triticoryzae* in relation to soil moisture.
2. To study the population dynamics of root-knot nematodes under rice-based cropping systems.
3. To study the effect of tillage and water management on the population behaviour of root-knot nematodes in rice.

4. To study the effect of some nematicides on the population density of root-knot nematodes and performance of the rice crop.

5. To devise and test a practical and economical method for integrated management of root-knot nematodes in wheat - rice cropping system.
