

Morphological and Cultural Variability of *Drechslera maydis* (Nisikado) Subram. and Jain. Casual Agent of Maydis Leaf Blight of Maize

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Received 19 February 2016; Accepted 23 March 2016; Published online 20 April 2016

Abstract The variability studies were carried out for twelve isolates collected from different places. Morphological and cultural variability of twelve isolates were studied under identical conditions. Among the twelve isolates, isolate Dm1 was found to be fast growing, high sporulating with deep black pigmentation. Maximum number of isolates produced elliptical conidia with four septa. Maximum size of conidia was observed in Dm10 (60.18 μm long \times 14.74 μm wide). Among the five solid media studied, pathogen produced maximum growth Potato Dextrose Agar medium (79.95 mm) followed by Corn meal agar (77.02 mm), minimum growth was observed on Potato Dextrose \times Yeast (74.38 mm).

Keywords Maize, *Drechslera maydis*, Variability, Maydis leaf blight.

Introduction

Maize (*Zea mays* L.) is the most versatile crop, adapted to different agro-ecological and climatic conditions. In India, maize is an important cereal crop next to rice, wheat and sorghum. It is mainly grown in Karnataka, Andhra Pradesh, Maharashtra, Uttar Pradesh, Bihar, Rajasthan, Madhya Pradesh and Punjab. It is gaining significant importance on account of its growing demand for diversified uses, especially feed and industrial uses. Maize ranks third in the world after wheat and rice in area and production. However, as far as productivity is considered it ranks first. In India, about 50 to 60% of maize production is consumed directly as food, 30 to 35% goes for poultry, piggery and fish meal, 10 to 12% in wet milling industry e.g., starch and oil and about 3% in dry milling for traditional requirements like Dalia and Sattu and other food industry such as corn bread and corn chips, brewery one per cent and as seed, one per cent [1]. In India it is cultivated on an area of 9.42 m.ha with production of 22.26 m.t and productivity of 2583 kg/ha. In Karnataka, it is cultivated on an area of 13.82 lakh ha with a production of 39.84 lakh t and average productivity is 2883 kg/ha [2].

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Conducted survey of maydis leaf blight in maize

Table 1. Morphological Variability in the Isolates of *Drechslera maydis*. +++++-Excellent, >25 conidia per microscopic field, +++-Good, 20–25 conidia per microscopic field, ++-Fair, 15–20 conidia per microscopic field, + - Poor, <15 conidia per microscopic field, Dm-*Drechslera maydis*.

Sl. No.	Location	Isolate	Colony character	Colony diameter (mm)	Pigmentation	Sporulation	Spore germination (%)	No. of septa	Size of conidia (µm)		Mycelium width (µm)	Dry mycelial weight (mg)
									Length	Breadth		
1	Dharwad	Dm1	Excellent, regular, blackish growth dark grayish black color colony.	88.33	Deep black	++++	87.66	8	38.18	10.94	5.71	368.00
2	Hirekerur	Dm2	Excellent, irregular, blackish growth	79.33	Black	++++	75.22	6	47.04	11.86	4.79	203.00
3	Haveri	Dm3	Excellent growth, irregular margin, dark grayish black colony.	88.00	Deep black	+++	83.00	8	36.95	11.11	4.74	275.00
4	Bailhongal	Dm4	Good growth, dark grayish black colony, light black on margin.	82.66	Black	++	75.33	5	44.71	13.52	4.96	328.00
5	Koppal	Dm5	Poor growth, circular margin, grayish black in center, distinct ring	70.66	Gray	++++	68.66	4	41.84	12.50	3.71	233.00
6	Gokak	Dm6	Good, irregular growth, appressed dark in center.	85.66	Brownish black	++++	85.00	4	35.20	12.15	4.1	230.00
7	Gadag	Dm7	Excellent growth, light black at center, Circular margin with cottony growth.	80.30	Brownish black	+++	76.00	3	31.96	12.16	4.44	230.00
8	Saundatti	Dm8	Good, irregular growth, white cottony with grayish center.	80.80	Black	+	82.55	4	36.69	12.10	3.69	216.00
9	Bagalkot	Dm9	Poor growth, restricted cottony growth throughout black colony.	76.00	Brown	++	72.33	3	31.86	11.14	4.71	130.00
10	Sankeshwar	Dm10	Excellent, regular growth, whitish or grayish growth	87.33	Black	++++	85.66	8	60.18	14.74	5.94	220.00
11	Ranebennur	Dm11	Moderate, irregular, cottony growth	86.66	Black	++	76.66	4	31.83	11.48	3.96	258.00
12	Nevalgund	Dm12	Excellent, cottony growth, slightly grayish in color	84.00	Black	++	82.33	4	40.23	11.42	5.33	216.00

growing areas of Northern Karnataka during *kharif* of 2011 and reported that maximum disease severity recorded in Ranebennur (56.26 PDI) and least was noticed in Kushiagi (33.88 PDI). During *rabi* 2011, reported that maximum disease severity recorded in Ranebennur (50.26 PDI) and least was noticed in Kushtagi (27.88 PDI) [3]. Studied morphological and cultural variability in sixteen isolates of *E. turcicum* and observed variation with respect to colony character, colony diameter, mycelial dry weight, spore germination and sporulation. In order to develop the dis-

ease resistant and high yielding cultivars it is imperative to analyse and understand the variability in the pathogen [4].

Materials and Methods

The maydis leaf blight infected leaf samples were collected from different parts of Northern Karnataka and pure hyphal tip culture of twelve isolates were maintained on PDA. Studies on morphological and cul-

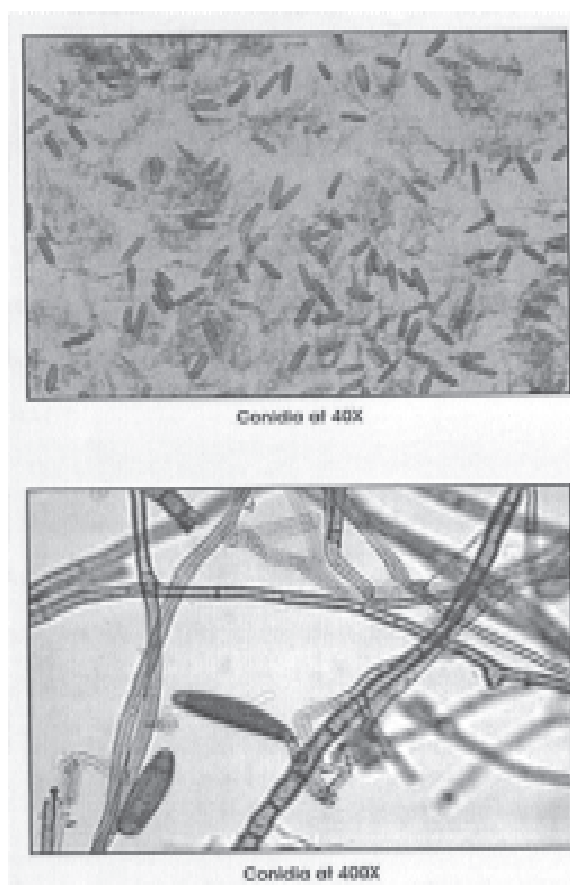


Fig. 1. Conidia and mycella of *Drechalera maydis*.

tural characters viz. colony characters, colony diameter, mycelium dry weight, spore germination and sporulation were carried out in the laboratory.

Morphological variability

Conidia of *D. maydis* were measured from pure cultures of different isolates maintained on PDA and spore suspension of 10^5 was mixed with lactophenol thoroughly so that uniform spread is obtained and then cover slip was placed over it. The number of spores was counted with the help of Differential Interference Contrast (DIC) microscope and spore length, width, mycelium width, and septa and shape of spore were recorded. Further photo micrographs were taken to show the typical spore morphology of

the fungus (Fig. 1).

Cultural variability

The growth characters of the fungus were studied on five solid media as mentioned below: 1. Potato dextrose agar medium; 2. Corn meal agar medium; 3. Potato carrot agar medium; 4. Czapek's malt agar medium; 5. Potato dextrose yeast medium.

Results and Discussion

Morphological variability

All the isolates under study showed differences in growth and colony characters. The results are pre-

Table 2. Effect of Solid Media on Growth of Isolates of *Drechslera maydis*.

Sl. No.	Isolate	Radial growth (mm)				
		Potato dextrose agar	Potato carrot agar	Corn meal agar	Czapeck's malt agar	Potato dextrose yeast agar
1	Dm1	88.70	88.00	83.00	85.90	85.00
2	Dm2	79.30	76.00	74.00	70.70	72.30
3	Dm3	88.00	75.30	81.70	86.00	78.00
4	Dm4	82.70	80.00	82.00	76.00	82.00
5	Dm5	45.00	50.70	52.30	51.70	47.30
6	Dm6	83.00	74.30	79.00	80.30	79.00
7	Dm7	70.70	70.70	70.70	73.30	67.70
8	Dm8	88.00	74.00	80.30	86.30	85.30
9	Dm9	76.00	77.00	73.30	77.70	68.30
10	Dm10	87.30	82.00	82.30	76.00	77.00
11	Dm11	86.70	77.70	81.30	65.00	75.70
12	Dm12	84.00	78.00	84.30	76.00	75.00
	Mean	79.95	75.31	77.02	75.41	74.38
	SEm±	0.42	0.27	0.36	0.39	0.53
	CD at 1%	1.66	1.11	1.43	1.57	2.11

sented in Table 1. The considerable variation was observed among the various isolates tested. The variation in morphological characters of different isolates indicated that, growth of isolates viz., Dm1, Dm2, Dm3, Dm7, Dm10, Dm12 was excellent and isolates Dm4, Dm6, Dm8 produced good growth, whereas poor growth was observed in Dm5 and Dm9.

Excellent sporulation was exhibited in Dm1, Dm2, Dm5, Dm6 and Dm10 while good sporulation was observed in Dm3 and Dm7. It was fair in Dm4, Dm9, Dm11 and Dm12. Poor sporulation was noticed in Dm8. Maximum spore germination of 87.66% was recorded in Dm1 followed by Dm10 (85.66%). Spore germination was least in Dm5 (68.66%) followed by Dm9

(72.33%). The black pigmentation was observed in large number of isolates but some isolates showed brownish black and gray pigmentation Dm1, Dm3 and Dm10 were having eight septa. Maximum size of conidia was observed in Dm10 (60.18 μm long \times 14.74 μm wide) followed by Dm2 (47.04 μm long \times 11.86 μm wide). Minimum size of conidia was observed in Dm11 (31.83 μm long \times 11.48 μm wide). Although some of the isolates produced length wise bigger conidia their width was very small and some conidia were length-wise smaller and width wise they were wider comparatively. These results agreement with All the isolates produced dark colored, fusoid conidia, measuring 6.14–23.41 μm \times 2.15–5.70 μm . The conidia of MDCh1 isolate was largest (19.6 μm \times 5.0 μm), whereas MUCh3 isolate produced smallest (9.7 μm \times 3.3 μm) conidia. The average number of septa varied from 2 to 8. The isolate, MLCh1, showed highest number of septa (5.0). Isolate, MDCh1 (Delhi), showed maximum colony diameter and MLCh1 (Ludhiana), the minimum [5].

Cultural variability

In order to culture fungi in the laboratory it is necessary to supplement the media with those essential nutrients for their growth and other metabolic processes. Hence to find out the best source of nutrients for fungal growth, different media were tested against different isolates in the present investigation. The results are presented in Table 2.

In the present investigation, all the isolates of *D. maydis* showed good growth on Potato Dextrose Agar medium (79.95 mm) followed by Corn meal agar (77.02 mm), minimum growth was observed on Potato Dextrose + Yeast (74.38 mm) for their growth but variations were noticed. This may probably be due to differences in the nutrition requirement of *D. maydis*. These results are in support with growth on different culture media, revealed that, MKCh1 (Kangra), MDCh1 (Delhi) and bMUCh6 (Udaipur) registered highest colony growth on PDA and Richard's agar respectively, while MLCh1 (Ludhiana) registered minimum colony growth on both PDA and Richard's agar media. The color of mycelium of specific isolates varied between media. In a majority of the isolates, the color was black ranging from light black, light grey,

light green and grey [6].

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