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EFFECT OF DIFFERENT TEMPERATURE AND pH AGAINST *SCLEROTIUM ROLFSII* SACC. CAUSING ROOT ROT OF GROUNDNUT

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In the present investigation, maximum mycelial growth of the *Sclerotium rolfsii* causing root rot of groundnut occurred at 30 ± 2 °C followed by 35 ± 2 °C . The fungus grew on a wide range of pH from 4 to 9 but the maximum growth of the fungus was recorded on the medium having pH value as 6.0 followed by pH 5.0.

Keywords: Groundnut; pH; Root rot; *Sclerotium rolfsii*; Temperature.

Groundnut (*Arachis hypogaea* L.) is an important *kharif* oil seed crop, which is afflicated by and several diseases caused by fungi, bacteria, viruses *etc.* posing as the major constraints in its production. The soil-borne fungal pathogens such as *Rhizopus* spp., *Penicillium* spp., *Aspergillus* spp., *Sclerotium rolfsii*, *Macrophomina phaseolina etc.*, are the most devastating pathogens which attack this crop from seedling stage to maturity and thus have been found to be the potential yield reducers for this crop[1]. The first visible characteristic symptom of root rot caused by *S. rolfsii* in the field is drooping of leaves followed by yellowing of the plant and ultimately drying leading to mortality of the seedlings of the groundnut which are very susceptible to this disease. The present investigations were undertaken to find out the effect of different temperature and pH on the growth of the *S. rolfsii,* an information which is required for developing a perfect management strategy for this disease.

Studies on different temperature effects were conducted with a view to determine the optimum range of temperature for best mycelial growth of *S. rolfsii*. The five different temperature treatments (15, 20, 25, 30 and 35 °C) were maintained in incubators before incubating the inoculated plates for mycelial growth. The observations were recorded by measuring the colony diameter of the fungus after 7 days of incubation.

The 6 different pH (4.0, 5.0, 6.0, 7.0, 8.0 and 9.0) values of the culture medium were adjusted using pH meter by adding the required amount of N/10 NaOH and HCl solution (in drops) so as to find out suitable pH for maximum growth of *S. rolfsii*. The Petri plates were inoculated with 5 mm diameter bits of pure culture (7 day old) of *S. rolfsii*. The inoculated Petri plates were incubated at 25 ± 2°C for 7 days. The data were recorded by measuring the colony diameter (mm).

Symptoms of disease include on the older plants that have woody tissues develop water soaked and brown girdles at the collar part and eventually die. Invaded tissues turn pale brown and soft but are not watery[2-3]. *S. rolfsii* survives from one season to another in the form of sclerotia and its survival rate is influenced by several factors such as soil type, temperature, moisture, proximity to a susceptible host and depth in soil.

Among the environmental factors, which influence the growth of fungi, temperature plays an important role affecting metabolic functions of all organisms including fungi. There is a minimum and maximum temperature below and above which fungus cannot grow. The optimum temperature swings between these two extremes. Results depicted in Table 1 revealed that maximum growth (86.67 mm) of the fungus occurred at 30 ± 2°C followed by 35 ± 2°C (76.67 mm) and the lowest mycelial growth at 15 ± 2°C (19.67 mm). The fungus *S.rolfsii* inciting infection in root zones on groundnut has been practically found to prefer the temperature range of 25-30°C at which it becomes more infectious on groundnut which is cultivated in the *kharif* season. The result of experiment *in vitro* corresponds well with the behaviour of the fungus observed in field conditions, where the fungus was found to become more aggressive when temperature swung between 25-30°C. Presumably, the effects of temperature are not only visible only on growth of the fungus, but also affect production of metabolites like enzymes and toxins which are essentially required for disease causation by *S. rolfsii* as root rot/wilt. These results are well supported by the earlier

Table 1. Effect of different temperature on mycelial growth of *S. rolfsii* on PDA.

S.No.	Temperature ± 2 °C	Mycelial growth in diameter (mm)*
1.	15	19.67
2.	20	39.83
3.	25	68.00
4.	30	86.67
5.	35	76.67
	SEm±	1.39
	CD at 5 %	4.37
	CD at %	6.21

* Mean of three replications

Table 2. Effect of different pH on growth of *S.rolfsii* on PDA.

S.No.	Different pH	Mycelial growth in (mm)*
1.	4	43.00
2.	5	76.67
3.	6	87.00
4.	7	71.83
5.	8	40.33
6.	9	28.67
	SEm±	1.06
	CD at 5 %	3.29
	CD at %	4.59

* Mean of three replications

work done by several workers[2,4]. Sahu and Narain[5] studied the viability of sclerotia of *S.rolfsii* by exposing them to different soil temperature and found that the sclerotia remain viable at low temperature but the higher temperature (> 70°C) proved lethal.

There is considerable evidence available which indicate that pH of the medium influences the growth of the pathogenic microorganisms. The hydrogen ion concentration (pH) governs all the enzymatic activities of the growing organisms both in natural and artificial cultural conditions. Though fungi grow over a wide range of pH, the optimum mycelial growth may differ for each species or even forms within the species of the fungi. The results presented in Table 2 indicate that the fungus grew on a wide range of pH from 4 to 9 but the maximum growth of the fungus was recorded on the medium having pH value as 6.0 (87.00 mm) followed by pH 5.0 (76.67 mm). Lowest mycelial growths was obtained at pH 9.0 (28.67 mm) and pH 8.0 (40.33 mm). It is evident from the data that optimum pH for best growth of *S. rolfsii* lies between 6 to 7.

The results indicate that the fungus did not prefer the alkaline and acidic range of the growth medium, which is indicated by the poor growth of the fungus obtained on the medium having pH 4,8 and 9. The fungus, however, showed luxuriant growth at pH 6 followed by pH 5. Similar results have been reported by Boonthong and Sommart[6]. Kulkarni and Kulkarni[7] also observed the maximum growth of the fungus at pH 6. The results, as obtained by Kanzaria and Patel[8], while working with stem rot of groundnut caused by *S.rolfsii*, showed that maximum growth of the fungus was produced at pH 6. However, they also observed that the best sclerotial formation was supported by pH 6.85 and 6.83. Das *et al*[9] concluded that the role of pH in formation of sclerotia by the fungus *S.rolfsii* was more prominent then the soil types.

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