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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. 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.

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.

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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. utilisimus, Cucumis sativus, Citrullus vulgaris var. fistulosus were found infected during the survey. Cucurbita maxima, M. charantia

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, heterothalism 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.
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. Telemorphs 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. Ascii 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 telemorphs present on L. siceraria, C. melo and C. moschata, the powdery mildew species causing disease on cultivated cucurbits was recognised as Sphaerotheca fuliginea.

Telemorphs of powdery mildew of cucurbit occur frequently in some countries and rarely or not at all in other. Some reports of telemorph 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 telemorphs 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 telemorph production in nature from different regions emphasize the importance of atmospheric factors particularly of temperature and relative humidity. Most of reports of the telemorph occurrence of powdery mildew are from temperate region (Khan, 1983; Gupta & Sharma, 2012a, b). Thus frequent development of telemorph, 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 telemorph production.

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

REFERENCES


McGrath MT., 1996. Increased resistance to triadimefon and to benomyl in Sphaerotheca fuliginea populations following fungicide usage over one season. Plant Disease. 80: 633-639.
