Investigations were carried out to find the molecular characterization of root-knot nematode of Assam, morphological and morphometric variations among the populations of root-knot nematode (s) of Assam and effect of temperature on the biology (embryogenesis, penetration and multiplication) of root-knot nematode, *Meloidogyne incognita*. PCR analysis using specific primer, MiF-MiR for *M. incognita* showed that all the populations of root-knot nematode collected from nine districts (Jorhat, Golaghat, Sibsagar, Lakhimpur, Dhubri, Nagaon, Dibrugarh, Kokrajhar and Kamrup) of Assam produced a PCR product of 399bp for all the root-knot nematode isolates. A representative of four different isolates from four districts viz., Jorhat, Lakhimpur, Nagaon and Kamrup were partially sequenced. Sequenced similarity of Mi isolates from four districts showed 89 per cent to 99 per cent homology. Results of molecular characterization using RAPD primers revealed that populations of root-knot nematode of nine districts of Assam formed three clusters with a bifurcation at 0.47 similarities. The first cluster had five isolates viz., Jorhat, Sibsagar, Kokrajhar, Kamrup and Dhubri. The second cluster comprised of three isolates viz., Golaghat, Lakhimpur and Dibrugarh, while Nagaon was found to be totally different from other isolates.

Study on the morphological variations among the populations of *Meloidogyne incognita* from nine districts of Assam exhibited variations only in the tail shape, while other morphological characters showed similarities among the populations. Tail shape of second stage juveniles of *M. incognita* collected from Golaghat, Kokrajhar, Nagaon and Sibsagar district was similar in shape. Likewise, tail shape of second stage juvenile of Dibrugarh, Jorhat and Lakhimpur population showed similarity but, Dhubri and Kamrup population showed variation from other populations. No variation on perineal pattern was observed in size and shape of perineal pattern of *M. incognita* collected from nine districts of Assam. Studies on morphometric variations (body length, stylet length, lip height, lip width, MB, a, b, b’, c and c’) among the populations of *M. incognita* from nine districts of Assam showed no distinct variations in the major characters, except in MB value. MB value of Kamrup population was higher (61.79) than other populations.

Present investigation on effect of temperature on the biology (embryogenesis, penetration and multiplication) of root-knot nematode, *Meloidogyne*
incognita revealed that *M. incognita* completed embryogenesis within 4.468 days at 28°C, which was found to be the favorable temperature for embryogenesis than 31°C (5.168 days) and ambient temperature (7.645 days).

Penetration was not affected by temperature but, migration and post-penetration inside the root tissue were influenced by temperature. At 27±1°C, *M. incognita* second stage juvenile took 5 days to reach stele region followed by 31±1°C and 23±1°C (7 days) while, at 21±1°C, it took 10 days.

Multiplication of *M. incognita* was greatly affected by temperature. Maximum number of galls per root system (119.6), number of egg masses per root system (275.2), number of eggs per egg mass (343.6), final nematode population (1335.2) and reproduction factor of nematodes (2.67) was observed at 27±1°C followed by 31±1°C, 23±1°C and 21±1°C.