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Morphological and cultural characteristics of *Alternaria polianthi*

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Abstract

The present investigation revealed that all the eight culture media tested showed better growth and variable sporulation of *Alternaria polianthi*. The mean colony diameter/mycelial growth recorded with all test media was ranged between 4.80 cm (Soybean casein agar) to 8.13 cm (Malt extract agar). The radial growth of *Alternaria polianthi* was maximum on Malt extract agar (8.13 cm) which was at par with Potato dextrose agar (7.43 cm), Yeast dextrose agar (7.43 cm), Sabouraud's Dextrose Agar (7.33 cm), Oatmeal agar (6.97 cm) and Czapek's agar (6.80 cm). The growth reported in Richard's agar medium was 5.30 cm. While, least growth was observed in Soybean casein agar medium (4.80 cm). The mycelium was creamy to ashy white in most of media except in case of Richard's agar, where mycelium showed dull white to green growth. Whereas, in case of Czapek's dox agar, the mycelium showed dull white to indigo growth. Potato dextrose agar, Malt extract agar and Oat meal agar recorded good sporulation (+++).

Keywords: Richard's agar, Sporulation, *Alternaria polianthi*, growth characters

Introduction

Alternaria polianthi is one of the important plant pathogenic microorganisms of the bulbous ornamental crop tuberose. Tuberose leaves and peduncle are heavily attacked by this pathogen. It produces red brown spots with faint concentric rings on the midrib and margins of the leaf. Dark brown spots of 10-50 mm in length appear on the peduncle. Infection leads to drying up of affected parts. The spots begin as brown specks and grow into a circular to oval form with a diameter of 4-5 mm and a length of 10-30 mm. The number of spots on each leaf vary from one to ten and spots frequently became larger and coalesce into bigger patches. In India, leaf blight of tuberose incited by *Alternaria polianthi* was first reported from the locality of Coimbatore (Mariappan *et al.*, 1977)^[7] and in succeeding period once again from same state, Tamil Nadu (Muthukumar *et al.*, 2007)^[8]. The Fungus produces conidia for reproduction. Tuberose crop planted in June 2020 in Pune exhibited typical symptoms of leaf blight of tuberose. The possible aetiology of *Alternaria* infection was suggested by the symptoms. Morphological characterization of infected leaves was carried out to validate the aetiology, demonstrating the typical signs of infection with *Alternaria*.

Materials and Methods

Present investigations were carried out during 2020-2021 in the Department of Plant Pathology and Agricultural microbiology, College of Agriculture, Pune-05 and field experiments were carried out at Zonal Agricultural Research Station, Ganeshkhind, Pune.

Cultural and Morphological Studies

Morphological Studies

The morphological characteristics *viz.* size, shape, colour of conidia, number of transverse and longitudinal septa were recorded. The size of conidia was measured by using ocular micrometer (calibrated using stage micrometer) under the compound microscope at 400X magnification.

Cultural studies

The cultural characters of *Alternaria polianthi* were studied on six non-synthetic/semi-synthetic and two synthetic solid media. The non-synthetic/semi-synthetic media *viz.* Potato dextrose agar, Oatmeal agar, Malt extract agar, Sabouraud's dextrose agar, Yeast dextrose agar, Soybean casein agar and synthetic media *viz.* Richard's agar, Czapek's agar were used.

All media were sterilized at 1.054 Kg/cm² pressure at 121 °C for fifteen minutes. To carry out the study, 20 ml of each of medium was dispensed in 90 mm petri plates. Such petri plates were inoculated with 5 mm disc cut from periphery of actively growing culture and incubated at 27±1 °C. Each treatment was replicated thrice. Observations were taken after seven days of incubation. The colony diameter was recorded. The fungal colony colour, margin and sporulations were also recorded. The data on radial fungal growth was assessed statistically. The composition and preparation of the above mentioned synthetic and non-synthetic or semi-synthetic media was taken from 'Ainsworth and Bisby's Dictionary of the Fungi' by Ainsworth (1967) and 'Plant pathological methods: fungi and bacteria' by Tuite (1969) [9].

Pathogen	Conidia					
	Shape	Colour	Size		Septation	
			Range(μ)	Average(μ)	Horizontal	Vertical
<i>Alternaria polianthi</i>	Clavate	Brown	25.25-76.75 μ X 6.32-19.13 μ	58.78 X 12.33 μ	3-6	1-2



Plate 1: Microscopic observations of pathogen

Morphology of the fungus in respect of septate mycelium, conidia, conidiophores and their dimensions reported in present studies are in conformity with findings of Mariappan *et al.* (1977) [7] who reported that *Alternaria polianthi* produces mycelium, which is septate, branched; conidiophores septate, brown to olivaceous and geniculate; conidia brown single, clavate, with long beak, 3-7 horizontal septa and 1-2 vertical septa.

Cultural Studies

Growth Characters on Different Solid Media

Cultural characteristics *viz.* mycelial growth, colony diameter and sporulation of *Alternaria polianthi* were studied *in vitro* using eight culture media and the results obtained are presented in Table 1 and depicted in PLATE 2 and Fig 1.

Mycelial Growth

The results presented in Table 1, Fig 1 and PLATE 2 revealed that all the eight culture media tested showed better growth and variable sporulation of *Alternaria polianthi*. The mean colony diameter /mycelial growth recorded with all test media was ranged from 4.80 cm (Soybean casein agar) to 8.13 cm (Malt extract agar).

The radial growth of *Alternaria polianthi* was maximum on Malt extract agar (8.13 cm) which was at par with Potato dextrose agar (7.43 cm), Yeast dextrose agar (7.43 cm), Sabouraud's Dextrose Agar (7.33 cm), Oatmeal agar (6.97 cm), Czapek's agar (6.80 cm). The growth reported in

Results and Discussion

Morphological Studies

The temporary slide mounts were prepared in lactophenol with spores of pathogen. Then, they were observed under high power (400X) microscope and measured using ocular micrometer. The morphological characters of *Alternaria polianthi* are depicted below.

The mycelium was septate, branched, olivaceous to brown; conidiophores septate, brown to olivaceous and geniculate; conidia brown single, clavate with a long beak, 3-6 horizontal septa and 1-2 vertical septa; conidia (with beak) measured 25.25-76.75 μ X 6.32-19.13 μ with a mean of 58.78 X 12.33 μ.

Richard's agar medium was 5.30 cm. While, least growth was observed in Soybean casein agar medium (4.80 cm).

Growth Characteristics

Growth characters of *Alternaria polianthi* studied in different solid media indicated that Malt extract agar, Potato dextrose agar, Yeast dextrose agar, Sabouraud's dextrose agar supported maximum growth of fungal colony. The margin was entire in all media except it was wavy in case Malt extract agar and serrated in case of Czapek's dox agar and Soybean casein agar. The mycelium was creamy to ashy white in most of media except in case of Richard's agar, where mycelium showed dull white to green growth. Whereas, in case of Czapek's dox agar, the mycelium showed dull white to indigo growth (Table 1 and Plate 2).

Sporulation

All eight culture media exhibited variation with respect to sporulation. However, Potato dextrose agar, Malt extract agar and Oat meal agar recorded good sporulation (+++). While, moderate sporulation (++) was observed in Sabouraud's dextrose agar, Yeast dextrose agar and scanty sporulation (+) was observed in Richard's agar, Czapek's dox agar, Soybean casein agar media (Table 5).

Results of present study on the effect of various culture media on mycelial growth and sporulation are in conformity with several scientists *viz.* Ashour and El-kadi (1959) [3], Kalane (1979) [5], Mahabaleshwarappa (1981) [6], Gupta *et al.* (1987)

[4], Arunakumara (2006) [2] who reported maximum growth of *Alternaria polianthi* on Potato dextrose agar, Oat meal agar, Richard's agar and Czapek's dox agar media.

Table 1: *In vitro* effect of various culture media on mycelial growth, cultural characteristic and sporulation of *Alternaria polianthi*

Tr. No.	Treatment	Colony Diameter (cm)	Growth Characters	Sporulation	Margin
T1	Potato Dextrose Agar	7.43b	Creamy to ashy white growth with whitish margin	+++	Entire
T2	Oat Meal Agar	6.97b	Ashy white to light green growth with greenish margin	+++	Entire
T3	Malt Extract Agar	8.13b	Creamy grayish white growth with light green margin	+++	Wavy
T4	Sabouraud's Dextrose Agar	b	Greenish to ashy white growth with light green margin	++	Entire
T5	Yeast Dextrose Agar	7.43b	Ashy white to yellowish growth with light green margin	++	Entire
T6	Richard's Agar	5.30a	Dull white to green growth with whitish margin	+	Entire
T7	Czapek's Dox Agar	6.80b	Dull white to indigo growth with yellowish margin	+	Serrated
T8	Soybean Casein Agar	4.80a	White to light ashy growth with creamy white margin	+	Serrated
	SE (m) ±	0.35			
	CD at 1%	1.46			
	CV (%)	9.03			

*Mean of three replications.

Note: Treatment means having common superscripts are statistically non-significant and different superscripts are statistically significant.

+: Scanty sporulation, ++: Moderate sporulation, +++: Good sporulation



Plate 2: Cultural variability of *Alternaria polianthi*

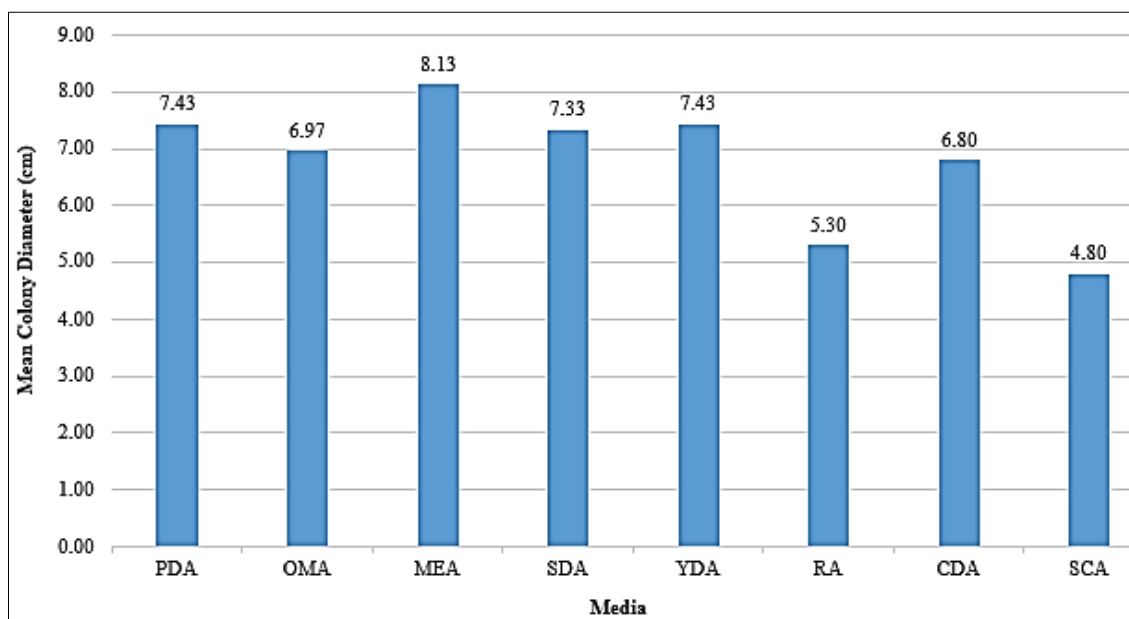


Fig 1: *In vitro* effect of different culture media on mycelial growth of *Alternaria polianthi*

Conclusion

PDA, YDA and MEA were found the excellent media for mycelial growth and sporulation of *Alternaria polianthi*.

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