



Survey of Rhizospheric soil fungi on Ginger fields from Kannad Taluka, Chhatrapati Sambhajinagar District, India

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ABSTRACT

The present study conducted to investigate the soil fungal diversity of *Zingibere officinale* Rosc. in Kannad Taluka of Chhatrapati Sambhajinagar District. Rhizospheric soil collected aseptically i.e. April to December 2025. Altogether, 89 fungal species belonging to 35 different genera isolated from the rhizospheric soil of *Zingibere officinale* Rosc.. Species of *Penicillium*, *Aspergillus*, *Cladosporium*, and *Fusarium* were dominant in Rhizospheric soil in all the sampling periods.

Keywords: Fungal diversity, Rhizospheric soil fungi, *Zingiber officinale* Rosc.

INTRODUCTION

Different studies revealed that fungi are an important component of the soil microbiota constituting more of the soil biomass than bacteria, depending on soil depth and nutrient conditions (Bopaiah and Shetty, 1991). It was estimated 1.5 million fungal species are present in natural ecosystems, but only 5-10% has been described formally (Fawole and Oso, 2007). The actual number of fungi is still unknown; however, only 5-13 % of the total estimated global fungal species have been described (Hao, et al. 2019). Research on fungal diversity provides a basis for estimating the functional role of fungi in ecosystems. The unique physico-chemical and biological characteristics of the soil associated with roots, compared to the soils away from the root and root surface are responsible for the enhanced microbial diversity together with increased number and activity of microorganisms in the rhizosphere (Magurran, 2004). Therefore, rhizosphere has been stated as a hotspot of microbial activities (Olahan et al., 2015). Despite their crucial role in the transport, storage, release and recycling of nutrients and also in the development and health of a plant (Oyedele et al., 2006) and their extraordinary impacts on ecosystems, relatively little is known about them. *Zingiber officinale* Rosc. is an important commercial crop grown for its aromatic rhizomes (Oyeyiola, 2009) which are used as a spice and medicine (Raaijmakers et al (2009). India is one of the leading producer and exporter of ginger in the world. It is an important crop that earns a sizeable amount of foreign exchange for India (Raaijmakers et al., 2009). The aims of the present study were to investigate the fungal diversity of the rhizospheric and

non rhizospheric soil of *Z. officinale* Rosc. and also to determine its relationship with the various physico-chemical properties of the soil.

MATERIAL AND METHODS

Study site: The study was conducted at Kannad Taluka.

Soil sampling: Soil sampling was done for one year (2025) for the crop growing season (April – December 2025). For the purpose of rhizospheric soil sampling, the growing rhizome was uprooted and the soil adhering to the rhizome was carefully collected in sterilized polythene bag where as soil was collected from the area surrounding the rhizome.

Isolation and enumeration of fungal population: Serial dilution plate method (Saha et al., 2015) was followed for the isolation of fungi using Rose Bengal Agar medium (Sule and Oyeyiola, 2012). Three replicates were maintained for each sample. The inoculated Petri dishes were then incubated upside down at $25 \pm 1^\circ\text{C}$ for 5 days in a incubator. The number of fungal colonies was counted and the population per gram dry soil was calculated by taking into consideration of the moisture content and dilution factor.

Identification of fungal species: The fungal species were identified on the basis of their morphology and reproductive structures by consulting standard

monographs (Wahegaonkar et al., 2011; White et al (1990; Ali S, et al (2020; Johnson and Curl EA, 1972).

Diversity analysis: The number of colonies per plate in 1 g of soil was calculated. The percent contribution of each isolate was calculated by using the following formula:

$$\% \text{ Contribution} = \frac{\text{Total No. of CFU of an individual species}}{\text{Total No. of CFU of all species}}$$

*CFU-Colony forming Unit

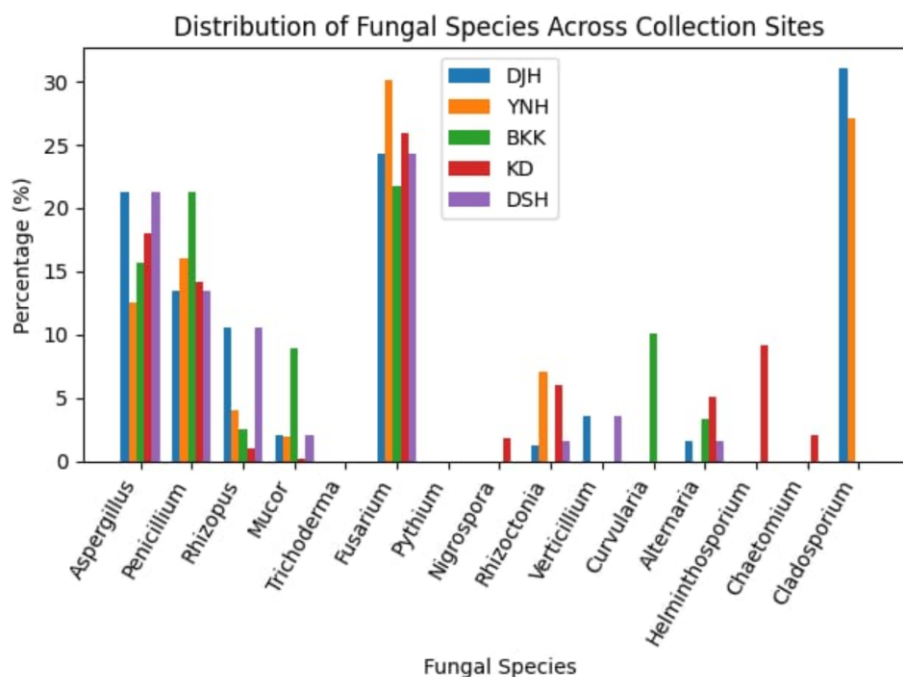
RESULT AND DISCUSSION

The present investigation revealed the diversity and distribution of rhizospheric soil fungi associated with ginger fields from different collection sites (DJH, YNH, BKK, KD and DSH) in Kannad Taluka. A total of 15 fungal species belonging to 12 genera were recorded during the survey.

Among the isolated fungi, *Fusarium* showed the **highest total occurrence (126.56%)**, indicating its dominance in the rhizospheric soil of ginger fields. It was consistently present at all sampling sites with comparatively high percentages, especially in YNH (30.15%) and KD (25.91%). The high occurrence of *Fusarium* suggests favorable soil conditions for its growth and its common association with ginger rhizosphere.

Table 1: rhizosphere soil sample table

Sr. No.	Name of Fungal Species	Collection Sites / Fields					Total %
		DJH	YNH	BKK	KD	DSH	
1	<i>Aspergillus</i>	21.25	12.56	15.65	18.07	21.25	88.78
2	<i>Penicillium</i>	13.48	16.08	21.23	14.18	13.48	78.45
3	<i>Rhizopus</i>	10.57	4.03	2.54	1.04	10.57	28.75
4	<i>Mucor</i>	2.08	2.01	8.94	0.23	2.08	15.34
5	<i>Trichoderma</i>	00	00	00	00	00	00
6	<i>Fusarium</i>	24.36	30.15	21.79	25.91	24.36	126.56
7	<i>Pythium</i>	00	00	00	00	00	00
8	<i>Nigrospora</i>	00	00	00	1.90	00	1.90
9	<i>Rhizoctonia</i>	1.26	7.04	00	6.07	1.56	15.93
10	<i>Verticillium</i>	3.63	00	00	00	3.63	7.26
11	<i>Curularia</i>	00	00	10.06	00	00	10.06
12	<i>Alternaria</i>	1.56	00	3.35	5.09	1.56	11.56
13	<i>Helmanthosporium</i>	00	00	00	9.12	00	9.12
14	<i>Chaetomium</i>	00	00	00	2.07	00	2.07
15	<i>Cladosporium</i>	31.09	27.13	00	00	00	00



Graph 1: Percentage distribution of rhizosphere soil fungal species.

The second most abundant genus was *Aspergillus*, with a **total percentage of 88.78%**, recorded from all study sites. Similarly, *Penicillium* (78.45%) was also widely distributed across the sampling locations, indicating its adaptability to different soil environments. These genera are commonly reported in agricultural soils due to their strong saprophytic nature and ability to grow under varied environmental conditions.

Moderate occurrence was observed in *Rhizopus* (28.75%) and *Mucor* (15.34%), which were present in several fields but with lower frequency compared to dominant genera. Likewise, *Rhizoctonia* (15.93%) and *Alternaria* (11.56%) were detected in a few sites, indicating their limited distribution. Some fungi showed **site-specific occurrence**. For example, *Curvularia* (10.06%) and *Helminthosporium* (9.12%) were recorded mainly in particular locations, while *Verticillium* (7.26%), *Chaetomium* (2.07%) and *Nigrospora* (1.90%) were present in very low percentages.

The genus *Cladosporium* showed comparatively high values at DJH (31.09%) and YNH (27.13%), indicating its abundance in these particular fields. On the other hand, *Trichoderma* and *Pythium* were not recorded in the present study, suggesting their absence or very low population in the sampled soils during the study period.

Overall, the results indicate that ginger rhizospheric soils of Kannad Taluka harbor diverse fungal populations dominated by *Fusarium*, *Aspergillus*, and *Penicillium*. The variation in fungal occurrence among the collection sites may be influenced by factors such as soil moisture, organic matter content, agricultural practices, and microclimatic conditions. These fungi play an important role in soil nutrient cycling, organic matter decomposition, and plant-soil interactions in ginger cultivation systems.

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Conflict of interest

The authors declare no competing interests.

Data Availability Statement: Not applicable.

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REFERENCES

- Ali S, et al (2020) Influence of soil microorganisms on the growth of ginger. *Journal of Soil Science and Plant Nutrition* 20(4): 1–12.
- Allen SE (1974) *Chemical analysis of ecological materials*. Blackwell Scientific Publications.
- Anderson JM, Ingram JSI (1993) *Tropical soil biology and fertility: A handbook of methods* (2nd ed.). CAB International.
- Barnett HL, Hunter BB (1972) *Illustrated genera of imperfect fungi*. Burgess Publishing Company.
- Bopaiah BM, Shetty HS (1991) Soil microflora and biological activities in the rhizospheres and root regions of coconut-based multistoried cropping and coconut monocropping systems. *Soil Biology and Biochemistry* 23(1): 89–94.
- Domsch KH, Gams W, Anderson TH (1980) *Compendium of soil fungi*. Academic Press.
- Ellis MB (1971) *Dematiaceous hyphomycetes*. Commonwealth Mycological Institute.
- Fawole MO, Oso BA (2007) *Laboratory manual of microbiology*. Spectrum Books Limited, p 127.
- Hao X, et al (2019) Role of soil fungi in sustainable agriculture: A review. *Agriculture, Ecosystems & Environment* 286: 106–119.
- Jackson ML (1973) *Soil chemical analysis*. Prentice Hall of India, pp 38–56.
- Johnson LF, Curl EA (1972) *Methods for research on the ecology of soil-borne plant pathogens*. Burgess Publishing Company.
- Magurran AE (2004) *Measuring biological diversity*. Blackwell Publishing.
- Martin JP (1950) Use of acid, rose Bengal, and streptomycin in the plate method for estimating soil fungi. *Soil Science* 69: 215–232.
- Olahan GS, Garba T, Ibrahim FO, Adeyemi SB (2015) Isolation and identification of fungi associated with the rhizosphere and rhizoplane of tobacco (*Nicotiana tabacum*). *Jewel Journal of Scientific Research* 3(1): 1–8.
- Oyedele DJ, Asonugbo C, Awotoye OO (2006) Heavy metals in soil and accumulation by edible vegetables after phosphate fertilizer application. *Electronic Journal of Agricultural and Food Chemistry* 5: 144–145.
- Oyeyiola GP (2009) Rhizosphere mycoflora of okra (*Hibiscus esculentus*). *Research Journal of Soil Biology* 1(1): 31–36.
- Raaijmakers JM, et al (2009) Soil microbial communities and their roles in plant health. *Annual Review of Phytopathology* 47: 1–23.
- Raaijmakers JM, Paulitz TC, Steinberg C, Alabouvette C, Moenne-Loccoz Y (2009) The rhizosphere: A playground and battlefield for soil-borne pathogens and beneficial microorganisms. *Plant and Soil* 321: 341–361.
- Saha S, et al (2015) Isolation and characterization of soil fungi from different agricultural fields. *International Journal of Current Microbiology and Applied Sciences* 4(8): 1025–1034.
- Shannon CE (1948) A mathematical theory of communication. *Bell System Technical Journal* 27: 379–423.
- Subramanian CV (1971) *Hyphomycetes: An account of Indian species, except Cercospora*. ICAR Publication.
- Sule IO, Oyeyiola GP (2012) Fungi in the rhizosphere and rhizoplane of cassava cultivar TME 419. *International Journal of Applied Biological Research* 4(1-2): 18–30.
- Wahegaonkar N, Salunkhe SM, Palsingkar PL, Shinde SY (2011) Diversity of fungi from soils of Aurangabad, Maharashtra, India. *Annals of Biological Research* 2(2): 198–205.
- White TJ, et al (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis MA, et al (eds), *PCR protocols: A guide to methods and applications*. Academic Press, pp 315–322.

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