

Germination behaviour and the fate of *Rhizopus stolonifer* in autoclaved and agricultural soil collected from Tea Ecosystem

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INTRODUCTION

Mucormycosis is a life-threatening invasive fungal infection caused by ubiquitous species under the order Mucorales of the class Zygomycetes. Species of fungi under Mucorales are mostly airborne and encountered in soil, water, decomposed plant materials, compost, and food items, including bread, rice, dry fruits, etc. Very few studies are available in the literature on the impact of soil fungistatic on the growth of Mucorales.

A *Rhizopus stolonifer* (Ehrenb: Fr) Vuill was isolated from outdoor air during a three-year survey of aeromycoflora over a residential apartment (Ananda Niketan, Anandanagar, Adabari) in the metropolitan area of Guwahati, Assam, India.

OBJECTIVE

The present work investigates the influence of sterile (autoclaved) and unsterile soil (Natural soil) on the fate and germination behaviour of spores of *R. stolonifer*.

METHODS

I. Site of the experiment: The study was carried out at the rooftop of three-storied residential apartments, Ananda Niketan, Anandanagar, Guwahati, Assam (26.1065°N, 91.5860°E). Air mycoflora was studied by the settle plate method as per Turner, 1966. The fungus was isolated and morphologically identified as per Zheng et al. (2007)

II. Source of Soil samples: Soil samples were collected from 13 different sections from a tea farm and data on soil carbon, pH, Potash, and sulfur content.

III. Germination test: As per (Dobb and Hinosan, 1953). A spore is said to be germinated if the germ tube exceeds half the diameter of a normal spore (APS, 1934)

RESULTS

❖ The fungus grows fast (2.85mm hr^{-1}) in Petri plate, initially white, later turning black due to sporulation.

❖ Natural soil inhibited 61% of the mean germination of *R. stolonifer*, while autoclaved soil caused 28% of mean inhibition ($r=+0.68$). The estimated germ tube growth rate for autoclaved and non-autoclaved soil was $166\ \mu\text{m hr}^{-1}$ and $66\ \mu\text{m hr}^{-1}$, respectively.

❖ There was a wide variation of germination among 13 different soil samples, which may be attributed to variation in soil carbon, pH, Potash, and sulfur content.

❖ Unautoclaved soil caused significant abnormality, i.e., zigzag growth of germ tube, swelling of hyphae and excessive coiling, excessive growth, etc., during growth and development.

❖ Spores of *R. stolonifer* swell and transform into a spherical body almost double the spore size before germination.

❖ The germ tube growth in natural soil under starvation becomes thin and fades away in about 72 hours.

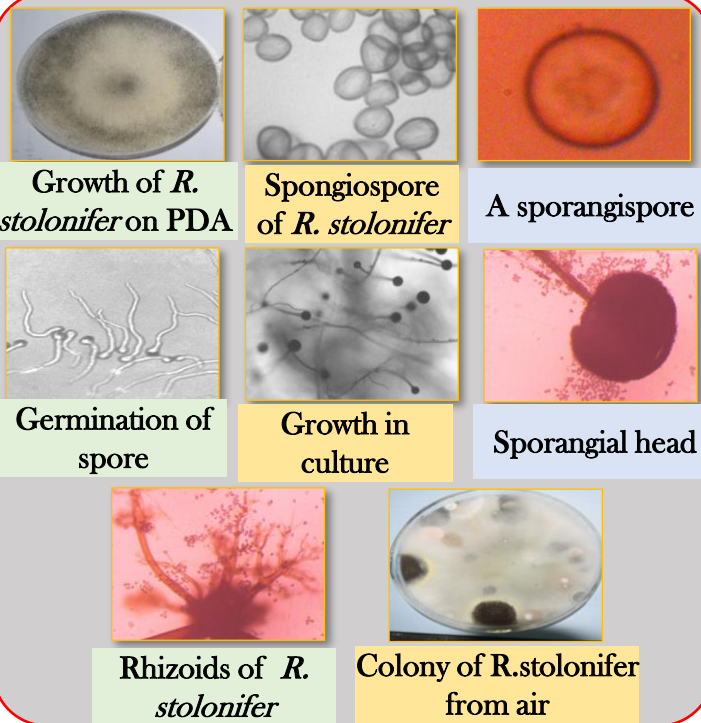


Table 1. Correlation coefficient (r) between pH, C, K, S, and germination in natural (Agricultural) soil and autoclaved soil.

| Soil types | Germination (%) | pH | Carbon (%) | Potash (mg kg^{-1}) | Sulfur (mg kg^{-1}) |
|------------|-----------------|--------|------------|--------------------------------|--------------------------------|
| Natural | 72 | -0.20 | +0.793 | +0.231 | -0.072 |
| Autoclaved | 39 | -0.226 | -0.332 | -0.009 | -0.516 |

CONCLUSION

Germination of airborne *R. stolonifera* was suppressed significantly by unsterilized soil and induced growth abnormalities. Soil pH, carbon, potash, and sulfur content have influenced germination in autoclaved and unautoclaved soil. The growth of germ tube mycelium in soil was poor with time, possibly due to a lack of soil nutrients.

REFERENCES

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