SUMMARY

SECTION-I

Surveys were conducted for root-knot nematodes in some localities of 5 selected districts (Aligarh, Bulandshahr, Gautam Buddha Nagar, Ghaziabad and Mahamaya Nagar) of Western Uttar Pradesh. Highest incidence and intensity of root-knot disease was found in the vegetable fields of Aligarh district followed by Bulandshahr, Ghaziabad, Mahamaya Nagar and Gautam Buddha Nagar. Similarly, incidence and intensity of disease was also observed on different vegetables. Highest incidence and intensity was noticed on eggplant followed by tomato, okra, pepper, cucumber and cabbage. Three species- *M. incognita, M. javanica* and *M. arenaria* were identified to be present in the area. In these three identified species *M. incognita* and *M. javanica* were common and more frequent than *M. arenaria*. Disease intensity in terms of Gall index and egg mass index (EMI) was maximum in case of *M. incognita* and minimum in *M. arenaria*. The survey indicates that root-knot nematodes would affect the plant growth and can cause appreciable yield losses to vegetables, if suitable step will not be taken.

Application of fly ash to soil (0, 5, 10, 20, 30, 40, 50, 75 and 100% levels) changed the physico-chemical properties of the soil. The physico-chemical properties viz. pH, EC, CEC, WHC, sulphate, chloride, phosphorus and potassium were increased gradually and significantly
with the increasing levels of fly ash. While nitrogen was decreased gradually with the increasing levels of fly ash.

SECTION-II

All the levels of fly ash-extract (5, 10, 20, 30, 40, 50, 75 and 100%) significantly suppressed the hatching of *M. incognita* and *M. javanica* juveniles. Inhibition (%) in hatching of juveniles was directly proportional to the levels of fly ash-extract. As the level of fly ash increased, inhibition in hatching of both the juveniles was also increased. Similarly, all the levels of fly ash-extract were harmful to juveniles of both the nematodes. All the above levels of fly ash-extract killed the juveniles of both the nematodes. The mortality (%) was directly proportional to concentration as well as number of days increased. However, inhibition (%) in hatching and mortality (%) of juveniles was greater in *M. javanica* as compared to *M. incognita*.

Penetration of juveniles was retarded at all the levels of fly ash in roots of all the three crops (okra, cucumber and pepper). Penetration of the juveniles of both the nematodes was inversely proportion to the fly ash ratio. As the levels of the fly ash were increased, less number of juveniles of *M. incognita* and *M. javanica* were penetrated. Similarly, development of juveniles of both the nematodes was delayed and suppressed at all the levels of fly ash. At last, in fourth week none of the juveniles reached to mature female stage except at 5-10% fly ash levels. However, effect of fly ash was slightly more on *M. javanica* than *M.
incognita. Root penetration and their subsequent development were greater in okra followed by cucumber and pepper roots.

SECTION-III

Soil application of fly ash was found beneficial to all the three crops (okra, cucumber and pepper). All parameters were increased significantly up to 30% levels of fly ash, maximum being at 20% level in all the crops.

Nematode inoculated plants also showed improvement in their plant growth, yield and photosynthetic pigments under the influence of fly ash. However, in combined treatments all parameters were increased significantly from 10 to 30% levels, highest being at 20% level + nematode combination. While at 40% level, all the parameters were at par in single fly ash amended treatment or in combination with any nematode, on any crop. In rest of the combinations, nematodes effects were suppressed completely. So from 50 to 100% fly ash amended soil + nematode showed similar results as single fly ash amended treatments, however growth was slightly less than fly ash amended soil without nematode.

At the same time, development of galls, egg masses and reproduction were completely checked. Fly ash and nematodes together interacted antagonistically. The study showed that fly ash was best to the plant growth and productivity at lower level (20%) and toxic to root-knot nematodes at all the levels.
Best dose of fly ash (20%) together with different inoculum levels of nematodes (250; 500; 1,000; 2,500; 5,000 and 10,000), affected variably to growth, yield and photosynthetic pigments of all the three crops. All parameters were significantly decreased as the inoculum level increased. All parameters were found highest with best dose and low inoculum level (20% fly ash + 250 N) compared to control set. However, this dose was effective enough to kill the nematodes except in plant inoculated with highest level (10,000), where some individuals of root-knot nematodes were able to slightly affect the plant growth, yield and photosynthetic pigments. However, none of the galls or egg mass was produced. So, it can be summarized that 20% fly ash is the best dose for these crops. Because this dose is increasing the growth of plants and also managing the root-knot nematodes.