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In vitro effect of different culture media on cultural and morphological characteristics of *Sclerotium rolfsii* causing root rot of Chilli

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Abstract
Sclerotium rolfsii is one of the major constraints in the production of chilli, causing heavy quantitative as well as qualitative losses. Results revealed that all the 10 culture media tested encouraged better mycelia growth and spore production of *S rolfsii.* However, significantly highest mean mycelial growth was recorded on Potato dextrose agar (90.00 mm). The second and third best media found were Richard's agar (86.78 mm) and V_8 Juice Agar (85.72 mm). Rest of the culture media recorded radial mycelial growth in the range 42.51 mm (Soybean meal agar) to 85.30 mm (Fungal agar). All the test culture media exhibited a wide range of colony morphology. Colonies produced were mostly raised and flat with smooth and irregular margins. Sclerotial formation initiated comparatively early at 7-8 days of incubation in the media. Potato dextrose agar, Richard's agar, V_8 juice agar, Fungal agar, Chilli root extract agar (@ 10 %), Chilli stem extract agar (@ 10 %) and Conn's agar recorded excellent (++++) spore production; whereas, it was Fair (++) on Oat meal agar, Czapek's dox agar. The media Soybean meal agar recorded poor (+) spore production.

Keywords: *Sclerotium rolfsii*, mycelial growth, sporulation, culture media

Introduction
Chilli (*Capsicum annuum* L.), is an important solanaceous vegetable cum spice crop. Chilli, the native of New World of tropics and sub-tropics was introduced into India from Brazil in 16th century. Major diseases of chilli are: damping off (*Pythium* spp.), anthracnose or fruit rot or dieback (*Colletotrichum capsici*), wilt (*Fusarium oxysporum* f. sp. *solani*), leaf spots (*Xanthomonas campestris* pv. *vesicatoria*) and powdery mildew (*Leveillula taurica*), root rot (*Sclerotium rolfsii*). Among the fungal diseases, root rot complex is caused by various pathogen *viz*., *Sclerotium rolfsii*, *Fusarium* spp., *Pythium* spp. (*P. ultimum, P. aphanidermatum*), *Rhizoctonia bataticola* and *Phytophthora* spp. During recent years, the root rot complex disease has century by the Portuguese. Chilli crop suffers with many fungal, bacterial, viral and mycoplasmal diseases attained serious proportion causing the economic losses in chilli (Kalmesh and Gurjar, 2001) [4]. Of the pathogens associated, *Fusarium solani*, *S. rolfsii*, *Pythium* spp. and *Rhizoctonia bataticola* were reported to cause losses to the tunes of 35-50%,60-80%, 34-65% and 50-60%, respectively (Rashad *et al.*, 2012, Kalmesh and Gurjar, 2001; Madhavi *et al.*, 2006; Muthukumar *et al.*, 2010) [8, 4, 6, 7]. Therefore, keeping in view importance of the chilli crop and economic importance of the root rot of chilli, present studies were undertaken at Department of Plant Pathology, College of Agriculture, VNMKV, Parbhani

Materials and Methods
A total of 10 culture media (Table 1) *viz.,* Potato dextrose agar, Oat meal agar, Richard's agar, Conn's agar, Soybean meal agar, Fungal agar, V_8 Juice agar, Czapek's dox agar, Chilli root extract agar (@ 10 %) and Chilli stem extract agar (@ 10 %) were used to study their effect on growth and spore production of *S. rolfsii.* The experiment was conducted applying CRD design with ten treatments and three replications.
Autoclaved and cooled media were poured (@ 20 ml/plate) in sterilized glass Petri plates (90 mm dia.) and allowed to solidify at room temperature. On solidification of the media, Petri plates of each culture medium (five plates/medium/replication) were inoculated by placing in the centre 5 mm mycelial disc of actively growing 7 days old pure culture of *S. rolfsii*. Each culture medium was replicated thrice. Plates were incubated at room temperature (27 ± 1^0C).
The observations on radial mycelial growth/colony diameter (mm), colony color and colony morphology and sporulation were recorded at a week of incubation and number of Spore/microscopic field (stereobinocular microscope) was recorded at two weeks of incubation

Results and Discussion

Cultural characteristics *viz*., mycelium, colony growth, colony elevation, colony colour and sporulation of *S. rolfsii* were studied *in vitro* on ten culture media and result obtained are presented in table.

Mycelial growth

The mycelia growth/colony diameter of *S. rolfsii* was recorded on the test media was ranged from 42.51 mm (Soybean meal agar) to 90.00 mm (PDA). However, significantly highest mean mycelial growth (90.00 mm) was recorded on PDA. The second and third best media were Richard's agar (86.78 mm) and V_8 Juice agar (85.72 mm). This was followed by the media *viz.*, Fungal agar (85.30 mm), Chilli root extract agar (75.75 mm), Conn's agar (75.35 mm), Chilli stem extract agar (74.25 mm), Oat meal agar (68.56 mm) and Czapek's dox agar (66.80 mm). Whereas, Soybean meal agar was found less suitable with minimum mycelial growth (42.51 mm) of *S. rolfsii*.

Colony characteristics and sporulation

All the test culture media exhibited a wide range of colony morphology. Colonies produced were mostly raised and flat with smooth and irregular margins. Sclerotial formation initiated comparatively early at 7-8 days of incubation in the media *viz.*, PDA, Oat meal agar,V_8 Juice Agar, Czapek's dox agar and Chilli root extract agar with excellent (++++) sporulation ; whereas, it was delayed (9-10 days) on rest of the culture media tested. While fair (++) sporulation was exhibited by Czapek's dox and Oat meal agar. However, poor (+) sporulation was recorded on Soybean meal agar.

Table 1: Effect of culture media on growth, cultural characteristics and sporulation of *S. rolfsii*

Tr. No.	Culture media	Col. Dia. (mm)	Cultural characteristics	Sclerotial Production
T_1	PDA	90.00	Smooth margin, raised colony, Sclerotial initiation on 7th day. Spherical, dark brown sclerotia	++++
T_2	Oat meal agar	68.56	Smooth margin, raised colony, sclerotial initiation on 8th day. Ellipsoidal brown sclerotia	++
T_3	Richard's agar	86.78	Smooth margin, raised colony, ellipsoidal, and brown Sclerotia. Sclerotial initiation on 10th day	++++
T_4	Conn's agar	75.35	Margin smooth, flat colony, sclerotial initiation on 9th day. Spherical and dark brown sclerotia	++++
T_5	Soybean meal agar	42.51	Margin smooth and flat colony, sclerotial initiation on 9th day. sclerotia ellipsoidal and brown	+
T_6	Fungal agar	85.30	Smooth margin, flat colony, sclerotial initiation on 9th day. Spherical and dark brown sclerotia	++++
T_7	V_8 Juice Agar	85.72	Smooth margin, flat colony, sclerorial initiation on 8th day, spherical sclerotia	++++
T_8	Czapek's dox Agar	66.80	Smooth margin, flat colony. Sclerotial initiation on 8th day Sclerotia spherical and brown	++
T_9	Chilli root extract agar (@ 10 %)	75.76	Smooth margin, sparse mycelium, spherical and sclerotia dark brown.Sclerotial initiation on 8th day.	++++
T_{10}	Chilli stem extract agar (@ 10 %)	74.25	Irregular margin, with sub spherical sclerotia. Sclerotial initiation on 10 th day.	++++
	SE ±	0.31	--	--
	C.D. (P=0.05)	0.92	--	--

* Mean of three replications ++++: Excellent, +++: Good, ++: Fair, +: poor

Results revealed that the media *viz.*, Potato dextrose agar was found most suitable to *S. rolfsii* in present study were also reported excellent for growth and sporulation of *S. rolfsii* earlier by several workers (Gupta *et al*., 2002; Singh *et al*., 2005; Jadon and Tiwari, 2011). The results obtained in present study on suitability of the culture media *viz*., Richard's and V_8 Juice agar, to *S. rolfsii* are in consonance with the reports of earlier workers. (Gupta and Sharma, 2004; Kumar *et al*., 2008).

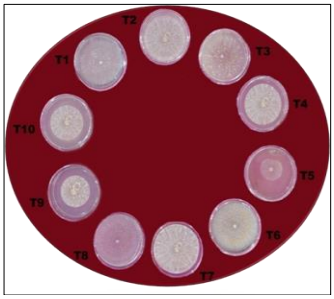

Fig 1: Effect of various culture media on mycelial growth of *S. rolfsii*

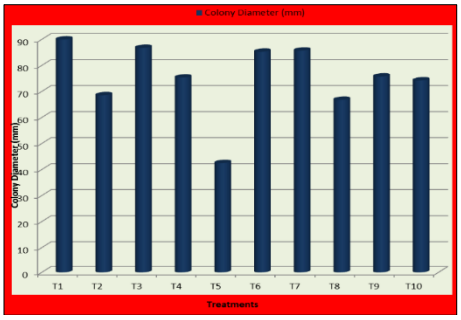

Fig 1: Effect of culture media on growth of *S. rolfsii*

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