

TELEOMORPHS OF *Sphaerotheca Fuliginea* ON CUCURBITS IN ROHILKHAND REGION OF UTTAR PRADESH (INDIA)

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ABSTRACT

Anamorphs of powdery mildew on cucurbits occur annually throughout the Rohilkhand region of Uttar Pradesh (India). There have been only few published reports on the occurrence of teleomorphs on cucurbits in various states of India. Each teleomorph contained one ascus and each ascus has eight ascospores. Atmospheric factors, heterothalishm and nutritional status of the host are implicated to determine the teleomorph production in cucurbit powdery mildew.

KEYWORDS : Teleomorphs, Powdery mildew, *Erysiphe cichoracearum* and *Sphaerotheca fuliginea*

Powdery mildew is a common disease and a major production problem in cucurbits in all parts of world including India. All cucurbits are susceptible and symptoms caused by powdery mildew disease are less common. Yields are reduced because of a decrease in the size or a number of fruit or a shortened harvested period. *Sphaerotheca fuliginea* and *Erysiphe cichoracearum* are the two most commonly recorded fungi causing cucurbit powdery mildew. Prior to 1958 *Erysiphe cichoracearum* was considered to be the primary causal organism throughout most of the world. Today *Sphaerotheca fuliginea* is more common. A shift in the predominance of the two fungi may have recorded or the causal organism may have been misidentified. *Sphaerotheca fuliginea* is more aggressive pathogen than *Erysiphe cichoracearum*. In India *Erysiphe cichoracearum* may have a low on optimum temperature since the species is mainly found during cooler spring and early summer months, while *Sphaerotheca fuliginea* appears to progress most rapidly during the warmer months (McGrath and Thomas, 1997). The anamorphs of *Erysiphe cichoracearum* and *Sphaerotheca fuliginea* difficult to distinguish and teleomorph, sexual fruiting bodies are rarely developed. Thus great similarities between the anamorphs of *Sphaerotheca fuliginea* and rarity of teleomorphs compounded the difficulty in establishment of their identity. Although the some reports of teleomorph production in cucurbit powdery mildew are available from some states of India. Available reports of cucurbit powdery mildew in India are Madhya Pradesh (Dave et al., 1971), Punjab (Gupta & Sharma, 2012a), Tamil Nadu (Sharma and Khan, 1991), Haryana (Gupta and Sharma, 2012b). From several other states in India there is no report of teleomorph production of cucurbit powdery mildew. There is no such information is available from Rohilkhand region of Western Uttar Pradesh. This situation prompted us to study the

occurrence and production of teleomorphs of cucurbit powdery mildew and confirm the identity of species causing the disease in Rohilkhand region of Western Uttar Pradesh.

MATERIALS AND METHODS

Surveys were conducted in February and March 2004 in different cucurbit growing areas of Rohilkhand region. The study area included 8 districts viz. Shahjahanpur, Pilibhit, Bareilly, Rampur, Moradabad, Bijnor, Badaun and Mahatma Jyotibaphule Nagar in Western Uttar Pradesh (India). Five to ten field plants or other cultivation units like kitchen garden etc. were surveyed in each area. Samples of infected leaves and stems having teleomorph packed in polythene bags and properly marked were brought to the laboratory for further studies.

Infected samples collected during the survey were thoroughly examined under dissecting microscope or magnifying glass to detect the presence of teleomorphs. Morphological characteristics of teleomorph of powdery mildew species in each sample were studied microscopically and dimensions were measured. Diameter of cleistothecia, type of appendages, number of asci per cleistothecium, number of ascospore per ascus, shape of ascus and ascospores and dimensions of asci and ascospores are important characters of teleomorphs, used in the identification of powdery mildew species.

RESULTS AND DISCUSSION

The study area included 8 districts of Rohilkhand region of Western Uttar Pradesh (India) and *Lagenaria siceraria*, *Cucurbita moschata*, *Luffa cylindrica*, *C. cordifolia*, *Cucumis melo*, *Cucumis melo* var. *utilissimus*, *Cucumis sativus*, *Citrullus vulgaris* var. *fistulosus* were found infected during the survey. *Cucurbita maxima*, *M. charantia*

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and *C. lanatus* were free from infection. *L. siceraria*, *C. moschata* and *C. cordifolia* were most heavily infected. *L. siceraria* was infected in all the localities of the surveyed districts. *L. cylindrica* was not infected in Shahjahanpur district, *Cucumis sativus*, *Cucumis melo* and *Cucumis melo* var. *utilissimus* in Pilibhit district. *Citrullus vulgaris* var. *fistulosus* in Badaun district were not infected. *L. cylindrica* in Rampur, *C. cordifolia* in Bijnor and *C. moschata* and *C. maxima* in Jyotibaphule Nagar were found free from infection at the time of survey. Teleomorphs were observed on *L. siceraria*, *C. melo* and *C. moschata* in some localities of Pilibhit, Bareilly, Badaun and Moradabad district of Rohilkhand region of Western Uttar Pradesh.

Cleistothecia were scattered to densely gregarious, brown to dark, globose to subglobose, 72-101.3 µm in diameter on *L. siceraria*, 64.3-98.8 µm on *C. melo*, 66-99.2 µm on *C. moschata*. Appendages mycelioid, brown, septate, variable in number and length. Each cleistothecium contained single broadly elliptical to subglobose ascus. Asci of cleistothecia obtained from *L. siceraria* measured 56-86 x 30-61 µm, 58-85 x 29-58 µm from *C. melo*, 55.6-83.3 x 28.8-58.8 µm from *C. moschata*. Each ascus contained 8 ellipsoidal to spherical ascospores, measuring 17.8-23 x 12.8-22 µm (*L. siceraria*), 16.3- 20.6 x 11.3-22.1 µm (*C. melo*) and 17.1-20.4 x 14.2- 19.8 µm (*C. moschata*). Based on their characters of teleomorphs present on *L. siceraria*, *C. melo* and *C. moschata*, the powdery mildew species causing disease on cultivated cucurbits was recognised as *Sphaerotheca fuliginea*.

Teleomorphs of powdery mildew of cucurbit occur frequently in some countries and rarely or not at all in other. Some reports of teleomorph of powdery mildew on cucurbits are available from states like Uttar Pradesh, Bihar, Kashmir, Rajasthan, Madhya Pradesh and Himanchal Pradesh. Although, Khan (1983) remarked that teleomorphs of powdery mildew are rare in tropics, these under Indian conditions have atmospheric factors, heterothallism and nutritional status of the host are implicated to determine the teleomorph production in nature from different regions emphasize the importance of atmospheric factors particularly of temperature and relative humidity. Most of reports of the teleomorph occurrence of powdery mildew are from temperate region (Khan, 1983; Gupta & Sharma, 2012a, b). Thus frequent development of teleomorph, of cucurbit powdery mildew in some states of India demonstrated the availability of the congenial environment in the part of tropics

and its suitability for the teleomorph production.

Heterothallism has been assumed as a factor for the occurrence of teleomorph commonly in some areas, rarely or absent from others. Both mating types may be present in their centre of origin ensuring frequent teleomorph development and only one mating type in other areas where teleomorph are lacking (Khan, 1983; Gupta & Sharma, 2012a, b). However the importance of environmental condition in the teleomorph development even when both mating types are present cannot be overlooked. The role of relative humidity in teleomorph production on cucurbits seems to be obscure. It is likely that high relative humidity by helping rapid development of the disease indirectly influences the teleomorph production. It appears that for teleomorph production in powdery mildew of cucurbits due to their heterothallic nature primary pre-requisite is the presence of both mating types (McGrath, 1996; Khan, 1983; Gupta & Sharma, 2012a, b). However, the factors and their complexity involved in teleomorph production in powdery mildew on cucurbits need detailed and thorough investigation.

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