Evaluation of plant defence related biomolecules produced by nematophagous fungi in tomato against root-knot nematode

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The aim of this study was to evaluate the plant defence-promoting ability of various nematophagous fungi like *Arthrobotrys oligospora*, *Paecilomyces lilacinus* and Pleurotus sp. against root-knot nematode *Meloidogyne* incognita in tomato by determining the plant defence-promoting biomolecules, viz. hydrogen peroxide, superoxide dismutase, catalase, peroxidase and polyphenol oxidase. It was observed that soil application of *A. oligospora* along with farmyard manure (FYM) enhanced the activity of defence-related biomolecules from day 30 to day 60 after transplant, thereby showing its immense potential in controlling root-knot nematodes in tomatoes. The highest mean defence-related enzyme activity in plants was recorded in the treatment containing nematode-infested soil + FYM + *A. oligospora* with 97.65 enzyme unit (EU) mg^{-1} protein min^{-1} of hydrogen peroxide, 1.54 EU mg^{-1} protein min^{-1} of superoxide dismutase, 4.57 EU mg^{-1} protein min^{-1} of catalase, 9.45 EU mg^{-1} protein min^{-1} of peroxidase and 5.89 EU mg^{-1} protein min^{-1} of polyphenol oxidase. The gall production in nematode-infested soil had also reduced drastically after the application of the nematophagous fungi.

Keywords: Defence-related biomolecules, nematophagous fungi, plant defence, tomato.

goes up to 60% (ref. 2). Among various vegetable crops, tomato, which belongs to the Solanaceae family, is the most popular after potato. More than 80% of the area of tomato cultivation is in Asia and Africa, yielding about 70% of the world's tomato output[3]. In India, it was estimated that about 778,000 ha area was under tomato cultivation during 2019, producing more than 19,000 metric tonnes of fruits[1]. Tomato suffers both qualitative and quantitative yield loss caused by various pests and diseases. Among them, the root-knot nematode of tomato causes a loss of about US$ 80 billion per year[4]. Globally, it was estimated that the root-knot nematodes caused a yield loss of 27% in tomato[5]. Considering these issues, we carried out a detailed study of nematophagous fungi to evaluate their plant defence-promoting ability.

Materials and methods

Nematophagous fungal culture

The nematophagous fungal cultures, viz. *Arthrobotrys oligospora*, *Paecilomyces lilacinus* and *Pleurotus* sp. were collected from the Department of Plant Pathology,