

Original Research Article

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Morphological Variability of Conidia of *Leveillula taurica* (Lev.) Arn Causing Chilli Powdery Mildew

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ABSTRACT

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Powdery mildew of chilli caused by *Leveillula taurica* is one of the most serious diseases of chilli. The leaves showing typical symptom of chilli powdery mildew were collected. Twenty four isolates were collected from different chilli growing areas of northern Karnataka during survey during *kharif* 2017, which showed morphological variation in terms of conidia colour which varied from hyaline to greyish, shape of conidia varied from cylindrical to pyriform, size of conidia ranged between $36.23-58.60 \times 10.57-16.32 \mu\text{m}$ and $41.16-60.99 \times 12.67-14.58 \mu\text{m}$ respectively for cylindrical and pyriform conidia. Whereas, length of conidiophore ranged between 53 to 96.11 μm and conidiophore showed branching pattern.

Introduction

Chilli (*Capsicum annum* L.) is an important vegetable cum spice crop grown in both tropical and subtropical regions of the world. It belongs to the family solanaceae. Chilli is originated in the Latin American regions of New Mexico as a wild crop in and around 7500 BC. It is low in sodium and cholesterol free, rich source of vitamin A, vitamin C and E, potassium and folic acid too. Chilli is valued for its pungency (imparted by an alkaloid, capsaicin) and the red pigments (capsanthin, capsorubin and capxanthin).

India is the major producer, consumer and exporter of chilli in the world. In India, the area under chilli cultivation during 2015 was 1.81 lakh ha and the production was 1.9 mt and productivity of 10.1Mt/ha. It is the second most important spice in the Indian export market (Anon., 2016). Chilli suffers from many diseases caused by fungi, bacteria and viruses. Among the fungal diseases, powdery mildew, cercospora leaf spot and anthracnose are the most prevalent ones. Powdery mildew caused by *Leveillula taurica* is a major constraint in chilli production causing yield loss of 42.82 per cent due to severe

defoliation and reduction in size and number of fruits per plant (Ashtaputre, 2014). The fungus causing powdery mildew is an obligate pathogen, mycelium is endophytic bearing dimorphic conidia (pyriform and cylindrical) on long and often branched conidiophores. Conidia borne singly or in chains. The present investigation was carried out to find out the morphological variability among the different isolates collected from different chilli growing areas of northern Karnataka.

Materials and Methods

The samples collected from different chilli growing areas of northern Karnataka during survey from powdery mildew infected chilli fields during *kharif* 2017. Twenty four isolates were collected from different areas, brought to the laboratory and subjected to morphological variability study. The white powdery mass of conidial growth was dislodged in to the lacto phenol solution using camel hair brush. The spore suspension was placed on to cavity slides and the observations were made with respect to size, shape and colour of the conidia and also length, branching in conidiophores. Leaf was folded and directly observed under microscope for its conidiophores, conidia (singly or in chains) and germination under compound microscope at 100X and 400X magnification.

Results and Discussion

Twenty four isolates collected from the different chilli growing areas of northern Karnataka during survey during *kharif* 2017 were subjected for morphological variability study. The data pertaining to morphological characters *viz.*, shape of conidia, size of conidia, colour of conidia, length of conidiophore and conidiophores branching were recorded and results are presented in the Table 1.

Shape of the conidia

The shape of conidia varied from cylindrical to pyriform. Among the 24 isolates, 14 isolates had cylindrical conidia (Dharwad, Somapur, Hebballi, Morab, Shirkol, Navalgund, Gadag, Mundaragi, Savanur, Dodawad, Ramdurga, Inamhongal, Savadatti) 4 isolates had pyriform conidia (Shirur, Ramageri, Hulgur, Shiggavi) and 6 isolates had both types of conidia (Kundgol, Gudenakatti, Sanklikoppa, Lakshmeshwar, Haveri, Byadgi).

Colour of the conidia

The colour of the conidia varied from hyaline to greyish. Among 24 isolates, 16 isolates were hyaline (Kundgol, Gudenakatti, Dharwad, Somapur, Hebballi, Ramageri, Dambal Lakshmeshwar, Hulgur, Shiggavi, Haveri, Savanur, Ramdurga, Inamhongal, Savadatti) and 8 isolates (Shirur, Morab, Shirkol, Navalgund, Gadag, Mundaragi, Byadgi, Dodawad) were greyish in colour.

Size of the conidia

The conidial size varied considerably among the isolates. The range of conidial measurements was 23.00-58.60 × 10.57-16.32 μm and 41.16-60.99 × 12.67-14.58 μm for cylindrical and pyriform conidia, respectively. The smallest size of conidia 36.23 × 10.57 μm was observed in isolate collected from Savadatti, whereas biggest size of conidia 60.99 × 14.58 μm was observed in isolate collected from Kundgol.

Length of conidiophores

The length of the conidiophores varied from 53.00 to 96.11 μm. The maximum length of conidiophores 96.11 μm was observed in isolate collected from Kundgol, whereas minimum length of conidiophore was observed in isolate collected from Savadatti.

Table.1 Morphological variability of conidia of *Leveillula taurica* causing chilli powdery mildew

Sl.No.	Isolates	Shape of conidia	Dimensions of conidia Length × Breadth (µm)	Colour of conidia	Conidiophore	Conidiophore length (µm)
1	Kundgol	Cylindrical	58.60 × 16.32	Hyaline	Branched	96.11
		Pyriform	60.99 × 14.58			95.34
2	Gudenakatti	Cylindrical	57.95 × 16.08	Hyaline	Branched	94.88
		Pyriform	60.88 × 14.45			96.34
3	Shirur	Cylindrical	57.64 × 15.20	Greyish	Unbranched	95.15
		Pyriform	59.27 × 14.67			96.05
4	Dharwad	Cylindrical	56.45 × 15.50	Hyaline	Unbranched	90.70
5	Somapur	Cylindrical	56.66 × 15.89	Hyaline	Unbranched	89.00
6	Hebballi	Cylindrical	56.11 × 14.23	Hyaline	Branched	89.36
7	Morab	Cylindrical	54.13 × 14.22	Greyish	Branched	89.87
8	Shirkol	Cylindrical	54.67 × 15.22	Greyish	Branched	89.11
9	Navalgund	Cylindrical	54.55 × 15.12	Greyish	Branched	87.76
10	Gadag	Cylindrical	48.71 × 12.63	Greyish	Unbranched	60.54
11	Ramageri	Pyriform	45.65 × 12.00	Hyaline	Unbranched	64.44
12	Sanklikoppa	Cylindrical	47.45 × 12.25	Hyaline	Unbranched	61.55
		Pyriform	50.12 × 14.50			64.15
13	Dambal	Cylindrical	47.55 × 12.35	Hyaline	Unbranched	61.22
14	Lakshmeshwar	Cylindrical	46.84 × 12.75	Hyaline	Branched	60.24
		Pyriform	49.16 × 12.89			65.13
15	Mundaragi	Cylindrical	45.67 × 13.03	Greyish	Branched	60.58
16	Hulgur	Pyriform	48.34 × 12.97	Hyaline	Branched	69.12
17	Shiggavi	Pyriform	49.12 × 13.68	Hyaline	Branched	68.34
18	Haveri	Cylindrical	38.50 × 11.57	Hyaline	Unbranched	75.78
		Pyriform	43.35 × 13.12			74.41
19	Byadgi	Cylindrical	38.50 × 11.45	Greyish	Unbranched	73.98
		Pyriform	41.16 × 12.67			75.76
20	Savanur	Cylindrical	36.89 × 10.67	Hyaline	Branched	73.65
21	Dodawad	Cylindrical	36.77 × 11.98	Greyish	Branched	55.65
22	Ramdurga	Cylindrical	37.56 × 12.05	Hyaline	Unbranched	56.73
23	Inamhongal	Cylindrical	38.94 × 11.43	Hyaline	Unbranched	55.36
24	Savadatti	Cylindrical	36.23 × 10.57	Hyaline	Branched	53.00

Conidiophores branching

The conidiophores were branched in some of the isolates. Whereas, remain unbranched in some of the isolates. Among the 24 isolates, 13 isolates had branched conidiophore and in

remaining 11 isolates, conidiophore were unbranched.

The variation in conidial shape ranged from cylindrical to pyriform, colour of conidia varied from hyaline to greyish, range of

conidial measurements was 23.00-58.60 × 10.57-16.32 μm and 41.16-60.99 × 12.67-14.58 μm for the cylindrical and pyriform conidia respectively. Length of conidiophores varied from 53.00 to 96.11 μm. Conidiophores were branched in some of the isolates whereas, remain unbranched in some of the isolates (Table 1).

The results are in agreement with findings of Sharmila (2001) who reported that, the conidia were dimorphic (cylindrical and pyriform), hyaline, and produced on long and often branched conidiophores. On an average pyriform conidia measured 67 × 18.4 μm while that of cylindrical was 61.2 × 16.4 μm. Earlier workers viz., Raghavendra (2005) reported that, pathogen produces dimorphic conidia (cylindrical and pyriform) on long and often branched conidiophores.

The average size of pyriform conidia was found to be 70.00 × 19.6 μm while that of cylindrical was 60.3 × 15.7 μm. Marthand (2016) reported that, the conidia were dimorphic (cylindrical and pyriform) single celled, hyaline and borne on long and often branched conidiophores. The average dimensions of pyriform conidia were 67.37 ×

18.84 μm while that of cylindrical conidia were 60.01 × 15.32 μm.

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