5. SUMMARY

PART I: Effect of oil-seed cakes/nematicides and ploughing:

In a field study, oil-seed cakes of castor, margosa/neem, mustard, rocket-salad/duan and groundnut (peanut) and two nematicides, viz., carbofuran and aldicarb were found highly satisfactory for the control of plant parasitic nematodes commonly occurring in the experimental plot, e.g., Meloidogyne incognita, Rotylenchulus reniformis, Tylenchorhynchus brassicae, Hoplolaimus indicus, Helicotylenchus indicus and Tylenchus filiformis. However, their efficacy varied in different crops tested. But the nematicides had slight edge over the oil-seed cakes. Compost, on the other hand, failed to contain nematode multiplication in all the crops. As a consequence of reduction in the population of plant parasitic nematodes, the plant growth of tomato, eggplant and okra and yield of carrot was improved.

Deep ploughing (40 cm deep) when compared with normal ploughing (20 cm deep) was found a limiting factor against the population build-up of nematodes. The efficacy of oil-seed cakes and nematicides against nematodes was invariably enhanced when these treatments were combined with deep ploughing treatment. Plant growth/yield was significantly improved due to deep ploughing treatment when given alone or along with oil-seed cakes and nematicides.

The residual effect of oil-seed cakes and nematicides...
persisted in the field for longer durations as they remained effective against plant parasitic nematodes in the subsequent crops even after a lapse of six months.

PART 2: Effect of margosa/neem and Persian lilac/bakain:

Soil amendments with fresh floral parts and decomposed fruits, leaves and bark of margosa/neem and Persian lilac/bakain were found highly satisfactory in reducing the root-knot development caused by *Meloidogyne incognita* and populations of *Rotylenchulus reniformis* on tomato and eggplant; and *Tylenchorhynchus brassicae* on cabbage and cauliflower. These treatments also caused a significant reduction in the populations of *R. reniformis, T. brassicae, Hoplolaimus indicus, Helicotylenchus indicus* and *Tylenchus filiformis* in a naturally infested field soil around tomato and eggplant. Greatest inhibition was found in the case of amending the soil with fruits of margosa and Persian lilac. There was a significant increase in plant growth due to these treatments. The efficacy of different treatments, however, varied from nematode to nematode and also from plant to plant.

Water extracts of leaves, flowers, fruits, bark, roots and gum of margosa and Persian lilac were found highly deleterious to different nematodes, viz., *Meloidogyne incognita, Rotylenchulus reniformis, Tylenchorhynchus brassicae, Hoplolaimus indicus, Helicotylenchus indicus* and *Tylenchus filiformis*. But the
sensitivity of different nematode species was different against different extracts. The mortality of the test nematodes increased with an increase in the concentration of water extract and the exposure period. There was a linear relationship between the mortality of nematodes and the concentration of the extracts. Juvenile emergence of *Meloidogyne incognita* was also retarded by these extracts. When compared with two nematicides, viz., carbofuran and aldicarb, the crude extracts of different plant parts of margosa and Persian lilac were found equally toxic to various plant parasitic nematodes and inhibitory to the larval hatching of the root-knot nematode.

Some chemicals of margosa, e.g., azadirachtin, nimbidic acid, nimbin, kaempferol and quercetin were tested and found to be highly toxic to different nematodes, viz., *Meloidogyne incognita*, *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, *Hoplolaimus indicus*, *Helicotylenchus indicus* and *Tylenchus filiformis*. The mortality of the test nematodes increased with an increase in the concentration of the neem chemicals and the exposure period. There was a linear relationship between the mortality of nematodes and the concentration of neem chemicals. These chemicals also caused a significant inhibition in the larval hatching of *Meloidogyne incognita*. There was an increase in the inhibition of larval hatching with an increase in the concentration of neem chemicals. The toxicity of these chemicals to various plant parasitic nematodes was comparable to the toxicity of two
nematicides, viz., carbofuran and aldicarb. Similarly between the neem chemicals and the nematicides was also noted in case of inhibition in the juvenile hatching of *M. incognita*.

Bare-root dip in the leaf extracts of margosa and Persian lilac caused a significant inhibition in the penetration of the root-knot larvae and the subsequent root galling in tomato and eggplant. Both *Meloidogyne incognita* and *Rotylenchulus reniformis* significantly reduced the plant growth of tomato and eggplant but bare-root dip treatment in the leaf extracts of margosa and Persian lilac significantly checked the nematode damage to the plants by way of reducing the root-knot development and population of *Rotylenchulus reniformis*. Root galling caused by *M. incognita* and populations of *R. reniformis* were gradually decreased with an increase in the concentration of leaf extract and the duration of root-dip treatment.

Certain chemicals of neem, viz., azadirachtin, nimbidic acid and nimbin significantly inhibited the penetration of the root-knot larvae and the subsequent root galling in tomato and eggplant when used as bare-root dip treatment. *Meloidogyne incognita* and *Rotylenchulus reniformis* significantly reduced the plant growth of tomato and eggplant but bare-root dip in azadirachtin, nimbidic acid and nimbin significantly checked the nematode damage to the plants by way of reducing the root-knot development and the population of *Rotylenchulus reniformis*. 
Root galling caused by *M. incognita* and population of *R. reniformis* were gradually decreased with an increase in the concentration of neem chemicals and the root-dip duration.

PART 3: Effect of latex-bearing plants and latices:

Chopped shoots of some latex-bearing plants, viz., *Euphorbia neriifolia*, *F. tirucalli*, *Calotropis procera*, *Pedilanthes tithymaloides*, *Thevetia peruviana* and *Nerium indicum* were incorporated into the naturally infested field soil. They caused a significant reduction in the populations of *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, *Hoplolaimus indicus*, *Helicotylenchus indicus* and *Tylenchus filiformis* around tomato and eggplant. In separate experiments the above treatments also caused a significant reduction in the root-knot development caused by *Meloidogyne incognita* and populations of *R. reniformis* on tomato and eggplant; and *I. brassicae* on cabbage and cauliflower. As a consequence of the reduction in root-galling and nematode populations the plant growth was improved, highest being in case of soil treated with the chopped shoots of *F. tirucalli*.

The latices obtained from *Euphorbia neriifolia*, *F. tirucalli*, *Calotropis procera*, *Pedilanthes tithymaloides*, *Thevetia peruviana* and *Nerium indicum* brought about high percentage of kill of plant parasitic nematodes, viz., *Meloidogyne incognita*, *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, **
Hoplolaimus indicus, Helicotylenchus indicus and Tylenchus filiformis. There was a linear relationship between the mortality of nematodes and the concentration of the latices. The mortality of the test nematodes increased with an increase in the concentration of latices and the exposure period. Juvenile emergence from eggs was also inhibited significantly by all the plant latices tested. All the plant latices were found as toxic as carbofuran and aldicarb in a comparative study. Moreover, they were equally inhibitory to the larval hatching of M. incognita.

Bare-root dip in the latices of Calotropis procera, Euphorbia neriifolia and E. tirucalli inhibited the larval penetration of the root-knot nematode into the roots of tomato and eggplant. The penetration was gradually decreased with an increase in the concentration of the latices and the root-dip duration. Meloidogyne incognita, Rotylenchulus reniformis and Tylenchorhynchus brassicae significantly reduced the plant growth but bare-root dip treatment in the latices of Calotropis procera, Euphorbia neriifolia and E. tirucalli significantly checked the nematode damage to the plants by way of reducing the root-knot development and the populations of Rotylenchulus reniformis on tomato and eggplant and Tylenchorhynchus brassicae on cabbage and cauliflower. Root galling and the populations of nematodes were gradually decreased with an increase in the concentration of the latices and the duration of root-dip treatment.
PART 4: Effect of Marigolds (Tagetes spp.):

When chopped leaves, flowers and stems of *Tagetes lucida*, *I. minuta* and *I. tenuifolia* were incorporated into the naturally infested field soil they efficiently checked the population build up of *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, *Hoplolaimus indicus*, *Helicotylenchus indicus* and *Tylenchus filiformis*. In separate experiments, all the above treatments brought about a significant reduction in the root-knot development caused by *Meloidogyne incognita* and populations of *R. reniformis* on tomato and eggplant; and *I. brassicae* on cabbage and cauliflower. Soil amendment with flowers showed greatest effect against the nematodes. There was a significant increase in the plant growth of tomato, eggplant, cabbage and cauliflower due to these treatments.

Water extracts of different parts of *Tagetes lucida*, *I. minuta* and *I. tenuifolia* were found highly deleterious to different nematodes, viz., *Meloidogyne incognita*, *Rotylenchulus reniformis*, *Tylenchorhynchus brassicae*, *Hoplolaimus indicus*, *Helicotylenchus indicus* and *Tylenchus filiformis*. There was a direct relationship between the mortality of the test nematodes and the concentration of the water extracts. The mortality increased with an increase in the concentration of the extracts and the exposure period. All these extracts also arrested significantly the egg-hatch of the root-knot nematode, *Meloidogyne incognita*.
It was also noted that these extracts were by no way less nematoxic and inhibitory to larval hatching than the solutions of two test nematicides, viz., carbofuran and aldicarb.