

Powdery Mildews in the Libyan Jamahiriya

III. Identity of Certain Powdery Mildew Fungi

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ABSTRACT

This paper, third in the series, presents the identity of certain powdery mildew fungi infecting cultivated and wild plants in the Libyan Jamahiriya. It includes *Erysiphe pisi*, *E. communis*, *E. cichoracearum*, *Sphaerotheca fuliginea* and *Leveillula taurica* on certain hosts not described in this series. The occurrence of these powdery mildew species on most of the hosts are new records for the Jamahiriya. Some are also new to the host index of the species.

INTRODUCTION

Records of powdery mildew fungi in the Libyan Jamahiriya seem to be incomplete and most of the records are not well established. Recently Khan and Mussa (10) and Khan (8) made attempts to identify and establish the identity of certain powdery mildew fungi infecting various host plants in the Jamahiriya. The present paper, third in the series, describes the identity of certain powdery mildew fungi on some more hosts not included so far.

MATERIALS AND METHODS

Cultivated and wild plants were observed for powdery mildew infections at different localities in the Jamahiriya. Disease severity on visual basis was scaled as mild, moderate and severe. Infected plant parts were collected and examined for the presence or absence of perithecia. Morphological characteristic of the fungi were microscopically studied. Dimensions of structures present were measured whenever felt necessary. In some cases mode of germination of conidia was studied (15). Conidia were also examined for the presence or absence of fibrosin bodies (4).

As the perithecia were absent in all the specimens, conidial characters and records from other parts of the world on the same host were taken into account to establish its identity. The host index given by Blumer (3) was mainly used as a check list for most of the records.

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RESULTS AND DISCUSSION

Some powdery mildew species on certain hosts collected from the Libyan Jamahiriya and not included in the earlier papers of this series are enumerated below. Some species already known to be found in the Jamahiriya have been recorded on some new hosts for the first time in the country. A few are additions to the host index of the powdery mildew species. The potential damage as important parasites of economic crops is discussed, wherever considered necessary.

1. *Erysiphe pisi* DC. ex St. Am.

On living plants of *Medicago lupulina* L. (Papilionaceae) collected from the Faculty of Science Lawns, Al-Fateh University, Tripoli, 10th March, 1979.

Mild to severe infection. Infection patchy; infected plants chlorotic, deteriorated and gradually dying. Only conidial stage present. Morphological features of the conidial stage identical to those described for the species (5).

On living plants of *Vicia villosa* Roth. (Papilionaceae) collected from Agriculture Farm, Faculty of Agriculture, Al-Fateh University, Tripoli, 15th March, 1980.

Mild infection on few plants. Infection confined to leaves. Conidial stage present, characteristic of *E. pisi*. Perithecia absent.

On living plants of *Medicago sativa* L. (Papilionaceae) collected from Tajora, 20th April, 1979.

Mild to severe infection on leaves. Conidial stage present. Perithecia absent. Conidial characters similar to those of *E. pisi*.

E. pisi is reported to infect 14 species of *Medicago* including *M. lupulina* and *M. sativa* (3). It is also reported to infect *V. villosa* in certain parts of the world (3). But its occurrence on these plants is a new record for the Jamahiriya. Earlier, Khan (8) claimed its existence in the Jamahiriya on pea, lentil and *Vicia monantha*. *E. pisi* infects many leguminous hosts and causes loss to the crops of economic importance. This species is chiefly parasitic on Papilionaceae and is worldwide in distribution (5). It seems to appear regularly on pea in the Jamahiriya. It is quite likely that some of these weed hosts might be providing opportunity for the survival of *E. pisi* during the period when cultivated plants are not available.

2. *Erysiphe communis* (Wall.) Link

On living plants of *Papaver dubium* L. collected from New Airport Road, and Qasre-Ben Ghasir, 6th May, 1979.

Severe infection on leaves and stem. Mycelium well developed, amphiphylous, covering entire leaf blades. Morphological characters resembled those described by Blumer (3) for *E. communis*. Severely infected plants succumbed gradually. Infection of this weed was wide-spread in the fields.

On living plants of *Brassica tournefortii* Gouan. (Cruciferae) collected from Tajora, 2nd February, 1980.

Moderate to severe infection on leaves and stems. Conidial stage present. Perithecia absent. Conidial characters similar to those of *E. communis*. Severely infected plants were gradually dying.

On living plants of *Rapistrum rugosum* (L.) Alld. (Cruciferae) collected from Al-Marj and Jabal-Akhdar Project Area, 24th March, 1980; Bursis 26th March, 1980.

Severe infection on leaves and stems. Only conidial stage of *E. communis* present. Infection was wide spread in both areas. Infected plants shed their leaves gradually leaving bare stems.

Cruciferous plants including crops of economic importance are infected by *E. communis*. *E. communis* is reported to infect 5 species of *Papaver* including *P. dubium* in certain parts of the world (3). However, it is not reported on *P. dubium* in the Jamahiriya. Its host index also includes *R. rugosum*. But its occurrence on this host is a new record for the Jamahiriya. It is also reported to infect 15 species of *Brassica*, but this does not include *B. tournefortii* and thus it is an addition to its host index.

3. *Erysiphe cichoracearum* DC.

On living plants of *Chrysanthemum carinatum* L. (Compositae), collected from the Faculty of Agriculture Gardens, Al-Fateh University, Tripoli, 5th November, 1979 and 16th February, 1980.

Mild to severe infection on stems and leaves. Conidial stage present. Perithecia absent. Conidial stage similar to those of *E. cichoracearum* (6).

Infection appeared on seedling and continued till the flowering stage of the plants. As a result, plants became poor in growth, chlorotic, stunted with small flowers.

E. cichoracearum is known to infect 13 species of *Chrysanthemum* including *C. carinatum* (3). But its occurrence on this host has not been reported from the Jamahiriya. *E. cichoracearum* was claimed to infect several plants in Libya (1, 12, 13). Khan and Mussa (10) reported its existence on *Amberboa lippii* in perithecial stage. It was also recorded (8) to infect *Hedynois cretica*, *H. polymorpha*, *Sonchus oleraceus* and *Conyza bonariensis* in the Jamahiriya.

E. cichoracearum seems to exist on many weeds in the country. It is chiefly parasitic on compositae. However, in view of its ability to cause powdery mildew of cucurbits in certain areas of the world, its wide spread occurrence may be detrimental to certain cucurbit crops.

4. *Sphaerotheca fuliginea* (Schlecht.) Poll.

On living plants of *Cucumis sativus* L. (Cucurbitaceae) collected from different localities (Swani, Ainzara, Janzoor, Amriya, Azzahra) 12th May, 1979 and 25th May, 1979.

Mild to severe infection on leaves and stems. Mycelium hyaline, occasionally brown, well developed; conidia in long chains with distinct fibrosin bodies; ellipsoidal to barrel-shaped. Some conidia formed forked germ tubes on germination; $24-40 \times 12-22 \mu$. Perithecia absent.

Indoor and outdoor cultivations of cucumber was affected by this species; in some instances very severely.

On living plants of *Cucurbita pepo* L. (Cucurbitaceae) collected from Swani, Janzoor, Amriya 12th May, 1979 and 25th May, 1979; Jabal-Akhdar area 24th March, 1980.

Mild to severe infection on both indoor and outdoor cultivations. Conidial stage present, typical of *S. fuliginea*. Perithecia absent.

On living plants of *Cucurbita maxima* Duch ex Lam. (Cucurbitaceae) collected from Swani, 12th May, 1979.

Moderate to severe infection on leaves, petioles and stems. Conidial stage of *S. fuliginea* present; perithecia absent.

On living plants of *Cucumis melo* L. (Cucurbitaceae) collected from Amriya 25th May, 1979.

Moderate to severe infection throughout the field; amphiphylous; only conidial stage of *S. fuliginea* present.

On living plants of *Lagenaria leucantha* (Duch.) Rusby (Cucurbitaceae) collected from Amriya, 25th May, 1979.

Mild to moderate infection on leaves. Conidial stage of *S. fuliginea* present.

S. fuliginea is recognised as the causal organism of cucurbit powdery mildew in many countries, while in others *E. cichoracearum* is claimed as the causal agent. In some, both species are responsible for the disease (2, 7). In the Jamahiriya, the identity of the causal organism of powdery mildew of cucurbits is not established. Pucci (13, 14) and Kranz (11) claimed *E. cichoracearum* as causal species on several cucurbits in Libya. Khan (9), however, recently found that powdery mildew of cucumber is caused by *S. fuliginea*. The present record of *S. fuliginea* on other cucurbits like *C. pepo*, *C. maxima*, *C. melo* and *L. leucantha* in a wide-spread area indicates that *S. fuliginea* is mainly responsible for this disease in the Jamahiriya. Occurrence of *S. fuliginea* on *C. maxima*, *C. pepo*, *C. melo* and *L. leucantha* are new records for the Jamahiriya.

S. fuliginea is potentially one of the most important powdery mildew species causing economic losses especially to cucurbit crops. It is widely distributed and infects a variety of cultivated cucurbits (2, 7). The disease appears to recur every year on cucurbits in the Jamahiriya especially on cucumbers and squash causing heavy losses.

On living plants of *Calendula officinalis* L. (Compositae) collected from the Faculty of Agriculture Gardens, Al-Fateh University, Tripoli, 5th November, 1979.

Mild to severe amphiphylous infection. Conidia showed fibrosin bodies and forked germ tubes, characteristic of *S. fuliginea*. Perithecia absent.

Infection first appeared sparsely on young plants which spread rapidly and all the plants became infected in the flowerbed. Infected plants deteriorated and eventually produced small flowers. Young plants with initial severe infection were killed.

On living plants of *Calendula arvensis* L. (Compositae) collected from the Agriculture Farm, Faculty of Agriculture, Al-Fateh University, Tripoli, 20th March, 1980.

Mild to severe infection on leaves. Conidial stage of *S. fuliginea* present. Perithecia absent.

S. fuliginea is enlisted to infect 10 species of *Calendula* including *C. officinalis* and *C. arvensis* (3). But its occurrence on these hosts is a new record for the Jamahiriya.

5. *Leveillula taurica* (Lev.) Arn.

On living plants of *Capsicum frutescens* L. (Solanaceae) collected from Ainzara, 2nd January, 1980.

Moderate to severe infection on leaves of plants growing in a plastic tunnel. Mycelium internal. Conidiophore *Oidiopsis* type, branched and typically arising from stoma. Conidia similar to those of *Leveillula*.

Conidial stage of *Leveillula taurica* was reported by Pucci (14) and Kranz (11) on pepper and eggplant in Libya. This species is also referred to as *Leveillula solanacearum* Golov. (3). This disease seems to appear regularly, especially on pepper, and adversely affects the plants in the young stage.

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البياض الدقيقي في الجماهيرية العربية الليبية الشعبية الاشتراكية

٣ — تعريف بعض أنواع فطريات البياض الدقيقي

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المستخلص

هذا هو البحث الثالث ضمن سلسلة الدراسات لتعريف بعض أنواع فطريات البياض الدقيقي على النباتات الحقلية والبرية في الجماهيرية وهي تحوي الأنواع :
(*Erysiphe pisi*, *E. communis*), (*E. cichoracearum*, *Sphaerotheca fuliginea*), (*Leveillula taurica*)
وقد وجدت على بعض العوائل التي لم تذكر ضمن هذه السلسلة من قبل . وظهور هذه الأنواع على تلك العوائل يعتبر إكتشافاً جديداً في ليبيا كما تعتبر أيضاً عوائل جديدة لفطريات البياض الدقيقي .