Environment & Ecology 35 (3D) : 2598—2601, July—September 2017
Website : environmentandecology.com ISSN 0970-0420

Influence of Different Culture Media on Growth of *Sclerotium rolfsii* Causing Stem Rot of Tuberose (*Polianthes tuberosa* L.)

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Received 28 November 2016; Accepted 30 December 2016; Published online 18 January 2017

Abstract The fungus under present study attained the maximum growth (213.13 mg) on 10th day after inoculation on potato dextrose broth. The radial growth of the fungus was maximum on Oat meal agar (90 mm) and Potato dextrose agar (90 mm) these two are significantly superior over rest of the media tested. The least growth was found on Rose Bengal agar (40.88 mm). The maximum dry mycelial weight of was obtained in Corn meal broth (224.3 mg) and Potato dextrose broth (221.17 mg). Least dry mycelial weight was observed in Czapeck's dox broth (122.30 mg).

Keywords Cultural studies, *Sclerotium rolfsii*, Tuberose.

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Introduction

Tuberose (*Polianthes tuberosa* L.) is one of the most important bulbous ornamentals of tropical and subtropical areas. It is commercially cultivated for cut and loose flower trade and also for the extraction of highly valued natural flower oil. The serene beauty of the flower spike, bright snow white flowers, sweetness of blooms and delicacy of fragrance of this ornamental crop, transforms the entire area in to a nectarine and joyous one. Because of their lingering delightful fragrance and charm, they are adorned with vernacular names in India like Gulcheri, Gulshaboo (Hindi), Rajanigandha (Bengali) , Sugandharaja (Kannada), Nilasampangi (Telugu) and Nishigandha (Marathi).

Among the fungal diseases stem rot (*S. rolfsii*) is a destructive soil borne disease of economic importance. The disease occurs in *kharif* season and under severe condition losses go up to 50—60% . The pathogen *Sclerotium rolfsii* is a soil inhabitant, polyphagous and facultative parasite has an extensive host range of at least 500 species in 100 families. The most common hosts are legumes, crucifers, cucurbits and ornamental crops. In case of severe attack, no flowering shoots are obtained.

Sclerotium rolfsii Sacc. is a well known and most destructive soil borne fungus initially described by Rolfs [1] on tomato. The *Sclerotium rolfsii* is widely

distributed and causes severe damage to more than 500 crops.

Materials and Methods

Growth phase study

Twenty ml of the potato dextrose broth was dispensed into each of 150 ml conical flasks and sterilized at 1.1 kg/cm^2 for 15 minutes. Each of the flasks was inoculated with 5 mm culture disc obtained from the growing periphery of seven day old culture of the fungus grown on PDA in petri plates. The flasks were incubated at room temperature (27 ±1°C). Observations with respect to colony characters and sclerotial formation were taken every day.

The culture was filtered through Whatman No. 42 filter paper which was previously dried at 60°C for three days to obtain constant weight and weight of the fungal growth was recorded. The filter papers along with the fungal mat were then dried in the oven at 60°C for three days to obtain constant weight and then cooled in a dessicator and weighed immediately on an analytical electrical balance and the dry weight of mycelium was recorded.

Radial growtgh of *S. rolfsii* on different solid media

Growth and cultural characters of *S. rolfsii* was studied on eight different solid media viz., Corn meal agar (CMA), Oat meal agar (OMA), Saborud's agar (SA), Czapeck's dox agar (CDA), Rose Bengal agar (RBA), Richard's agar (RA), Host leaf extract agar (HLEA) and Potato dextrose agar (PDA) to identify the best media for the fungus growth. All the media were prepared using the standard method. Each petri dish was poured with 20 ml sterilized medium for solidification. Equal discs of a 5 mm in diameter of fungus obtained from the 7-day -old pre-cultured petri dishes on potato dextrose agar, were taken out with the help of a cork borer and placed at the center of each set of petri dishes containing different medium. After inoculation, Petri dishes were incubated at 27 ±1°C for seven days. The colony diameter was recorded by averaging the radial growth of the colony in two directions for each plate of the fungus. Each treatment was replicated thrice and various cultural characters viz., rate of growth, type of margin, color and sclerotial production on different media were also recorded. The data were analyzed statistically using completely randomized design.

Table 1. Mean dry mycelia weight of *Sclerotium rolfsii* on Potato dextrose broth.

Sl. No.	Days	Dry mycelia weight (mg)
1	4	143.53
2	5	154.57
3	6	160.03
4	7	176.03
5	8	182.30
6	9	191.83
7	10	213.13
8	11	213.00
	S. Em ±	0.48
	CD at 1%	2.01

Growth on liquid media

Growth and cultural characters of *S. rolfsii* was studied on eight different solid media viz., Corn meal broth (CMA), Oat meal broth (OMA) , Saboraud's broth (SA), Czapeck's dox broth (CDA), Rose Bengal broth (RBA), Richard's broth (RA), Host leaf extract broth (HLEA) and Potato dextrose broth (PDA) to identify the best media for the fungus growth. All the media were prepared using the standard method.

Twenty ml of different liquid media were added into each of 100 ml conical flasks and sterilized at1. 1 kg/cm^2 for 15 minutes. Equal discs measuring 5 mm in diameter of fungus obtained from 7-day-old pre-cultured petri dishes on Potato Dextrose Agar , were taken out with the help of a cork borer and placed in each set conical flask containing different me-

Table 2. Morphological characters of *Sclerotium rolfsii* on different solid media.

Sl. No.	Medium	Mean colony diameter (mm)	Growth	Type of margin	Colony	Sclerotial initiation	No. of Sclerotial bodies	Shape
1	Oat meal agar	90.00	Excellent	Smooth	Flat	11th day	55	Ellipsoid
2	Corn meal agar	76.13	Poor	Wavy	Flat	10th day	47	Spherical
3	Saboraud's agar	83.26	Good	Wavy	Raised	8th day	33	Ellipsoid
4	Czapeck's dox agar	78.32	Good	Wavy	Flat	7th day	10	Ellipsoid
5	Rose Bengal agar	40.88	Poor	Wavy	Flat	Nill	0	Nil
6	Richard's agar	82.50	Good	Wavy	Raised	10th day	7	Ellipsoid
7	Host leaf extract agar	80.18	Good	Smooth	Flat	7th day	12	Ellipsoid
8	Potato dextrose agar	90.00	Excellent	Smooth	Flat	10th day	60	Ellipsoid
	SEm±	0.66						
	CD at 1%	2.74						

dium. After inoculation, flasks were incubated at 27 ± 1°C for seven days and were shaken twice every day. each treatment was replicated thrice and dry mycelial weight was recorded as described earlier in the growth phase study.

Results and Discussion

Growth phase studies of *S. rolfsii* on potato dextrose broth

The results revealed that dry mycelial weight of the *Sclerotium rolfsii* was minimum on 4th day after inoculation and on subsequent harvest, it significantly increased and finally reached maximum on 10th day. Later, the dry mycelial weight started decreasing. Maximum dry mycelial weight of 23.13 mg observed on tenth day of incubation and was significantly superior to all other treatments tested (Table 1). This period was used as maximum growth period for further studies. The fungal growth was fast on Potato dextrose broth, exhibiting thick mycelial growth and formation of sclerotial bodies. It reached maximum growth on tenth day after inoculation. Growth remained static thereafter, indicating the exhaustion of nutrients from the medium. Bhagyaraj and Sirsi [2] working with an isolate of *S. rolfsii* Sacc. Observed maximum growth of the fungus within eight to ten days of incubation.

Growth on different solid media

Radial growth of *S. rolfsii* was maximum on Oat meal agar (90 mm) and Potato dextrose agar (90mm) with, smooth margin and flat colony and early sclerotial initiation i.e. on 10th day with maximum number of sclerotial bodies were observed on Oat meal agar (55) and Potato dextrose agar (60), which were ellipsoidal in shape. These two are significantly superior over rest of the media tested. This is followed by Sabouraud's agar (83.26 mm). Least growth was found in Rose Bengal agar (40.88 mm) showed poor growth with irregular margin, flat colony and sclerotial bodies were not produced (Table 2). These results are in confirmation with that of Zape et al., [3] who reported that the most suitable medium for better growth of *S. rolfsii* was Potato dextrose agar (PDA) and Malt extract agar (MEA).

Table 3. Mean dry mycelial weight *of S. rolfsii* on different liquid media.

Medium	Dry mycelial weight (mg)
Saboraud's broth	150.27
Potato dextrose broth	221.17
Corn meal broth	224.33
Czapeck's broth	122.30
Richard's broth	187.83
Rose Bengal broth	171.43
Host leaf extract broth	146.07
Oat meal broth	184.10
SEm±	0.37
CD at 1%	1.53

Growth on different liquid media

Maximum dry mycelial weight of fungus was obtained in Corn meal broth (224.3 mg) and Potato dextrose broth (221.17 mg). These were on par with each other and significantly superior over rest of the liquid media tested. These were followed by Richard's broth (187.8mg) and Oat meal broth (184.10 mg). Least mycelial weight was obtained in Czapeck's dox broth (122.30 mg) (Table 3). The results are in conformation with the findings of Basamma et al. [4] and Chaurasia et al [5] who also noticed the response of *S. rolfsii* to different media.

References

1. Rolfs PH (1892) Tomato blight. Some hints. Bull Florida Agric Exp Stn, pp 18.
2. Bagyaraj J, Sirsi M (1965) Studies on the oxalic acid synthe sis by *Sclerotium rolfsii* Sacc. Curr Sci 34 : 458—459.
3. Zape AS, Gade RM, Singh R (2013) Physiological studies on different media, pH and temperature on *Sclerotium rolfsii* isolates of soybean. Scholorly J Agric Sci 2 : 238—241.
4. Basamma, Naik K, Madhura C, Manunath L (2012) Cultural and physiological studies on *Sclerotium rolfsii* causing sclerotium wilt of potato. Int J Pl Sci 7 : 216—219.
5. Chaurasia S, Chaurasia AK, Chaurasia S (2013) Factors affecting the growth and sclerotial production in *Sclerotium rolfsii* causing foot rot of Brinal. Ind J F Appl Life Sci 3 : 73—84.