6. Summary

6.1: Varietal reaction of lentil to the test nematode and fungi:

Twenty varieties of lentil (DPL-25, DPL-26, DPL-28, DPL-33, DPL-35, DPL-36, DPL-38, DPL-39, DPL-40, DPL-42, DPL-43, DPL-44, LH-88-8, DPL-47, LH-90-54, LH-90-57, LH-90-85, LH-90-103, LH-90-84 and LH-90-87) were screened for their reaction to the reniform nematode, *Rotylenchulus reniformis* and also to host specific fungi such as root-rot fungus, *Rhizoctonia solani* on lentil, using different inoculum levels. The resistance/susceptibility reaction was assessed not only on the basis of multiplication rate in case of *R. reniformis* and root-rot index in case of *R. solani*, but also on the basis of reduction in different plant growth parameters. In presence of *Rhizobium*, lentil varieties DPL-43, LH-90-57, DPL-44 and LH-90-85 were found resistant to *R. reniformis* where as LH-90-85 to *R. solani*.

In case of lentil, the root-rot fungus was found to be most damaging while the reniform nematode the least. The inoculum level of the pathogens was found directly correlated to the extent of plant damage in terms of length, fresh and dry weight of plants, pod-numbers, chlorophyll content and root-nodulation. Reproduction factor of nematode was found high at low inoculum level but reduction in growth parameters was less at low inoculum level. However, at the higher inoculum level, the reproduction factor decline sharply but plant growth was affected adversely. Nematode multiplication was increased as the inoculum level increased (Tables-1a, 2a).
The reaction of different varieties of lentil to the test pathogens was also studied in absence of *Rhizobium*. It was revealed that all the test pathogens brought about greater damage to various growth parameters. Moreover, the cultivars found resistant in presence of *Rhizobium*, showed susceptibility in absence of *Rhizobium* to varying extent (Tables-1b, 2b).

6.2: Influence of antagonistic fungi against nematode and fungi on lentil:

In a pot study, influence of some antagonistic fungi (*P. lilacinus, T. viride, A. niger, V. chlamydosporium, A. oligospora*) were assessed against *R. reniformis* singly or in combination with *R. solani* on lentil. Among all the antagonistic fungi, *P. lilacinus* was found to be highly effective followed by *T. viride, A. niger, V. chlamydosporium* and *A. oligospora* in limiting the detrimental effects of the pathogens. The different treatments were found to be more effective to *R. reniformis* than *R. solani*. As a consequence, plant growth parameters such as plant length, fresh weight, dry weight, pod number, chlorophyll content and root-nodulation improvement was observed (Tables-3a, 4a, 5a, 6a and 7a). A similar experiment was also done in the absence of *Rhizobium* (unbacterized seeds), here in this case the overall growth of plants was less, both in pathogen inoculated as well as uninoculated plants (Tables-3b, 4b, 5b, 6b and 7b).

6.3: Effect of oil-seed cakes in combination with *P. lilacinus* against nematode and fungi on lentil:

In a pot study, efficacy of different oil-seed cakes (neem, castor, mahua, mustard, sesamum, soybean, groundnut, linseed, karanj,
duan) were also evaluated against *R. reniformis* and soil-inhibiting fungi, *R. solani* on lentil. Among all oil-seed cakes, neem-seed cake was found to be highly efficacious followed by castor, mahua, mustard, sesamum, soybean, groundnut, linseed, karanj, duan in limiting the detrimental effects of the pathogens.

Highest inhibition in population of *R. reniformis* was noted in beds treated with neem-seed cake and *P. lilacinus* followed by castor, mahua, mustard, sesamum, soybean, groundnut, linseed, karanj, duan. Moreover less similar pattern was also noted in the reduction of frequency of pathogenic fungi. Frequency of saprophytic fungi increased in beds treated with oil-seed cakes and *P. lilacinus* where neem-seed cake with *P. lilacinus* gave the best results followed by castor, mahua, mustard, sesamum, soybean, groundnut, linseed, karanj, duan-seed cake (Tables-8a, 9a, 10a, 11a, 12a, 13a, 14a, 15a, 16a, 17a).

As a consequence of reduction in the population of *R. reniformis* and frequency of *R. solani*, the plant growth (length, fresh weight, dry weight, pod number, chlorophyll content and root-nodulation) of lentil improved. Moreover, there was positive correlation between the improvement in plant growth and reduction in pathogenic nematode and fungi (Tables-8a, 9a, 10a, 11a, 12a, 13a, 14a, 15a, 16a, 17a).

A similar experiment was also done in the absence of *Rhizobium* (unbacterized seeds), here in this case the overall growth of plants was less, both in pathogen inoculated as well as uninoculated plants (Tables-8b, 9b, 10b, 11b, 12b, 13b, 14b, 15b, 16b, 17b).
The effect of different treatments also persisted even after a lapse of 12 months in the next growing season when lentil was grown. The population of *R. reniformis* as well as frequency of *R. solani* could not increase as freely as in case of untreated beds, consequently improving plant growth characters. In this crop, the multiplication of nematode was below the initial population of the preceding crop in all the treatments.