Plants are frequently exposed to varied environmental stresses. These unavoidable changes trigger series of alterations at cellular, biochemical and molecular levels. The primary effect of environmental stresses is the accumulation of reactive oxygen species (ROS) such as singlet oxygen ($^{1}\text{O}_2$), superoxide ($\text{O}_2^{-}$), hydrogen peroxide ($\text{H}_2\text{O}_2$) and hydroxyl radicals ($\text{OH}^{•}$). ROS affects a cell through a combination of factors. These are highly reactive with membrane lipids, proteins, carbohydrates, DNA and ultimately resulting into cell death (Mittler et al., 2004; Ahmad et al., 2008). In order to counteract the toxic effects of these oxygen intermediates and to reduce oxidative injury, plant cells and its organelles like chloroplast, mitochondria and peroxisomes employ antioxidant defence systems (Gill and Tuteja, 2010). Each of these cellular components contains more than one enzymatic activity that detoxifies a particular ROS. Oxidative damage therefore is caused due to imbalance in any of the cell compartment in the production of ROS and antioxidative defence system (Ogweno et al., 2008). The components of antioxidant defence system are enzymatic and non-enzymatic antioxidants such as: superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APOX), glutathione reductase (GR), ascorbic acid (AsA), tocopherol (Vitamin E), glutathione (GSH) and phenolic compounds (Zhang et al., 2003; Ahmad et al., 2008; Khan and Singh, 2008). Usually, ROS production is enhanced with the concomitant increase in the level of antioxidants suggesting the role of antioxidative defence system in acquisition of tolerance by plants under stress conditions (Nunez et al., 2003).

Defence in plants, in general, is thus, defined as a range of adaptations evolved which improve survival and reproduction by reducing the impact of stresses (abiotic/biotic) and is a dynamic phenomenon. In plants, defence responses are largely mediated through the accumulation of phytohormones. These phytohormones are small signalling molecules that are essential regulators of plant growth and development beginning with seed germination and culminating in whole-plant senescence. Phytohormones are also known to play a pivotal role during internal and external stimuli integration (Goverse and Bird, 2011). Until recently, it was
believed that five classes of plant compounds: auxin, abscisic acid, cytokinins, ethylene and gibberellins accounts for most or all of the growth regulatory effects of plant. However, in the past few years, new hormones have been discovered which include brassinosteroids (Clouse, 2003); jasmonic acid (Westernack, 2007); salicylic acid (Loake and Grant, 2007); strigolactones (Dun et al., 2009) and nitric oxide (Grun et al., 2006).

Brassinosteroids (BRs) are the polyhydroxylated steroid hormones with high activity. They stimulate plant growth and development and regulate a wide spectrum of physiological responses to abiotic/biotic stress conditions including seed germination, plant growth, nitrogen fixation, senescence, leaf abscission, increased yield, fruit ripening and enhanced tolerance against stresses like chilling, drought, thermal, heavy metals, pesticides, salt and diseases (fungal, viral and bacterial infection) (Vasyukova et al., 1994; Wachsman et al., 2002; Nakashita et al., 2003; Ali et al., 2007; Kagale et al., 2007; Hasan et al., 2008; Ogweno et al., 2008; Kroutil et al., 2010). Since the isolation of first representative of BRs: brassinolide (BL; a steroidal lactone), extracted from pollen grains of Brassica napus (Grove et al., 1979), 70 BRs have been identified and fully characterized (Bajguz and Tretyn, 2003). Among these, three natural brassinosteroids: Brassinolide (BL), 24-Epibrassinolide (24-EBl) and 28-Homobrassinolide (28-HBl) have significant impact on plant metabolism, growth, productivity and shows high stability under field conditions (Khripach et al., 2000). As a result, pervasive research is being undertaken to develop BRs as plant growth regulators for agricultural production (Ikekawa and Zhao, 1991; Sasse, 2003; Ozdemir et al., 2004).

Nematodes are found throughout the world. They infect almost every species of crop plant, resulting in a global loss of over $125 billion per annum (Bird and Kaloshian, 2003). Nationally, Rs 21,068.73 million crop losses have been reported due to nematode parasitism (Khan et al., 2010). The most advanced plant-parasitic nematodes are biotrophic sedentary endoparasites, which invade and migrate through the root before initiating specialised feeding cells and becoming sedentary. Among these are the root-knot nematodes (e.g. Meloidogyne species) and the cyst nematodes (e.g. Heterodera and Globodera species). The feeding structures so formed, are the
result of dramatic changes in plant gene expression and concomitant reprogramming of differentiated root cells. Since plant hormones are important factors involved in the transcriptional regulation of genes, manipulation of hormone balance is likely a means for nematodes to redirect gene expression patterns in plant cells. *Meloidogyne* species are generally the most promiscuous with respect to host range. They infest plants and results into malfunctioning in root system, reduced shoot growth and biomass accumulation, nutritional deficiencies in the foliage, chlorosis, temporary wilting, reduced photosynthesis and suppressed yields by severely affecting plant-water relations (Bird, 1974; Trudgill and Cotes, 1983; Trudgill *et al*., 1990; Smit and Vamerali, 1998; Hammond-Kosack and Jones, 2000).

Ample studies have been conducted reporting an improved plant growth and its response to oxidative stress under abiotic stress using BRs (Anuradha and Rao, 2007; Bhardwaj *et al*., 2007; Arora *et al*., 2008; Xia *et al*., 2009; Arora *et al*., 2010; Sharma *et al*., 2010; Vardhini *et al*., 2011). But, only few reports have been documented regarding the involvement of BRs in the modulations of plant response to oxidative stresses induced during biotic stress (Vasyukova *et al*., 1994; Wachsman *et al*., 2002; Nakashita *et al*., 2003; Ohri *et al*., 2004; De Vleesschauwer *et al*., 2012). Furthermore, survey of literature available reported scanty information on the effects of BRs on antioxidative defence system of host plant under nematode stress. Hence, for the present study, tomato plants were chosen to observe the effects of BRs (28-HBl; which has high biological activity due to presence of 7-oxo lactone group and hydroxyl group at 2α and 3α position of lactone ring) on their growth and antioxidative defence system for different time intervals during *M. incognita* pathogenesis.

The present study was therefore, drafted to achieve the following objectives:

1. To determine the effect of 28-Homobrassinolide on growth and development of susceptible (Pusa Ruby) and resistant (PNR-7) varieties of tomato (percentage germination of seedlings, total plant height, root and shoot length, root and shoot weight, number of galls) at different time intervals of plant growth during nematode infection.
2. Biochemical estimation of antioxidative enzymes (superoxide dismutase, catalase, ascorbate peroxidase, guaiacol peroxidase, glutathione reductase, and glutathione peroxidase) of tomato varieties at regular intervals during nematode infection under the influence of HBl.

3. Biochemical estimation of non-enzymatic antioxidants (total phenolic content, total flavonoid content, ascorbic acid content and total glutathione content) at regular intervals during nematode infection in HBl treated and untreated tomato varieties.