
SHORT COMMUNICATION

First report of *Rhizoctonia* sp. causing root rot on garlic (*Allium sativum* L.) in India

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Garlic (*Allium sativum* L.) plants exhibiting root rot symptoms were observed in several fields of Vattavada Hills, Kerala, during July 2024. By morphological characteristics and nucleotide homology, the causal agent of this disease was identified as *Rhizoctonia* sp. The isolate was sequenced and deposited in NCBI GenBank. Phylogenetic analysis revealed that the isolate was grouped with reference isolates of *Rhizoctonia* sp. The pathogenicity test was carried out by inoculation, re-isolation and identification of the pathogen. This study provides the first report of the occurrence of *Rhizoctonia* sp. on garlic, causing root rot in India.

Keywords : Garlic, root rot, *Rhizoctonia* sp.

INTRODUCTION

Garlic (*Allium sativum* L.) has been used in various culinary preparations of Indian cuisines and to treat many human illnesses since ancient times. People have used all parts of the plant-including inflorescence, leaves and cloves- as a seasoning or condiment to enhance the flavour of dishes. In Kerala, India, it is produced commercially in Kanthalloor and Vattavada hills of the Western Ghats, which are the two distinct rain shadow pockets of Western ghats. During July 2024, garlic cultivated in Vattavada hills (Lat. 10.200650°, Long. 77.259244°) showed a characteristic rotting, with 30-40% incidence. Brown discolouration of the roots was noticed. The infected plants were stunted, and exhibited delayed maturity (Fig.1).

MATERIALS AND METHODS

Isolation of the pathogen from the diseased root samples was done as per standard protocols (Rangaswami and Mahadevan, 1999). The diseased root samples were collected from the

field, cleaned thoroughly to get rid of dirt, cut into small pieces, surface sterilised with 1% sodium hypochlorite for two to three minutes, and then rinsed with sterile distilled water. The samples were then placed on potato dextrose media, and incubated for five to six days at 25 °C with a relative humidity of 70% in a growth chamber. Pure cultures of the pathogen were prepared and cultural and morphological characteristics were studied.

For molecular identification, the fungal genomic DNA was extracted using a modified CTAB (Cetyl trimethyl-ammonium bromide) method. The ITS region was amplified by PCR and sequenced using primer sets ITS1 (5'-TCC GTA GGT GAA CCT GCG G-3') and ITS4 (5'-TCC TCC GCT TAT TGATAT GC-3') (White *et al.* 1990). The sequence was compared with the existing sequence of NCBI GenBank.

The pathogenicity of the fungus was tested on ten garlic plants grown in polybags. Sand-maize meal medium inoculated with *Rhizoctonia* sp. was mixed with the soil of each polybag in the 1:200 ratio, and watered regularly. The uninoculated plant was kept as control.

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Fig. 1: Typical symptoms of garlic plants infected with *Rhizoctonia* sp.

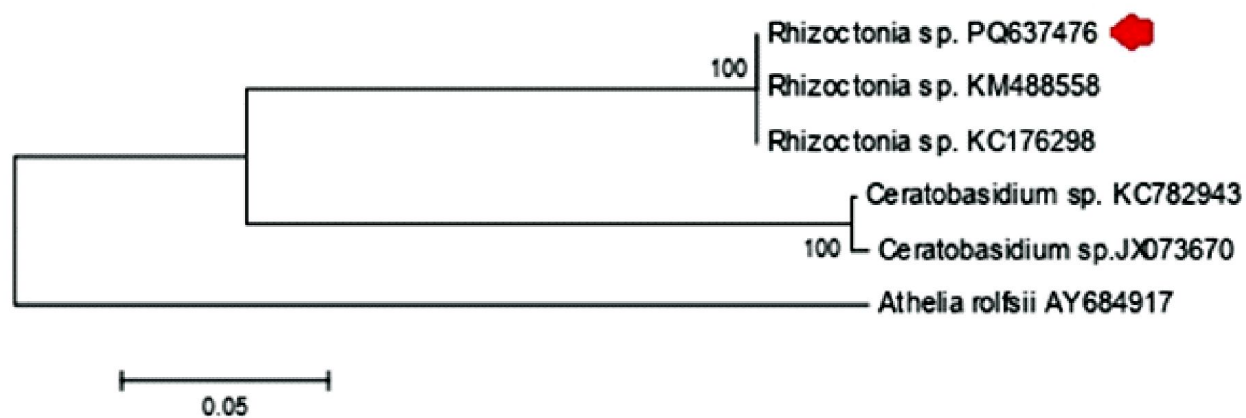


Fig. 2: Phylogenetic tree constructed using MEGA11 software by maximum likelihood method. NCBI GenBank accession numbers are given with the name. The isolate marked with red arrow was used in the study.

RESULTS AND DISCUSSION

Colonies were colourless and later turned light brown as they aged. Mycelia were branched, 5-13µm width, right angled with dolipore septum. Sclerotia were approximately 0.2-0.5mm diameter, light brown to dark brown with age.

BLASTn analysis revealed 99.69% similarity with two isolates (KC176298 and KM488558) of *Rhizoctonia* sp. in the NCBI GenBank. Based on the morphological characteristics and nucleotide homology, the pathogen was identified as *Rhizoctonia* sp. The sequence was deposited in GenBank with accession number PQ637476. The molecular phylogenetic tree was constructed using MEGA 11 to confirm the identity of the pathogen. Phylogenetic analysis also showed that the isolate was grouped with isolates belonging to *Rhizoctonia* sp. (Fig. 2).

Pathogenicity of the fungus was also proved. After ten days of inoculation, symptoms appeared in the plants, resembling those observed in the field, while the control plant remained healthy. *Rhizoctonia* sp. was reisolated from the infected plants to fulfill Koch's postulates. *R. solani* has already been reported on *A. tuberosum* in China by Shi *et al.* (2017). To our knowledge, this is the first report of *Rhizoctonia* sp. causing root rot on garlic (*A. sativum*) in India.

DECLARATION

Conflict of Interest : Authors declare no conflict of interests.

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