DISCUSSION
5. DISCUSSION

5.1 ROW SPACING

From the results presented in the table 1 and figure 2 it can be seen that the population density of nematodes gradually decreased as distance from the clump increased. Maximum density level of soil nematodes recorded at 20 cm depth and at 0 cm distance from the base of the clump proved that it was the more suitable zone for multiplication of nematodes than at other zones. Mehta et al. (1992) also reported this zone as "congenial" zone for nematode multiplication in sugarcane fields.

The sugarcane crop has a shallow root system, with thick dense spreading of freshly developing roots up to particular vertical distance depending on the cultivars, soil type etc. The vertical distribution of nematodes in cultivated soil is closely related to the spread of plant roots and the area adjacent to roots, i.e., the rhizosphere. Since the movement of nematode in the soil by their own activities is limited to almost a few feet per year, it is obvious that the number of plant-parasitic nematodes is always greater in soil where more plant roots develop and gradually reducing in zones with thining of plant roots. In grape vines Raski et al. (1965) reported that the largest numbers of A. index were found in the top 15-20 cm of soil where root density was greatest.

As the horizontal distance away from the sugarcane clump increased the nematodes showed a decrease in population density. The sugarcane root system provide the required nutrition for favourable multiplication and development of the nematode population by creating a suitable bio-environment for nematode activities. This incites a rapid multiplication of nematodes resulting in a concentration in the root zone near the base of clump i.e., at 0 cm distance. Such conditions have been reported
by Richard and Barker (1982) that the root distribution is the major factor influencing nematode distribution. The greater the root mass the greater the concentration of plant-parasitic nematodes and *vice versa*.

The density of nematode population varies as the distance between two rows changes. Further this is also correlated with the age of the crop. As the age of the crop advanced from first month to tenth month, the nematode population increased. This increase in population was higher at the row distance of 22.5 and 30 cm due to the rapid development of root system of crop towards the middle of the paired rows with minimum spacing the roots of both the rows meet together forming a root-matt, where the nematodes find a congenial zone for their multiplication (Mehta *et al.* 1992). At the distance of 45 and 60 cm formation of such a root matt is a delayed process. Consequently chances of nematode concentration in these distances was also lower, the population being more at the root zone. Hence, there was a significant decrease in the population density level. Also the density of plant nematodes is correlated with the distribution of the roots of present and previous crop. Reddy (1983) observed a similar fact where root mass forms the zone for multiplication of nematodes. In this investigations also nematode density was correspondingly spread out based on the density of root matt. Beyond 30 cm, concentration of nematodes recorded a reduction in number as the row spacing increased.

The nematodes are concentrated horizontally near the base of sugarcane clump and vertically at the top part of the rhizosphere. This zone serves as congenial source of food for nematodes. In addition to serving as a source of food for nematodes the rhizosphere, the zone immediately around the plant roots, is a dynamic environment, where the relationships among nematode, host and environment are
often of a chemical nature. A root exudate significantly increase the hatching of root-knot eggs (Anon, 1968).

This environment is known to be very favourable for development of all plant-parasitic nematodes by chemical exudates from a wide range of plants. A root exudate stimulates the eggs of root-knot nematodes as well as hatching of eggs of cyst nematodes and most other plant parasitic nematodes, freely in water. But in soil, plant root exudates significantly increase the hatching of root-knot nematode as compared with a water hatch (Anon, 1968) and the root exudates stimulate the metabolising of larvae after hatching and may account for their directional movement toward plant roots. The exudates also influence the moult of preadult larvae of the nematodes (Anon, 1968). In these studies also it can be noted that density of nematodes remains the maximum at rhizosphere/root zone, root exudates of sugarcane roots are probably the important factors that guide or attract or stimulate the same.

The population level of each nematode species is dependent on its ability to live successfully in the particular bio-eco system in the soil. All plant parasitic nematodes inhabit soil for varying length of time during their life cycles, for example, ecto-parasitic nematodes spend their lives completely in the soil usually in the rhizosphere of the plant. The more specialized endo-parasites enter plant tissue multiply therein and spend very little of life cycle in the soil and rhizosphere. The saprophytic nematodes found to be dispersed in the sugarcane fields, they not only found at the root zone of sugarcane but the grasses, dead organic materials were found to be the food sources of these nematodes (Throne, 1961) reported that saprophytic nematodes inhibit decaying organic materials and frequently individuals of this group comprise the greater portion of population in soil where the organic content is high.
The principal factors in the nematode soil environment i.e., the rhizosphere of soil are temperature, moisture, soil texture, aeration and chemistry of soil solution (Anon, 1968). The air/atmospheric temperature during the experimental period recorded was an average maximum of 36°C. Eventhough the atmospheric moisture is high, the soil temperature will be optimum for nematode activities, because the leaf canopy of sugarcane being very thick keeps the temperature underneath at a constant low with the accumulation of adequate moisture in the root zone serve to protect the nematode density (Mehta et al. 1992). The immediate base of the sugarcane clump form a dense shade, reducing the soil temperature, being favourable for the nematode activity and aid in rapid multiplication and survival.

Nematodes are constantly active in soils that have a moisture content between 40 and 60 per cent of field capacity. As the soil moisture increases, soil aeration decreases, so that soils become low in oxygen immediately after heavy rains, flooding, or irrigation. Individual nematodes are capable of fermentative as well as oxidative metabolism, which enables them to survive for varying periods of time without oxygen. Growth and development of nematodes which are important in determining population levels, are oxygen dependent; therefore, high populations are usually found in moist, well-aerated soil (Anon, 1968). The nematode activity increases with aeration. The air-filled pores are needed for the better survival of nematodes. Wallace (1954) reported that in moist sand, the thin film of water and air-filled pores give good aeration and induce rapid emergence of nematodes. The nematodes are reduced by excess water, lack of oxygen and toxins from anaerobic organisms. High population of only some nematodes such as species of Dolichodorus, Radopholus and Hirschmanniella survive chiefly only in wet locations (Anon, 1968), while other soil nematodes require lower water content in soil. In this experiment field
and generally in all sugarcane fields, the soil moisture is maintained regularly at field capacity. Excess or low moisture will not favour growth of a luxuriant sugarcane crop. Nematodes need free water films in the soil for their movement and development (Anon, 1968). Hence the zone of 0 cm to 30 cm form the optimum zone where the field capacity is maintained at a constant. Moving away from sugarcane clump base the moisture level gradually drops i.e., at 45 and 60 cm, as the area are not covered by the equal denseness of the clump and also are not covered by flow of irrigation water. Since the inter-relationship of soil moisture and soil texture is responsible for the aeration properties of the soil, the $O_2$ level may be the fundamental factor influencing activities of nematodes (Anon, 1968). The soil with intermediate moisture has sufficient aeration and water films for efficient nematode movement. Norton (1978) also reported similar findings, where moisture level around 40% and a little above field capacity are optimum for most soil is inhabiting phytonematodes. Hence the field capacity level at base of the clump forms the optimum zone for nematode population.

As the moisture content declines from normal, the nematodes slowly adapt to this condition and metabolic processes are slowed down to the extent that some stages of certain species become completely inactive. The nematodes also tend to move down to lower levels where there is sufficient water, but nutrition and other requirements reduces and consequently the population declines gradually at these levels (Norton, 1978).

Clay loam soil may have good crumb structure which will allow sufficient moisture and aeration (Wallace, 1965) for the reproduction and survival of soil nematodes. From these studies also it can be concluded that the nematode population density at the rhizosphere zone of the clump may be due to the crumb structure of the
clay loam soil in cultivation which allows sufficient aeration and moisture for the successful reduction and survival of soil nematodes.

5.2 CROP IRRIGATION

From the results obtained from various irrigation system trials the drip-irrigated sugarcane field showed that there was a continuous increase in the population density of soil nematode in the surface and sub-surface drip irrigation with very little fluctuation, compared to furrow irrigation which was treated as control, where wide fluctuations were noted. The higher level of population density in the surface and sub-surface drip irrigation may be due to the optimal water requirement for the nematode activities. The presence of this optimal moisture supports active life of soil nematodes which in turn speed up the feeding, locomotion and reproduction (Anon, 1968).

The importance of water for nematode activity was reported by Norton (1978) who added that water not only governs the life processes of nematodes but it is also an important medium for active migration in soil. As the reproductive rate of soil nematodes was higher, the population build up was also higher. The high moisture content in the soil for the nematode activities is supported by the report of Lee (1965) who added that active nematodes in the soil are always in water.

Barker and Sasser (1959) also suggested that infection and production of stem nematodes, *Ditylenchus dipsaci* increased at higher soil moistures. Irrigation by drip to plants is an economical method and it supports the growth of plants by supplying the water slowly and continuously to the root zone of plants. Rao *et al.* (1983) supported the view of water economy by drip irrigation and added that about 50 per cent water was saved by drip irrigation.
Nematodes feed actively on the roots of sugarcane, the movement towards the root zone being facilitated by the favourable moisture level in the root zone of the plant in the soil provided by drip irrigation. This view is similar to that of Lee (1965) who found the activity of some soil nematodes migrating to the wet end of a moisture gradient. Further he added that the larvae of *Globodera rostochiensis* are attracted to host roots against a water gradient. From this study, it can be inferred that the sugarcane nematodes identified are all attracted to the host roots towards with the water gradient.

The supply of available moisture to the root zone of the sugarcane drip irrigation may favour the quick growth of roots, because of an increase in the nutritional uptake of roots. The well established roots thus favour the nematode density, because it gives more surface area for the nematode feeding and further activities.

The reproduction of nematodes is more in the drip irrigation fields where there is a high moisture content in the developing root zone of sugarcane crop with required nutrients and favourable living conditions because of moisture. This enhances the reproductive rate of soil nematodes resulting in a continuous population density as recorded in the fields. This view of higher moisture requirement for the reproduction of nematodes was supported by Sundarababu and Muthukrishnan (1990) who reported that the nematode *X. basiri* prefers a high level of moisture condition in the soil and the response of *X. basiri* and the rate of nematode population in 100-75 per cent moisture could be attributed to be good growth of plants maintained throughout the period of this study.
Further, from the results it can be seen that the *P. zeae* was high in number compared to two other plant-parasitic nematodes viz., *H. dihystera* and *H. indicus*. The possible reason for the high number of *P. zeae* can be attributed to the fact that this species is well adapted species of sugarcane as noted by Spaull and Cadet (1990).

Roccuzzo and Ciancio (1991) studied the species composition and densities of different species of plant-parasitic nematodes in irrigation water in Southern Italy and showed that the species recorded were mainly ectoparasites and migratory endoparasites. They found *H. vulgaris*, *Merilinus brevidens*, *Pratylenchoides ritteri* and *X. index* at density levels varying from 2-35 specimens/ml of water. From these studies it can be said that the irrigation water helped in the dissemination of nematodes from one place to other place. However, this is not possible in the case of drip irrigation, because the water is directly delivered at the root zone. So if the nematodes are present in irrigation water they can gradually be concentrated in the root zone.

In these studies, sugarcane crop, the main host for all species identified provided nutrient source, which was essential for life activities. This increased the species population density. This view agreed with Sultan and Ferris (1991) who reported that in the absence of host fewer than 10 per cent of nematode *X. index* survived for 60 days even under favourable moisture conditions and in the presence of host plant population of this nematode was highest.

Das and Mukhopadhyaya (1990) suggested that an increase in the population of plant-parasitic nematodes stimulated a rise in the free-living nematodes. The root zone of drip-irrigated sugarcane, is the area of nutrient source (roots) for plant-parasitic nematodes and hence population was at higher levels in this zone. The
free living nematodes even though concentrated in the root zone of sugarcane, their presence was seen dispersed even apart from the root zone. This is because they find their nutrient sources (decomposed materials) which will be available in all places of the field (Throne, 1961).

The soil texture, of this experimental plot, being sandy clay loam soil probably provide better aeration for the activity of nematodes because of sufficient pore space in the soil and also because it forms better soil for the growth of the host plant.

Thus, in the furrow irrigation system the fluctuation in the soil moisture varies widely, resulting in the fluctuation of soil nematode population also than drip irrigation systems where the continuous moisture supply increases the soil nematode population, at a constant rate without much fluctuation at population density levels.

5.3 INTER-CROPPING AND APPLICATION OF HERBICIDES

5.3.1 INTER-CROPPING

The crops that were planted as inter-crops between rows of sugarcane proved to act as additional hosts for the nematodes. Since the nematodes are polyphagous in nature they can multiply rapidly in the presence of additional root systems of legume crops like soybean, cowpea, blackgram and greengram as intercrops in sugarcane field. However, results show a variation in the population density of nematodes of different genera in different crops.

The intercrops, in general, established a well developed root system within a short period compared to sugarcane roots. The similar finding were made by Bindra
(1970) who reported the enhancement of nematode population by inter-crops grown in citrus orchards.

It can be concluded that the intercropping will not generally help in the reduction of nematode population density, but it increases the dispersion of nematodes between host crop and inter-crop, thereby minimizing the concentration of nematode density on a particular host crop and reducing the loss on main crop. The above findings also agree with the view of Mehta (1986) who stated that inter-cropping sugarcane with wheat, soybean, cowpea and tagetes have been found to reduce nematode population density in the main crop.

5.3.2 APPLICATION OF HERBICIDES

Weeds are generally quick growing un-wanted plants with well established root system supporting a higher nematode population and help in its further dispersal. Weeds not only act as additional host for plant parasitic nematodes, but also cause a problem to agriculture by depleting the nutrient matter from the soil that is of high need for the economic crops. From the results it could be seen the nematode population was high and much dependent on the density of plant roots. In the plots where high population of weeds were recorded had higher density of nematodes. The roots of weeds tend to harbour or act as an alternate host for the nematodes. The weeds acting as a host for plant parasitic nematodes has been reported earlier by Anwar et al. (1992) who also added that roots and rhizosphere of weeds grown in fields of saffron, rice, peanut, maize, chilli, tomato, potato, okra, eggplant, banana, peach and apple supported 28 weed species and were found attacked by seven plant-parasitic nematode genera.
Sugarcane, being a luxuriant crop with high nutritional requirements, the field being well irrigated and manured aids in rapid growth of weeds. The weeds in turn acts as secondary favourable host for nematodes, resulting in a rapid build up of population density (Anwar et al. 1992).

From these studies it has been observed that the herbicides had little effect on nematode population. The nematode population was increasing at regular monthly interval, proving that herbicides had no effect on nematode population. Schmitt and Corbin (1981) have also stated that alachlor, fluchloralin and metolachlor generally enhanced nematode population, and not reduced the same. Schmitt et al. (1983) further reported that alachlor and other herbicides had a very low nematicidal effect in the soil for a short period, which in turn allow some rapid root development to occur, thus providing a greater root biomass to support further nematode population development. These studies have proved that the weedicides tested had no nematicidal properties, and so it could not control the multiplication of nematodes.

These studies proved that the effect of herbicide on the nematode population was indirect. If the weeds are controlled effectively, the nematode population also will decline due to the absence of weeds, the alternative hosts for nematodes. In the present study the herbicides were not effective in the control of weeds, which in turn supported and enhanced the population build-up of nematodes. Because of such results, applications of herbicides in zone specially where the nematode is a problem need to be taken up with a caution, herbicides applied only to such weeds which can be controlled.
5.4 BIO-FERTILIZERS

Bio-fertilizers are useful for better development of root and shoot systems of the crops. The free living bacteria viz., *Acetobacter*, *Azotobacter*, *Azospirillum* are used for the fixation of atmospheric nitrogen in the soil. Among the heterotrophic organisms, *Azotobacter* is the most important and well-known free living bacteria which plays an important role in agriculture in enriching soil nitrogen (Brown, 1962). Inoculation of soil with bio-fertilizers is effective in increasing the yields of crops by fixing atmospheric nitrogen (Subba Rao, 1977). Hence the increasing nitrogen content in the soil helps in the luxurious growth of shoot and root development of plants.

From the results presented in the chapter 4.4, it can be seen that the soil nematode population density was higher in the bio-fertilizer treated plots than in the control plots. The increase in soil nematode population may be due to the increase in nitrogen content of the soil by the activity of N$_2$ fixing agents like *Azospirillum*, *Acetobacter* and *Azotobacter*. The build up of the nematode *P. indicus* with increase in the levels of nitrogen content in the soil has already been reported by Prasad and Rao (1980). They also added that combination of potash or phosphorus either alone or in combination with nitrogen increased population build-up of *P. indicus*. Hence nitrogen and the fertilizers like potash and phosphorus which are all useful for the plant growth increases the population of nematodes.

The effect of bio-fertilizers on the build-up of soil nematode population can be said to be indirect. These nitrogen fixing agents help in the enrichment of soil nitrogen by their death. Since nitrogen is the most important macro-nutrient for the crops, its abundance in the soil accelerates the growth of shoots and roots. Plant
growth promoting effects of associative *Azospirillum* and *Azotobacter* by increasing yield of associative crops have been reviewed by Srinivasan and Naidu (1987).

The presence of large mass of roots will help in the reproduction and survival of plant parasitic nematodes which was discussed in chapter 5.1. Freckman and Mankau (1979) also found that the distribution of nematodes was closely related to food sources, i.e., root mass.

It is generally agreed that the exudation of organic compounds by roots constitute a major factor in the stimulation of microbial growth in the rhizosphere (Parkinson, 1967). The free living bacteria, *Acetobacter*, *Azospirillum* and *Azotobacter* did not have any competition with the nematodes for root invasion sites. They could spread throughout the field irrespective of root region. Hence these bacteria could proliferate throughout the plot after application. This induces better crop growth. Fertilization may increase nematode population by improved root system but crop damage is reduced due to increase in plant tolerance.

Conclusively, the bio-fertilizers enhance the root as well as shoot development. This favours the nematode population build-up. The damage caused by the nematode infestation is tolerated by the host, sugarcane crop and the toleration is due to the effect of bio-fertilizers on the enriched growth of the crop.

5.5 TRASH MULCHING

From table 6 it can be noted that all the organic amendments applied to the sugarcane field reduced the soil nematode population density when compared to the control plots. The combination of trash mulching with farm yard manure has reduced
the nematode population density equal to application of press mud and farm yard manure, combined together.

Further trash mulching alone also reduced nematode density as other organic amendments. The organic amendments applied to the soil for the control of nematodes gave delayed and better response in reducing the population of nematodes. However, no immediate effect on soil nematode population would be recorded. This can be explained by the fact that the microorganisms which are necessary for the decomposition of organic materials should multiply first. The prime nutrient source for the microorganisms was provided by the decomposition products. Burges (1967) had the similar view and reported that almost all natural organic substances, sooner or later fall into the soil. Their stay there may only be brief if they are readily decomposed by microorganisms.

The metabolites of microbes may active during decomposition of organic matter have toxic effects on soil nematodes. During the decomposition of organic amendments certain products like ammonia (Khan et al. 1979), fatty acids (Singh and Sitaramaiah, 1973), formaldehyde (Alam et al. 1977) are released. These byproducts may be toxic to nematodes. Also they not only destroy the nematode population in the soil but prevent the multiplication of the same (Singh and Sitaramaiah, 1973).

The water soluble fractions of organic amendments are effective for the inhibition of nematodes. Deshmuck and Prasad (1969) had the same opinion and stated that the water soluble fractions of the oil cakes are toxic to the larval hatch of *H.indicus*. 
The effect of trash mulching on the soil nematodes was greater in these studies because probably the specific composition of amendments obviously had a great influence on the types of microorganisms which participates in the degradation process.

Cellulose and Chitin, two important constituents of some plant residues were highly effective in reducing nematode population of citrus and root knot nematode numbers in soil (Mankau and Das, 1974). The present study supports this view. Since trash is the plant residue, it has two major cell components, cellulose and chitin. Organic materials rich in these components have more effect in the reduction of soil nematode population density. The build up of microphagous nematodes in starch, cellulose and chitin amended soils, enhanced the activity of microbes.

Conclusively, the addition of various organic materials to soil often results in a distinct suppression of plant parasitic nematodes due to

- antagonistic microbial activity
- by products of decomposition or toxic metabolites produced
- unfavourable environmental conditions
- and
- increased host vigour

With a beneficial effect on environment, both by the utilization of waste products and at the same time controlling nematode pests and there by increasing agriculture products.

**5.6 INORGANIC AND ORGANIC NEMATICIDES**
Effect of inorganic and organic amendments on the activity and survival of nematodes have been studied by many workers (Cadet et al. 1982; Kaushal and Seshadri, 1989).

Among the chemical nematicides tested, carbofuran reduced the nematode population effectively followed by phorate and aldicarb, while among organic amendments neem cake reduced the population of nematodes to the maximum per cent followed by press mud, groundnut oil cake, neem and cotton seed oil cakes (Mehta et al. 1994).

It has been observed that, the chemical nematicides gave more efficient control of nematode population density than the organic amendments for an immediate control. The chemical nematicides applied readily fumigate the soil and reduce the population density. The immediate and high reaction of chemical nematicides was already studied by Kaushal and Seshadri (1989). The sudden reduction of soil nematodes by the chemical nematicides was also supported by Cadet et al. (1982).

But the percentage of reduction in the soil nematodes population with different chemical nematicides varied in its degree. The effect of chemical nematicides in reducing the soil nematode population is dependent on its vapour pressure, molecular weight of the chemical and persistance of particular chemicals in the soil. The nematicidal properties are also effected or affected by environmental factors of soil such as soil porosity, water content, organic matter content and temperature (Jenkins and Taylor, 1967). Carbofuran is known to reduced 105.38 per cent of soil nematode population density phorate and aldicarb where reduction of soil nematode population was 86.71% and 81.63% over control respectively.
The nematode population build-up depend on the initial population of nematodes in the soil were the final population \( P_f \) is always correlated with \( P_i \) (Mehta et al. 1992). Hence in fields where \( P_i \) is higher, application of chemical nematicides would reduce the population level at period of germination and initial growth. So further population development could be prevented beyond the economic threshold level.

Application of organic amendments resulted in lower control in the nematode population when compared with chemical nematicides. This may be due to the fact that soil nematode population is only reduced when the organic amendments undergoes decomposition. The decomposition process in soil is generally slow. During the decomposition of organic materials, volatile fatty acids ammonia and hydrogen sulphide gas are released. Such gases are toxic to plant parasitic nematodes and reduces the population (Singh and Sitaramaiah, 1970). The beneficial effect of organic amendments for the control of plant parasitic nematodes differ. Their decomposition by micro-organisms has been reported by Singh and Sitaramaiah (1970).

Some amino acids may also be released during the decomposition process of the organic amendments which also inhibits the plant parasitic population by easy absorption (Yamahita and Akiya, 1968).

The organic amendments applied to the soil probably helped in build-up of predatory nematodes, fungi, bacteria etc. Consequently the increase in these organisms reduce the population of plant parasitic nematodes Singh and Sitaramaiah (1970) had reported that increase of bacteria and fungi in the fields applied with organic amendments decreased the nematode population. Further they noted that reduction of
nematode population, the organic amendments are also directly beneficial to the field crop by providing additional nutrients to the same.

For the better control of nematode population and prevention of nematode infestation integrated nematode management programmes utilizing right choice of chemicals and organic amendments are necessary (Singh and Sitaramaiah, 1970). The chemicals are effective for immediate short duration control and organic amendments for long duration. Organic amendments not only helps in the reduction of soil nematode population but also prevents the pollution created by the chemical nematicides. Regular use of organic amendments should be recommended as far as possible in controlling the soil nematodes in sugarcane fields depending on the nematode population level.

5.7 PHYSICAL PROPERTIES OF SOIL

5.7.1 pH

The pH recorded in the experimental fields ranged from 7.30 - 8.85 being basic in nature. The population of soil nematodes, their reproductive potential and survival was almost unaffected in alkaline media. This range of pH may be an important reason for the wide distribution of all the species identified. Jairajpuri et al. (1974) had also the same opinion and added that *H. indicus* has a wide range of optimum pH and their survival was unaffected in alkaline media.

5.7.2 ELECTRICAL CONDUCTIVITY (EC)

The EC value ranges from 0.80 to 1.45 in the experimental fields. This particular range of salt concentration did not affect the population build-up of soil nematodes and suitable for the survival of nematodes. Soroczan (1969) worked with
Rhabditis species and came to the conclusion that lower concentration of mineral salts were most suitable for the survival of nematodes.

5.7.3 SOIL TEXTURE

The soil texture have a determinate effect on soil nematode population density. All experimental fields have clay loam soils except trash mulched sugarcane field where it is sandy clay loam. Clay soils are heavy with fine soil fragments and the porosity, aeration were less and the water holding capacity was more compared to sandy soils. The nematode multiplication recorded in the experimental fields except trash mulched sugarcane field.

Rao and Swarup (1975) reported that the nematode, H. dihystera multiplied well on sandy loam, clay loam and loam soils in sugarcane cultivation. Srivatsava and Sethi (1984) reported that the Heterodera zeae preferred moderately light soil for reproduction and added that better aeration, available oxygen in light soils could be the possible reason for efficient multiplication, further, they added that addition of clay resulted in significant decline in reproduction of H. zeae. The present study however proved that the soil aeration was not a limiting factor for the reproduction of soil nematodes. The nematodes are adapted to survive well and reproduce both in anaerobic and aerobic conditions.

In trash mulched sugarcane fields, the population of nematodes reduced considerably. The soil texture may be one of the reasons for the control of soil nematodes. In the sandy clay loam soils, the porosity will be more compared to clay loam soil, which would help in the leaching of soil nematodes by irrigation. Moreover, the toxic gases produced during the decomposition of organic amendments could
easily and quickly pass through the soil pores and control the soil nematode population effectively.