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Original Article

Cultural, Morphological and Pathogenic Characterization of *Alternaria porri* Causing Purple Blotch of Onion

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Abstract

Twenty seven (27) isolates of *Alternaria porri* were isolated from diseased leaf samples collected from different onion growing regions of Bangladesh and characterized for cultural, morphological and pathogenic variabilities. *A. porri* colonies colony colour ranged between light to dark olivacious and grayish white with irregular, regular with concentric ring and regular without concentric ring shape. Margin of colonies were entire, irregular and wavy with effuse, fluffy and velvety texture. Isolates impregnated media with colour ranged between grey to brown on the reverse of the plates. Growth rate of isolates ranged between 2.433 and 3.950 mm/day with fast growth in isolate DSTR 02 and least in MMBH. Morphological variation in conidia production was between 7.720×10^3 to 47.02×10^3 per mm^2 with sporulation time 3.33 to 11.00 days. The conidial shape was straight to curve with light to deep brown colour. The number of horizontal and vertical separation in the conidia ranged from 3.00 to 6.00 × 1.00 to 2.00 with size from 11.20 to 39.20 × 4.76 to 11.43 µm. In pathogenicity test isolates also exhibited variations in size of the lesions (2.77 to 7.55 mm) produced on onion leaves. The results demonstrate existence of considerable variation in cultural, morphological, and pathogenic characters of *A. porri* isolates prevalent in Bangladesh environment.

Keywords: Concentric ring, conidia, fungal disease, mycelium, muriform

Introduction

Onion (*Allium cepa*) is an important spices crop commercially grown in many countries of the world. Out of 15 important vegetables and spice crops listed by FAO, onion stands second in terms of annual world production (Ali, 2008). The crop centre of origin of onion includes Iran, Pakistan and specially their mountainous regions situated in the north of these countries (Purseglove, 1972; Islam, 2006). Besides being used as salad and vegetables, onion is generally used as spice in most of the Asian countries. Onion has great economic importance due to its medicinal and dietetic values (Chakraborty *et al.*, 2015). Global vegetable production of nearly 36 million tons onion per annum, next to tomatoes and cabbages bears importance (FAO, 2012). The production of onion in Bangladesh is nearly 11.59 lac metric tons from 135569.69 hectares of land, whereas the demand is around 19.5 lac metric tons per year (BBS, 2012). Among the onion producing countries of the world, Korea Republic tops the list with 65.25 t ha^{-1} followed by USA (53.91 t ha^{-1}), Spain (52.06 t ha^{-1}), and Japan (47.55 t ha^{-1}) (FAO, 2008). The production of onion in Bangladesh is 8.95 t ha^{-1} (AIS, 2011) which is much lower compared to other onion producing countries. Onion suffers from 66 diseases including 10 bacterial, 38 fungal, 6 nemic, 3 viral, 1 mycoplasmal, 1 parasitic plant and 7 miscellaneous diseases and disorders (Schwartz, 2010). Purple blotch of onion is noted as a major disease throughout the world including Bangladesh which is caused by a fungus *A. porri* (Islam *et al.,* 2001). This disease can cause 30 to 50% yield reduction (Pascua *et al.*, 1997). About 20 to 25% seed yield reduction has also been recorded in India (Thind and Jhooty, 1982) and 41 to 44% in Bangladesh (Hossain *et al.,* 1993). Many studies have been conducted on the management of purple blotch in onion (Ashrafuzzaman and Ahmed, 1976; Rahman *et al.*, 1988; Rahman, 1990). Rovral 50WP (0.2%), Dithane M-45 (0.2%) and other fungicides are applied as foliar spray to control the disease. Most of the present day fungicides have failed in arresting the disease. This may be due to the arising genetic variability or introduction of new races of the pathogen. Variation in pathogen populations generally can be detected on the basis of morphological, cultural and pathogenic specificity. Variability studies are important to document the changes occurring in populations and individuals as variability in morphological and physiological traits indicate the existence of different

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pathotypes. Variability is a well known phenomenon in genus *Alternaria* and may be noticed as changes in spore shape and size, growth and sporulation, pathogenicity, etc. The present study was undertaken to identify and characterize *A. porri* isolates to find out their extend of variation in morphological and pathogenicity.

Materials and Methods

Collection of diseased leaf samples

Diseased leaf samples were collected from nine districts of Bangladesh namely Dhaka, Mymensingh, Rajshahi, Gazipur, Comilla, Jamalpur, Manikgonj, Jessore, and Faridpur.

These districts are scattered in different geographical locations and climatic conditions (Table 1). Samples were collected in February month from these areas and mainly chemical fungicides were used in these areas to control the disease. The diseased leaves were cut from the plants grown in the field, put into brown paper envelopes and taken to the laboratory, Department of Plant Pathology, Sher-e-Bangla Agricultural University, Dhaka for isolation. The samples were immediately cultured after collection.

Isolation and identification of the pathogen

The pathogen was isolated by tissue culture method (Ali, 2008). The diseased leaves were cut into pieces (4 mm diameter) and surface sterilization with $HgCl_2$ (1:1000) for 30 seconds. Then the cut pieces were washed in sterile water thrice and dried in keeping untreated blotting paper then placed on to acidified PDA in Petri dish. The plates containing leaf pieces were incubated at 25 °C temperature and near ultraviolet light for seven days. When the fungus grew well and sporulated then the pathogen slide was prepared and examined under stereomicroscope (Model: Motic, SMZ-168) and compound microscope (Model: Omano, OMTM-85) for identification of the pathogen with the help of relevant literature (CMI Description Vol. No. 338). Pathogenic conidia were muriform, tapering beak and brown in color. After identification of *A. porri* it was purified for further study in PDA and preserved in refrigerator at 4±0.5 °C for further use.

Designation of collected isolates

The isolates were designated following Aminuzzaman *et al.* (2010) based on its locations and sources. For example an isolate designated by JMSA 01 represents that this isolate was collected from district- Jessore (J), upazilla- Monirumpur (M), union-Shempur (S), village- Aminpur (A) and 01 denotes collection number.

Cultural variability of Alternaria porri

In cultural variation the colony diameter was measured on the 4th, 6th, 8th, 10th, 12th, and 14th days after inoculation. Growth per day was calculated by the formula:

Mm/day = (growth observed on a day - growth on previous observation) / 2.

The other cultural properties on colony colour, shape, margin, texture and substrate colour was also recorded.

Table 1. Sample collected area of purple blotch of onion caused by *Alternaria porri*

Sl. No	Isolates	Sample collected area			
		District	Area	Geographical locations	Climatic conditions
1	DSSA	Dhaka	SAU	23.77′ N latitude and 90.33′ E longitude	Rainfall- 22 mm Temp- 16.2 to 28.3 °C
2	DSTR 01		Savar	23.51′ N latitude and 90.16′ E longitude	
3	DSTR 02				
4	MMBH	Mymensingh	Mymensingh Sadar	24.45′ N latitude and 90.25′ E longitude	Rainfall- 19 mm Temp- 14.9 to 27.0 °C
5	MTBB 01		Trishal	24.34′ N latitude and 90.23′ E longitude	
6	MTBB 02				
7	RBHR 01	Rajshahi	Taherpur	24.22′ N latitude and 88.36′ E longitude	Rainfall- 14 mm Temp- 13.2 to 27.9 °C
8	RBHR 02				
9	RBHR 03				
10	GJBS	Gazipur	BARI	23.59′ N latitude and 90.25′ E longitude	Rainfall- 21 mm Temp- 15.4 to 27.2 °C
11	GGBB 01		Gazipur Sadar	24.0′ N latitude and 90.25′ E longitude	
12	GGBB 02				
13	CCKH 01	Comilla	Chandina	23.29′ N latitude and 91.0′ E longitude	Rainfall- 21 mm Temp- 15.5 to 27.7 °C
14	CCKH 02				
15	CCKH 03				
16	JJLL 01	Jamalpur	Jamalpur Sadar	24.55′ N latitude and 89.57′ E longitude	Rainfall- 18 mm Temp- 14.3 to 26.9 °C
17	JJLL 02				
18	JJLL 03				
19	MSMM 01	Manikganj	Shibalaya	23.50′ N latitude and 89.47′ E longitude	Rainfall- 23 mm Temp- 15.2 to 27.9 °C
20	MSMM 02				
21	MSMM 03				
22	JMSA 01	Jessore	Monirumpur	23.1′ N latitude and 89.14′ E longitude	Rainfall- 25 mm Temp- 14.7 to 28.9 °C
23	JMSA 02				
24	JMSA 03				
25	FFKU 01	Faridpur	Faridpur Sadar	23.35′ N latitude and 89.49′ E longitude	Rainfall- 26 mm Temp- 15.1 to 27.9 °C
26	FFKU 02				
27	FFKU 03				

(Source: Wikipedia and Bangladesh Metrological Department)

Morphological variability of Alternaria porri

Fifteen (15)-d-old cultures of all the isolates were studied for morphological variations. In terms of conidia colour, shape, size, septation, time of sporulation and number of conidia production were observed on PDA medium. Length and breadth of conidia was measured using digital microscope (Model: Motic, BA-210) and motic software. Twenty conidia per replication were made for the purpose. The conidia produced per unit surface area were estimated using haemacytometer, digital microscope using the formula of Chauhan and Pandey (1995):

Conidia produced per unit surface = (No. of conidia/ml × Volume of water of suspension)/(Total surface area of suspension).

Pathogenic variability of Alternaria porri

For testing the virulence levels of *A. porri* isolates, a local onion cultivar, 'Taherpuri' bulbs were collected from Savar Bazar, Dhaka. Air dried sandy loam soil and cowdung were mixed thoroughly at the ratio of 4:1 and filled in earthen pots (20 cm diameter) in net house following CRD maintaining three replications. The conidia suspension of *A. porri* was prepared with sterilized water using 10 days old PDA culture and the concentration of conidial suspension was adjusted to 21×10^5 per milliliter. The plants were inoculated by 27 isolates of *A. porri* at 30 days after planting. At first the onion leaves were injured by sterile toothpick followed by inoculation of the injured surfaces (one inoculation per leaf) with a drop of inoculums suspension by a micropipette. The inoculated plants were covered with polyethylene bag to maintain high relative humidity (% RH) and also to prevent natural contamination with other fungal conidia or spores. After 5 days of inoculation, the size of lesions was recorded on 5th, 7th, 9th, 11th, 13th, 15th, and 17th days. The increase in size of the lesions on day to day basis (mm/day) was estimated by the formula: [leaf infection observed on a day − leaf infection on previous observation/2].

Data analysis

The collected data were compiled and analyzed statistically using the analysis of variance (ANOVA) technique with the help of a statistical software MSTAT-C (Freed and Scott, 1986) and the mean differences among the treatments were compared by Duncan's Multiple Range Test (Gomez and Gomez, 1986).

Results

Cultural variation of Alternaria porri

In respect of cultural characteristics, the isolates of *A. porri* showed variation in growth rate, colony colour, shape, margin and texture and substrate colour. The isolates of *A. porri* depicted variation in growth rate (mm/day). The maximum increment rate of radial mycelial growth 3.95 mm per day was recorded in DSTR 02 and the minimum increment rate of radial mycelial growth 2.43 mm per day was recorded in MMBH (Fig. 1). Among 27 isolates 7 dark olivaceous green, 12 light olivaceous green, 1 greyish white and 7 olivaceous green colony colour isolates were found with 5 irregular, 16 regular with concentric ring and 6 regular without concentric ring shape isolates. Among the isolates 19 entire, 5 irregular and 3 wavy margins with 17 effuse, 1 fluffy and 8 velvety texture were found. Among the isolates 2 grey, 15 deep brown and 10 light brown substrate colour were found (Table 2).

Morphological variation of Alternaria porri

In respect of morphological characteristics, the isolates of *A. porri* showed variation in conidia production, sporulation, shape and colour of conidia, septation of conidia and size of conidia (Table 3). The highest production of conidia 47.02×10^3/ mm^2 was recorded in DSSA and the lowest production of conidia 7.72×10^3/ mm^2 was recorded in MMBH (Fig. 2). Highest sporulation time of 11.00 days was recorded in MMBH and the lowest sporulation time of 3.33 days was recorded in MTBB 01 and MSMM 02. All the isolates produced light to deep brown colour and straight or curved shape conidia. The highest mean horizontal septation 3.56 was recorded in isolate DSSA and the lowest 3.20 in isolate GGBB 01. The highest mean longitudinal septation 1.40 was recorded in isolates DSSA and DSTR 02 whereas the lowest 1.13 in isolates MTBB 02, JJLL 03 and MSMM 03. The highest mean length 28.31µm was recorded in isolate MMBH and the lowest 19.38 µm in isolate RBHR 01. The highest mean breadth 8.147 µm was recorded in isolate MSMM 01 whereas the lowest 6.740 µm in isolate RBHR 03 (Fig. 3).

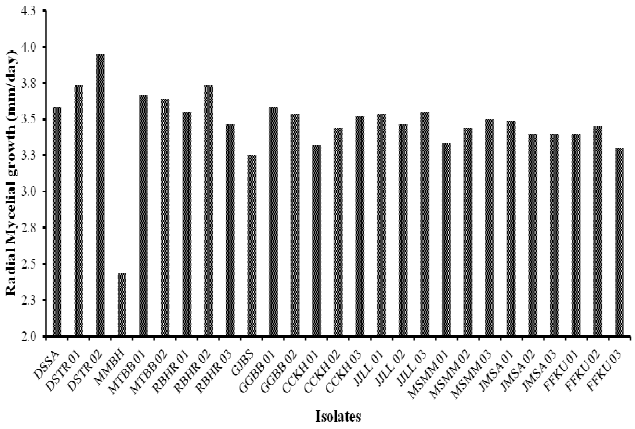

Fig. 1. Mean radial mycelia growth of 27 isolates of *Alternaria porri* per day

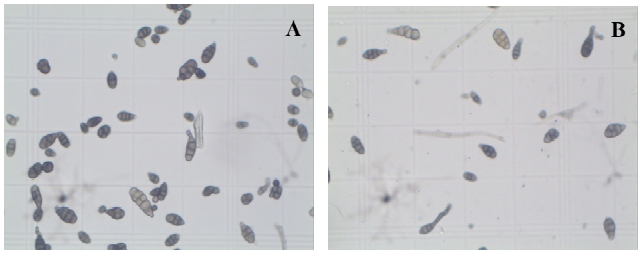

Fig. 2. Counting of *Alternaria porri* conidia by using haemacytometer and digital microscope; (A) Isolate DSSA (B) Isolate MMBH

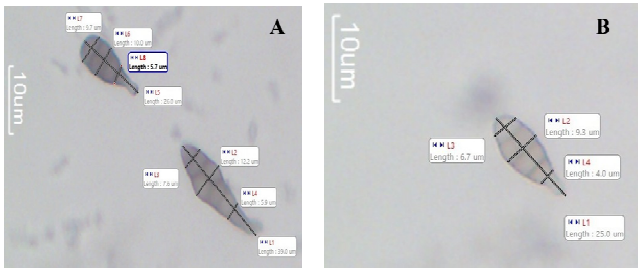

Fig. 3. Measurement of *Alternaria porri* conidia; (A) Isolate MMBH (B) Isolate RBHR 01

Table 2. Colony characteristics of 27 *Alternaria porri* isolates on PDA

Characteristics features	Isolates
Colony colour	
Dark olivaceous green	DSSA, RBHR 01, GJBS, GGBB 01, GGBB 02, JJLL 01, JMSA 01
Grayish white	MMBH
Light olivaceous green	DSTR 01, DSTR 02, RBHR 02, RBHR 03, CCKH 01, CCKH 03, JJLL 02, JMSA 02, JMSA 03, FFKU 01, FFKU 02, FFKU 03
Olivaceous green	MTBB 01, MTBB 02, CCKH 02, JJLL 03, MSMM 01, MSMM 02, MSMM 03
Colony shape	
Irregular	MMBH, RBHR 01, GJBS, CCKH 01, JJLL 02
Regular with concentric ring	DSSA, DSTR 01, DSTR 02, RBHR 02, RBHR 03, GGBB 01, GGBB 02, CCKH 03, JJLL 01, JJLL 03, MSMM 02, MSMM 03, JMSA 01, JMSA 02, JMSA 03, FFKU 02
Regular without concentric ring	MTBB 01, MTBB 02, CCKH 02, MSMM 01, FFKU 01, FFKU 03
Colony margin	
Entire	DSSA, DSTR 02, MTBB 02, RBHR 02, RBHR 03, GJBS, GGBB 02, CCKH 01, CCKH 02, CCKH 03, JJLL 01, JJLL 02, JJLL 03, MSMM 02, MSMM 03, JMSA 01, JMSA 03, FFKU 01, FFKU 02
Irregular	MTBB 01, RBHR 01, GGBB 01, JMSA 02, FFKU 03
Wavy	DSTR 01, MMBH, MSMM 01
Colony texture	
Effuse	DSSA, MTBB 01, MTBB 02, RBHR 01, GJBS, GGBB 01, GGBB 02, CCKH 01, CCKH 02, CCKH 03, JJLL 03, JMSA 01, JMSA 02, JMSA 03, FFKU 01, FFKU 02, FFKU 03
Fluffy	MMBH
Velvet	DSTR 01, DSTR 02, RBHR 02, RBHR 03, JJLL 01, JJLL 02, MSMM 01, MSMM 02, MSMM 03
Substrate colour	
Grey	MMBH, GJBS
Deep brown	DSSA, MTBB 01, MTBB 02, RBHR 01, RBHR 02, GGBB 01, GGBB 02, CCKH 01, CCKH 02, JJLL 03, JMSA 01, JMSA 02, JMSA 03, FFKU 01, FFKU 03
Light brown	DSTR 01, DSTR 02, RBHR 03, CCKH 03, JJLL 01, JJLL 02, MSMM 01, MSMM 02, MSMM 03, FFKU 02

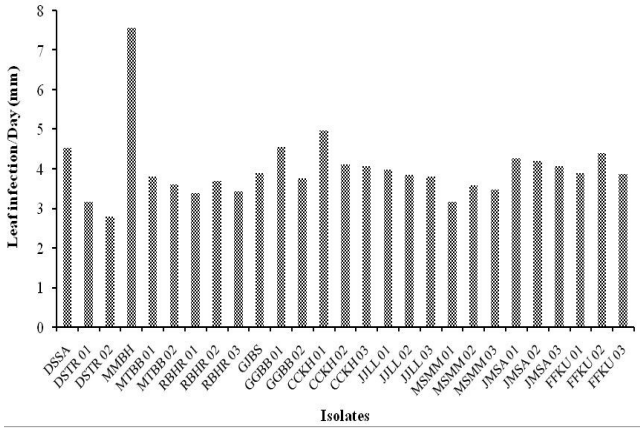

Fig. 4. Mean infection of onion leaf per day by 27 isolates of *Alternaria porri*

Pathogenic variation of Alternaria porri

The leaf infection of onion by 27 different *A. porri* isolates varied significantly in the pot experiment. The rate of leaf infection per day maximum increment 7.55 mm was recorded in isolate MMBH and minimum increment 2.77 mm was recorded in DSTR 02 (Fig. 4).

Discussion

The isolates of *A. porri* depicted variation in growth rate (mm/day). Isolate DSTR 02 exhibited the fastest growth among the isolates with mean growth rate of 3.95 mm/day while isolate MMBH exhibited the slowest growth with mean growth rate of 2.43 mm/day. Isolates in the present study showed periodic changes in their growth rates. All the isolates showed an increasing trend in growth rate. Sofi *et al.* (2013) also reported growth rate of *A. mali* isolates 5.86 to 8.21 mm/day. Goyal *et al.* (2011) found variation in mycelial growth of thirteen isolates of *A. brassicae* collected from different geographical zones. Ansari *et al.* (1989); Patni *et al.* (2005) and Kaur *et al.* (2007) found variability in mycelia growth of *Alternaria* species. Pusz (2009) found colony diameter ranging from 4.8 to 6.8 cm while working with *A. alternata*. Similar observations were also recorded by Thrall *et al.* (2005) and Rai and Kumari (2009).

All the isolates varied in colony colour, shape, margin and texture and substrate colour. Colony colour varied from light to dark olivaceous green with greyish white. Mostly the colony was irregular or regular with concentric ring and regular without concentric ring shape with entire, irregular and wavy margin. All the isolates had effuse, fluffy and velvety mycelia growth having grey to brown colour with some variations which were clearly visible from the underside of plates. The results are in agreement with Pusz (2009) who found that the colonies of *A. alternata* isolated from *Amaranthus retroflexus* varied from light grey to dark grey. Similarly, Rai and Kumari (2009) observed loose, cottony, compact and dense colonies with light to dark black colour in *A. alternata* infecting Periwinkle. Hubballi *et al.* (2011) noted variation in the pigmentation of fifteen *A. alternata* isolates producing black, brownish black, greenish black, brown and yellow pigmentation.

In respect of morphological characteristics, the isolates of *A. porri* showed variation in conidia production, sporulation, shape and colour of conidia, septation of conidia and size of conidia.

The conidia production of isolates varied from 7.720×10^3 to 47.02×10^3 per mm^2. Similarly, Daniel, *et al.* (2008) observed *A. alternata* isolates producing 2.8×10^5 to 17.2×10^5 conidia mL^{-1}. In present study, the variation in sporulation time varied in between 11 and 3 days.

Table 3. Morphological variation of 27 isolates of *Alternaria porri*

Sl. No	Isolate	Number of conidia/mm^2 ($\times 10^3$)	Sporulation time (days)	Number of conidial septation		Size of conidia		Shape of conidia	Colour of conidia
				Horizontal	Longitudinal	Length (µm)	Breadth (µm)		
1	DSSA	47.02 a	4.00 b	3.56	1.40 a	19.91 ij	7.29 b-d	Straight/Curved	Brown
2	DSTR 01	40.40 b	3.66 b	3.46	1.30 ab	23.20 d-g	7.71 a-c	Straight	Brown
3	DSTR 02	37.60 bc	3.66 b	3.26	1.40 a	20.45 h-j	7.53 a-c	Straight	Brown
4	MMBH	7.72 j	11.00 a	3.36	1.26 ab	28.31 a	7.33 a-d	Straight	Deep Brown
5	MTBB 01	34.20 c-e	3.33 b	3.26	1.23 ab	19.73 j	7.57 a-c	Straight	Brown
6	MTBB 02	32.85 c-e	3.66 b	3.26	1.13 b	20.27 h-j	7.63 a-c	Straight	Brown
7	RBHR 01	27.92 e-h	4.33 b	3.43	1.23 ab	19.38 j	7.18 cd	Straight	Brown
8	RBHR 02	22.83 hi	3.66 b	3.30	1.30 ab	20.90 h-j	7.46 a-d	Straight	Brown
9	RBHR 03	20.62 i	3.66 b	3.43	1.26 ab	19.82 j	6.74 d	Straight	Brown
10	GJBS	36.92 b-d	4.33 b	3.26	1.23 ab	19.49 j	7.41 a-d	Straight	Light Brown
11	GGBB 01	40.65 b	4.00 b	3.20	1.30 ab	19.87 ij	7.27 cd	Straight	Brown
12	GGBB 02	33.86 c-e	3.66 b	3.30	1.20 ab	20.13 h-j	7.51 a-d	Straight	Brown
13	CCKH 01	31.06 d-f	4.00 b	3.26	1.23 ab	24.55 cd	7.67 a-c	Straight/Curved	Brown
14	CCKH 02	25.55 f-i	4.00 b	3.26	1.20 ab	22.15 e-h	7.68 a-c	Straight	Brown
15	CCKH 03	25.46 f-i	3.66 b	3.26	1.20 ab	21.40 f-j	7.45 a-d	Straight	Brown
16	JJLL 01	33.61 c-e	4.00 b	3.40	1.20 ab	27.23 ab	8.13 a	Straight	Brown
17	JJLL 02	30.55 e-g	3.66 b	3.23	1.23 ab	23.46 d-f	7.70 a-c	Straight	Brown
18	JJLL 03	29.11 e-h	3.66 b	3.26	1.13 b	22.05 e-i	7.69 a-c	Straight	Brown
19	MSMM 01	23.93 hi	4.00 b	3.23	1.26 ab	26.24 bc	8.14 a	Straight	Brown
20	MSMM 02	23.00 hi	3.33 b	3.36	1.16 b	23.09 d-g	7.91 a-c	Straight/Curved	Deep Brown
21	MSMM 03	23.26 hi	4.00 b	3.33	1.13 b	21.18 g-j	7.80 a-c	Straight	Brown
22	JMSA 01	25.03 f-i	3.66 b	3.43	1.20 ab	25.74 bc	8.09 ab	Straight	Brown
23	JMSA 02	23.42 hi	3.66 b	3.23	1.16 b	23.59 de	7.84 a-c	Straight	Light Brown
24	JMSA 03	25.89 f-i	4.00 b	3.33	1.20 ab	23.54 d-f	7.67 a-c	Straight	Brown
25	FFKU 01	24.44 g-i	4.00 b	3.26	1.20 ab	22.12 e-h	7.54 a-c	Straight/Curved	Brown
26	FFKU 02	24.61 f-i	4.00 b	3.30	1.16 b	21.27 g-j	7.17 cd	Straight	Brown
27	FFKU 03	26.22 f-i	4.00 b	3.30	1.30 ab	20.43 h-j	7.28 b-d	Straight	Brown
	Significance	**	**	ns	*	**	*		
	CV (%)	11.68%	20.47%	5.85%	8.51%	5.09%	5.38%		

(ns- non significant, *-significant at P=0.05, **-significant at P=0.01. Different lowercase letters beside the mean value indicate significant at P=0.05 or 0.01)

All the isolates produced light to deep brown colour and straight or curved shape conidia. Similarly, Kaul and Saxena (1988) observed differences in colour, shape and sporulation of the isolates of *A. solani*. Goyal *et al.* (2011) reported variation in sporulation of thirteen isolates of *A. brassicae* collected from different geographical zones. Ansari *et al.* (1989); Patni *et al.* (2005) and Kaur *et al.* (2007) found variability in sporulation of *Alternaria* species. Conidial septation both horizontal and longitudinal varied significantly among the isolates. Horizontal septa varied from 3 to 6 and longitudinal septa from 1 to 2. The highest mean number of horizontal septa was 3.56 whereas the lowest was 3.20. The highest mean number of longitudinal septa was 1.40 and the lowest 1.13. In present study, the average conidial size varied from 11.20 -39.20 × 4.76 - 11.43 µm. Sofi *et al.* (2013) reported that average conidial size ranged from 21.36 to 31.74 × 8.34 to 14.48 µm. Rotem (1966) found a wide variability in the spore dimensions of 42 isolates of *A. solani*.

A considerable pathogenic variability was observed in size of leaf infection among the isolates. The maximum leaf infection rate was 7.55 mm/day while minimum 2.77 mm/day. Isolates in the present study depicted periodic changes in their leaf infection rates. All the isolates showed an increasing trend in leaf infection rate from 5 days to 17 days. The findings are in agreement with Thrall *et al.* (2005) who reported significant variations in the lesion size produced by *A. brassicicola* isolates on wound inoculated *Cakile maritima* plants. Kumar (2004) also reported variation in lesion size and lesion number in *A. triticina* isolates. However, present observations are contradictory to the findings of Quayyum *et al.* (2005) who did not find any significant variation in the lesions produced by the isolates of *A. panax* on detached leaflets of ginseng.

Conclusion

All the isolates showed variation in terms of cultural, morphological and pathogenic characteristics. Significant variation in growth, sporulation and conidial morphology of *A. porri* isolates were found on PDA media irrespective of crop and geographical states. All the isolates were found pathogenic in nature against their respective host. The fungal isolates showed substantial identities with *A. porri* and further detailed variation and diversity can be studied at molecular level. This could help us to reveal the true nature of this fungus from Bangladesh and proper sustainable management for purple blotch of onion disease can be implemented.

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