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Morphological Variations in Conidia of *Arthrobotrys oligospora* on Different Media

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Most commonly occurring predacious fungus *Arthrobotrys oligospora* showed great variation in size and shape of conidia on some media. The formation of larger conidia was recorded on beef extract and nutrient agar media. The length of conidia in Richard's YPSS, Sabouraud's, PDA and corn meal agar media was of medium size while smaller conidia were produced on Czapek's, Jensen's, Martin's medium. Maximum width of conidia was recorded on YPSS medium followed by Sabouraud's medium. The average size of spores on nematode infested corn meal agar medium was slightly increased than those on corn meal agar medium.

KEYWORDS: ***Arthrobotrys oligospora*, MMA = corn meal agar medium, NAM = nutrient agar medium, YPSS = yeast extract peptone soluble starch medium, Morphological variation, PDA = potato dextrose agar medium**

Arthrobotrys oligospora is a widely distributed predacious fungus. Its occurrence has been recorded from agricultural soils, decayed plant materials etc. Distribution of several species of *Arthrobotrys* depends on trapping structure formation, morphology and size of conidia (Cooke and Godfrey, 1964). The spores of this fungus are two celled, the distal cell usually 1.5 to 2 times longer than the proximal cells. The size of spores varies between 18~30 μm long and 9~14 μm wide on corn meal agar medium. Drechsler reported that the size of conidia of *A. oligospora* increased when this fungus was grown on infested nematode. However, Haard (1968) reported that size of spores is reduced from the infested nematodes.

During cultural studies of *A. oligospora* from a single spore culture on different media, distinct variation in size of spores was noticed on some media. In view of the variation, spores formed on conidial heads of the fungus on different media were picked up and measured. Conidia from the infested nematodes on corn meal were also compared with those on corn meal agar medium. Details on morphological variations in spores of the fungus are described in this paper.

Arthrobotrys oligospora was isolated from the agricultural soils by the method given by Duddington (1955). The fungus was purified and single spore isolation was made on corn meal agar medium. In order to study variation in morphology of conidia, several media: Richard's medium (Sucrose, 50 g; KNO_3, 10 g; K_2HPO_4, 5 g; $MgSO_4 \cdot 7H_2O$, 0.5 g; $FeCl_3$, 0.02 g), yeast extract peptone soluble starch medium (soluble starch, 20 g; Yeast extract, 4 g; K_2HPO_4, 0.5 g; $MgSO_4 \cdot 7H_2O$, 0.2 g), Sabouraud's dextrose agar (dextrose, 40 g; Neo peptone, 10 g), potato dextrose agar (peeled potato, 250 g; dextrose, 20 g), beef extract medium (beef extract, 3 g), Czapek's agar (sucrose, 30 g; $NaNO_3$, 3 g; K_2HPO_4, 1 g; $MgSO_4 \cdot 7H_2O$, 0.5 g; KCl, 0.5 g; $FeSO_4 \cdot 7H_2O$, 0.01 g), Jensen's medium (dextrose, 10 g; peptone, 5 g; K_2HPO_4, 0.5 g; $MgSO_4 \cdot 7H_2O$, 0.2 g; $FeCl_3.6H_2O$, traces), Martin's Medium (dextrose, 10 g; peptone 5 g; K_2HPO_4, 1 g; $MgSO_4 \cdot 7H_2O$, 0.5 g), nutrient agar medium (beef extract, 3 g; peptone, 5 g; NaCl, 5 g), and corn meal agar medium (corn meal 15 g) were prepared in one litre. The petri dishes with media were inoculated with 5 mm fungal disc from 7 day-old cultures of *A. oligospora*. The petri dishes were incubated at 25°C and 100 spores were picked and measured from conidial head from 7~10 day old cultures on each medium in water.

The conidia from single spore cultures of *A. oligospora* showed great variation in size and shape when grown on different media (Table 1, Fig. 1). The larger conidia were invariably observed on beef extract agar and nutrient agar media. The largest conidia up to 51.0 μm were recorded in culture of the fungus on beef extract agar medium followed by about 40 μm long spores in nutrient agar medium. In 100 spores, the percentage of larger conidia (31~51 μm) was 11% in beef extract agar medium, while in nutrient agar medium the percentage of larger conidia (35~40 μm) was only 4%. The distal cells of larger conidia measured 21.3~33.3 μm in length while proximal cells were 9~24 μm long on beef extract agar medium. Similarly, on nutrient agar medium the distal and proximal cells measured 18~26 and 10~15 μm respectively. The ratio of distal and the proximal cell in conidia ranged between 2 : 1 or 5 : 3 baring few exceptions. The length of conidia in cultures on Richard's, YPSS, Sabouraud's, PDA and corn meal agar media was up to 30.50 μm long,

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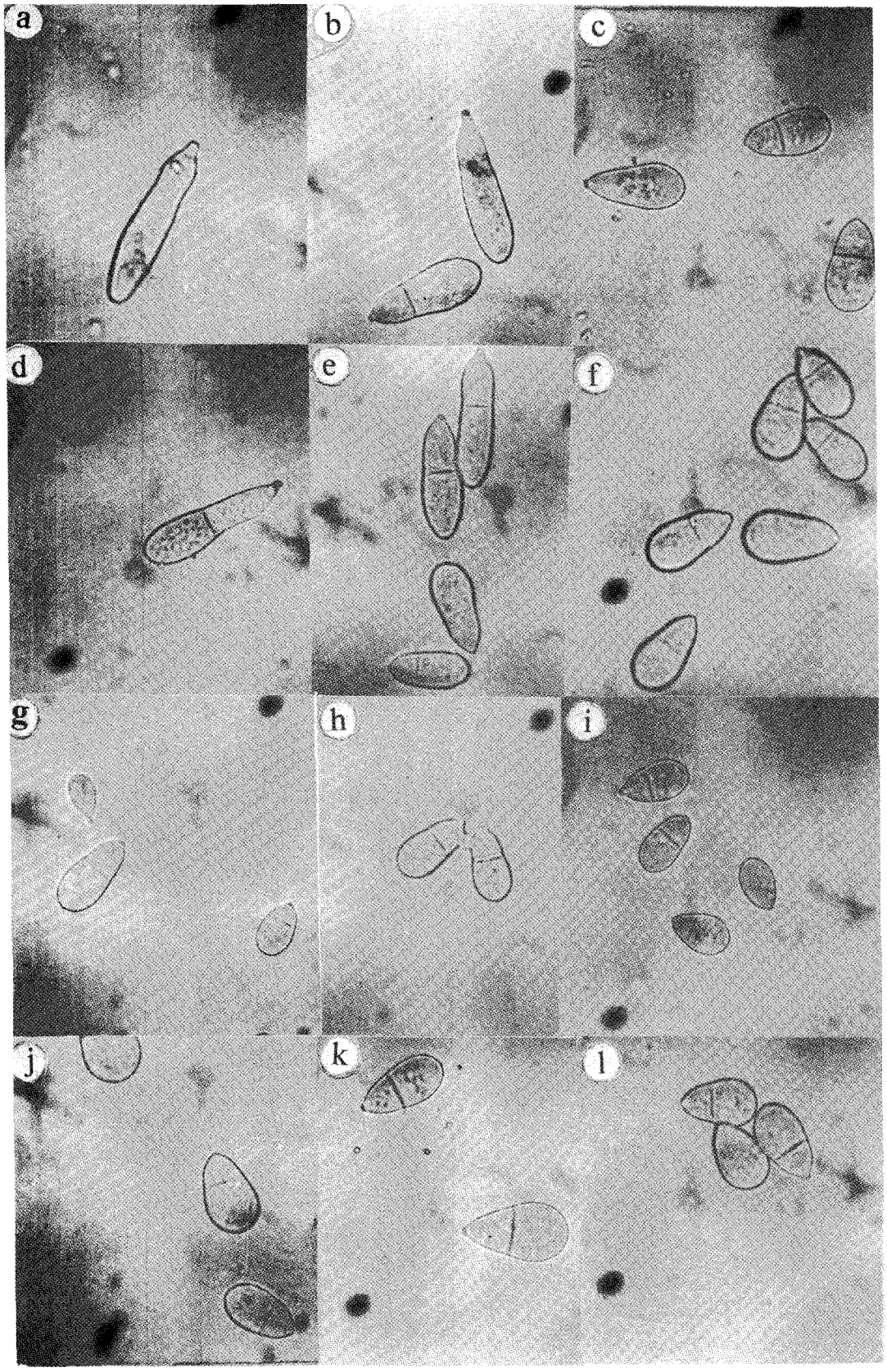

Fig. 1. Morphological variations in spores of *Arthrobotrys oligospora*. (a, b, c) Large and typical spores on beef extract agar medium (× 600), (d, e, f) Large and normal spores on nutrient agar medium (× 600), (g, h, i) Spores on Jensen's agar medium (× 600), (j, k) Spores on YPSS agar medium (× 600), (l) Spores from nematode infested corn meal agar medium (× 600).

Table 1. Variation in size of conidia of *Arthrobotrys oligospora* on different media at 25°C

Medium	Conidial size (μm)	
	Range	Average
Richard's agar	21.35~30.50 × 9.15~15.25	25.80 × 12.38
Yeast extract peptone soluble starch agar medium	18.30~30.50 × 12.20~19.82	24.12 × 14.13
Sabouraud's dextrose agar	15.25~30.50 × 9.15~18.30	21.10 × 12.33
Potato dextrose agar	18.30~30.50 × 10.67~13.72	22.45 × 12.59
Beef extract agar	18.30~51.00 × 9.15~15.25	26.93 × 12.06
Czapek's agar	18.30~27.45 × 9.15~13.72	23.79 × 12.01
Jensen's agar	18.30~27.45 × 9.15~13.72	22.32 × 12.10
Martin's agar	15.25~27.45 × 9.15~15.25	21.10 × 12.32
Nutrient agar	18.30~39.65 × 9.15~12.20	28.85 × 12.07
Corn meal agar	18.30~31.00 × 9.15~13.72	23.42 × 11.68
Nematode infested corn meal agar	18.30~30.50 × 9.15~16.78	25.43 × 12.32

while on Czapek's, Jensen's, Martin's media the maximum length of conidia was up to 27.45 μm.

Similarly the width of conidia also varied on different media. The maximum width of conidia (12.2~19.8 μm) was recorded on YPSS medium followed by Sabouraud's medium (9.2~18.3 μm wide) and nematode infested corn meal agar (9.2~16.8 μm). The minimum width of conidia was recorded on nutrient agar medium. Variation in size of conidia of *A. oligospora* from corn meal culture and infested nematodes in corn meal agar medium was also reported by Drechsler (1937). He reported that the size of conidia from infested nematode was larger and wider than those produced on corn meal agar medium.

Contrary to the present observation and that of Drechsler (1937), Haard (1968) reported reduction in size of conidia from the infested nematode cultures. This kind of variation could at best be attributed to variation in the isolations. The larger size of conidia formed in cultures on beef extract agar and nutrient agar media may be attributed to nutrients of the media. Due to the larger size of the conidia in beef extract agar and nutrient agar, the variation in spore size may be confused with the spore size of *A. conoides* and *A. musiformis*, however, the shape of the conidia even meanly was not like that of *A. musiformis*. Furthermore, the larger conidia on these two media were cylindrical or bottle shaped or elongated obovoid having no resemblance to *A. conoides*. The ratio of distal cell and proximal cell in larger conidia was mostly like typical conidia of *A. oligospora*. The other species of *Arthrobotrys* producing longer conidia are *A. dactyloides*, *A. anchonia* and *A. robusta* the former two species of which produce constricting rings, while the latter produces conidia having nearly equal cells. (Cooke and Godfrey, 1964). Morphological variations in conidia on two media, beef extract agar and nutrient agar are certainly surprising which were repeated twice. In view of the variations in spore size and morphology, it is recommended that for identification of this species, measurement of spores must be done on the corn meal agar medium.

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