Leveillula taurica on Solanaceous Vegetables in Libya

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ABSTRACT

Observations on powdery mildew of solanaceous vegetables grown in Libya are presented. In the coastal belt of the Western and Eastern regions of the country, powdery mildew was found on pepper, eggplant and tomato. The disease was more severe on indoor cultivations. Potato was free from the disease. The disease on pepper was more wide-spread than on eggplant and tomato. The inflicted damage to peppers was heavy in most cases. Eggplants were also badly damaged in several localities. Tomato was infected only at limited locations. *Leveillula taurica* in the conidial stage was responsible for the disease on these vegetables in the included locations.

INTRODUCTION

Leveillula taurica (Lev.) Arn. is the major powdery mildew pathogen of the family Solanaceae. It is found in all dry areas around the Mediterranean (1). It infects mainly leaves, rarely stalks, floral parts or fruits. The fungus forms a whitish powdery mass on the lower surface while the corresponding leaf surface turns yellow. Infected tissue later becomes necrotic. Infected leaves become dry, brittle and drop leading to defoliation of plants. The pathogen was reported to infect several important vegetable crops within the Solanaceae including eggplant, pepper, tomato and potato (1).

L. taurica has a very wide host range (2). Its importance as a major pathogen of crops of economic value has been recognised in several countries of the Mediterranean region and Central Asia (1). The existence of *L. taurica* in the conidial stage in Libya had been reported; Pucci (5, 6) listed *L. taurica* on pepper, eggplant and *Solanum nigrum* in Tripolitania (Western region of the country), Kranz (4) observed *L. taurica* on pepper and eggplant in many areas in Cyrenaica (Eastern region of the country). Recently Khan and Faraj (3) enlisted *L. taurica* on pepper grown under cover in Ain Zara near Tripoli. Inspite of the apparent prevalence of the fungus throughout the country, no attempt has been made to investigate the disease in its real perspective. Therefore, definitive observations on *L. taurica* infecting solanaceous vegetables in Libya were attempted.

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MATERIALS AND METHODS

During a survey for powdery mildews of various cultivated and wild plants in 1979–81 in the coastal belt of the Western and Eastern regions of the country, observations were also made for the powdery mildew of solanaceous vegetables such as pepper, eggplant, tomato and potato both in outdoor and indoor cultivations. Observations were made at Ain Zara, University Agricultural Farm (Tripoli), Ajdaida, Tajora, Gharabuli, El-Khoms, Hadba Khadra Project Area, Zawia, Qasr Ben Ghashir, Swani and Aziziya in the Western region, and at Al-Marj, Jabal Akhdar Project Area, Bursis, El-Baida, El-Ghubba, Derna and Benghazi proper in the Eastern region of the country. Wherever infection was present, its severity, was arbitrarily designated as heavy, moderate or mild based on visual assessment. Age of the crop plants was estimated and their general condition was noted.

Samples of infected leaves were collected at random from different cultivation units. Leaf samples were examined to establish the identity of the pathogen. Morphological characters of the fungus were thoroughly studied. As perithecia were absent in all the samples, the identity of the pathogen was based on the characteristics of the conidial stage.

RESULTS AND DISCUSSION

During the course of survey, crops of pepper, eggplant and tomato were found to be infected with the powdery mildew. Potato was free from infection in all the localities surveyed. Incidence of the disease was more evident in indoor cultivations compared to outdoor cultivations. Plants of all ages i.e. from newly transplanted seedlings to plants in flowering and fruiting stages were infected. Some of the greenhouses where fungicides have been regularly used, crops were free from infection.

In all the areas surveyed, infection was more frequent on pepper than on eggplant or tomato. Infection on tomato was only observed at four locations. Heavily infected pepper plants were observed to be at different stages of defoliation and death. Young seedlings in several plastic tunnels and glasshouses were dying. After defoliation plants gradually withered and dried. Infection on mature plants badly affected the leaves. The most common symptom was the presence of yellowish spots on the upper surface of the leaves and a white powdery covering on the lower surface (Fig. 1). Infection gradually spread leading to complete defoliation. Infected crops produced very few small fruits.

The incidence and intensity of the disease on eggplant were comparatively less than on peppers. However, in most of the locations where both crops were grown in close proximity, both were usually infected. On eggplant, the disease was more evident at the later stages of plant growth. Intensity of the disease varied from mild to moderate, but in some plots heavy infection was also observed. Infected plants did not show complete defoliation eventhough leaves were heavily infected and gradually withering. Diseased plants were poor in vegetative growth, and flowering (Fig. 2).

Tomato was not commonly found to be infected. Infection was observed only in indoor cultivations at El-Khoms, Benghazi, El-Marj and Derna. At El-Khoms and Derna tomatoes were grown adjacent to peppers in the same greenhouses whereas at Benghazi and El-Marj tomatoes were in separate greenhouses but adjacent to other greenhouses grown with peppers. In all cases, peppers were infected. Defoliation of tomato plants did not occur but leaves were badly infected (Fig. 3).

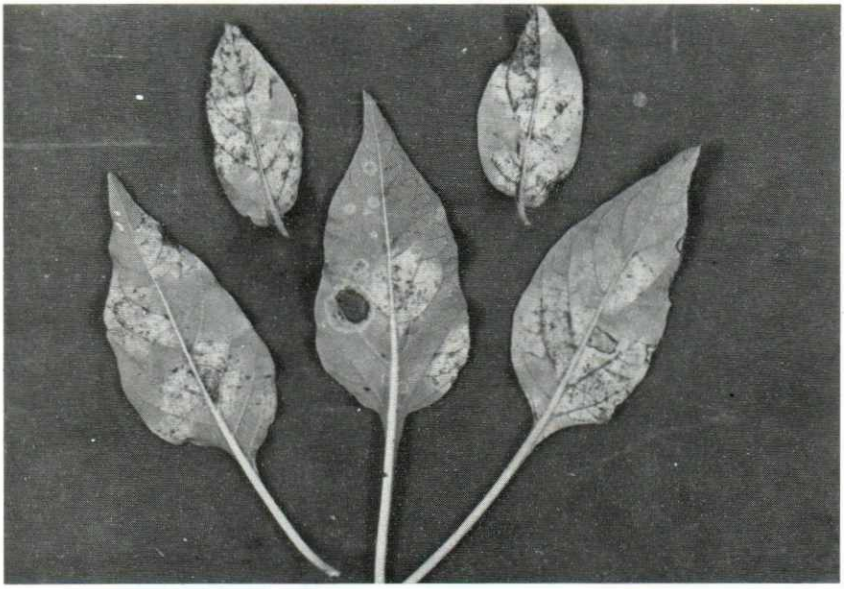

Fig. 1. Leaves of pepper showing typical symptoms of powdery mildew caused by *L. taurica.*

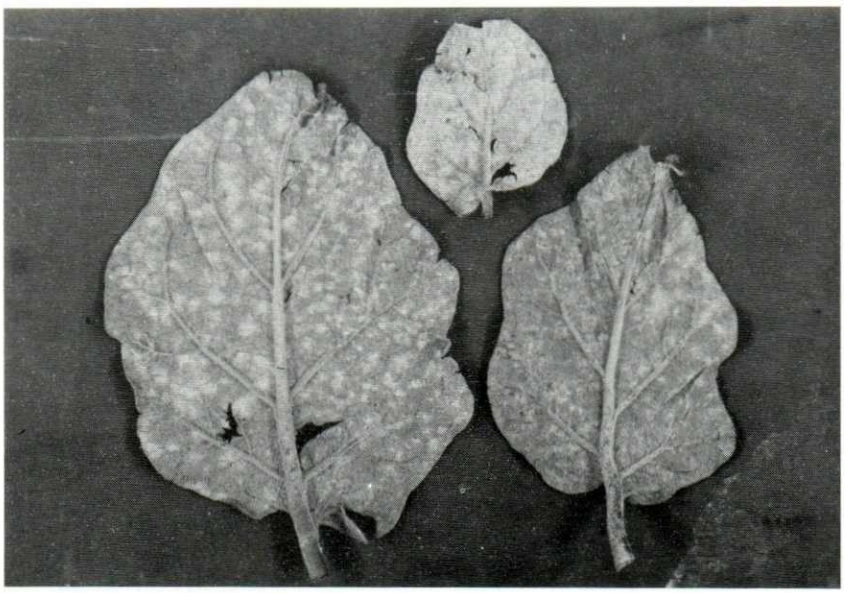

Fig. 2. Leaves of eggplant infected with *L. taurica.*

Examination of the leaves of pepper, eggplant and tomato collected from different regions revealed the invariable presence of the conidial stage of *L. taurica.* It was identified on the basis of its partial endophytic habit with mycellium present both on the epidermal layer and within the mesophyll. Conidiophores were emerging through stomata. Conidia in most cases were of two distinct shapes, cylindrical and navicular,

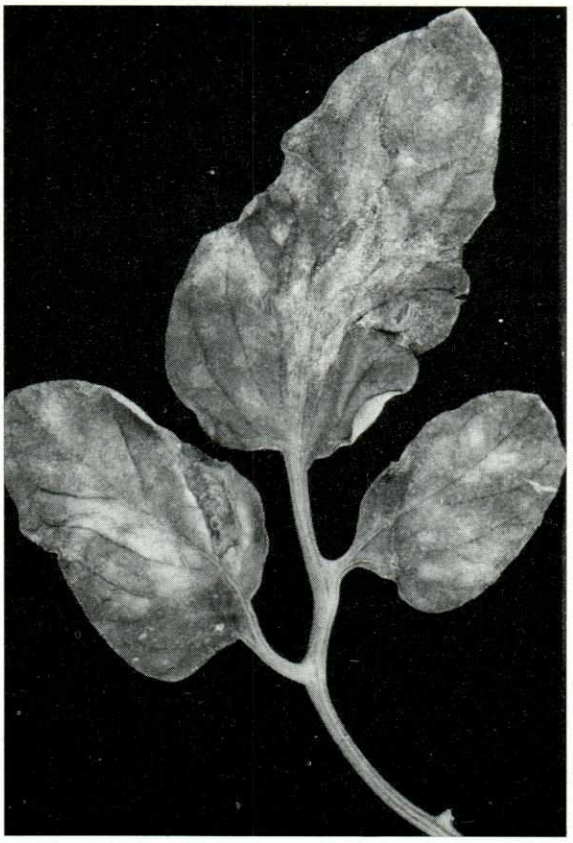

Fig. 3. A tomato leaf from a greenhouse infected with *L. taurica*.

varying greatly in size (52–78 μ in length, and 14–22 μ in width). (Fig. 4 and 5). Perithecia were not present.

It may be concluded that *L. taurica* is widely distributed on solanaceous vegetables particularly on peppers in the coastal belt of the country where most of the cultivation of vegetables is concentrated. The disease seems to recur every year causing substantial damage to these cash crops. Furthermore, the practice of mixed cropping of cucumber, tomato, eggplant and peppers in the same greenhouse or plastic tunnel, or separately in adjacent ones is particularly harmful to tomato because pepper being the most favourable host becomes initially infected and then serves as a source of inoculum for infection of other crops. Cucumber is also known to be infected by *L. taurica* in Libya. (El-Ammari and Khan—unpublished). Environmental conditions available in indoor cultivations apparently favour the spread and development of the disease.

Importance of *L. taurica* on other crops of economic importance in Libya is not well known and needs investigation. *Leveillula taurica* has, however, been enlisted in Libya on *Solanum nigrum* (6) which is a common weed found growing almost throughout the year. This solanaceous weed may be a factor in the recurrence of the disease.

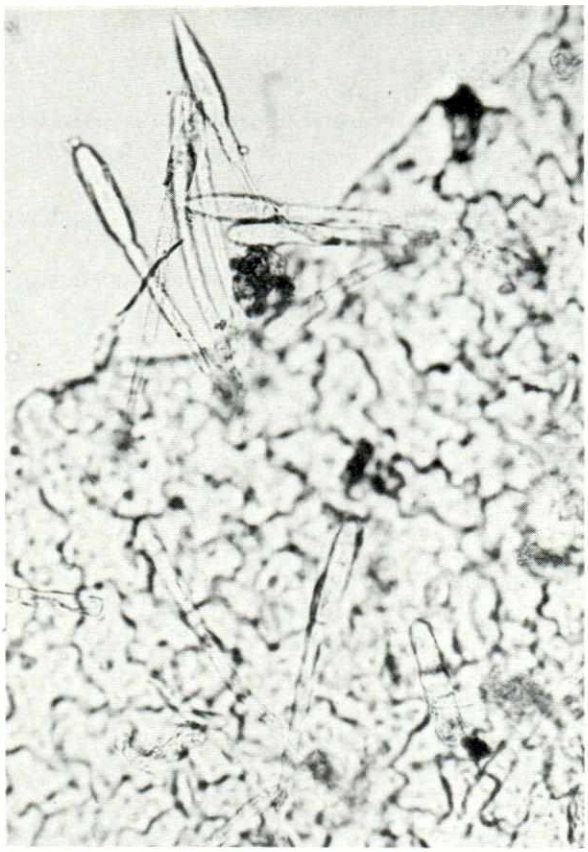

Fig. 4. *L. taurica* conidiophores, with attached conidia emerging from stomata.

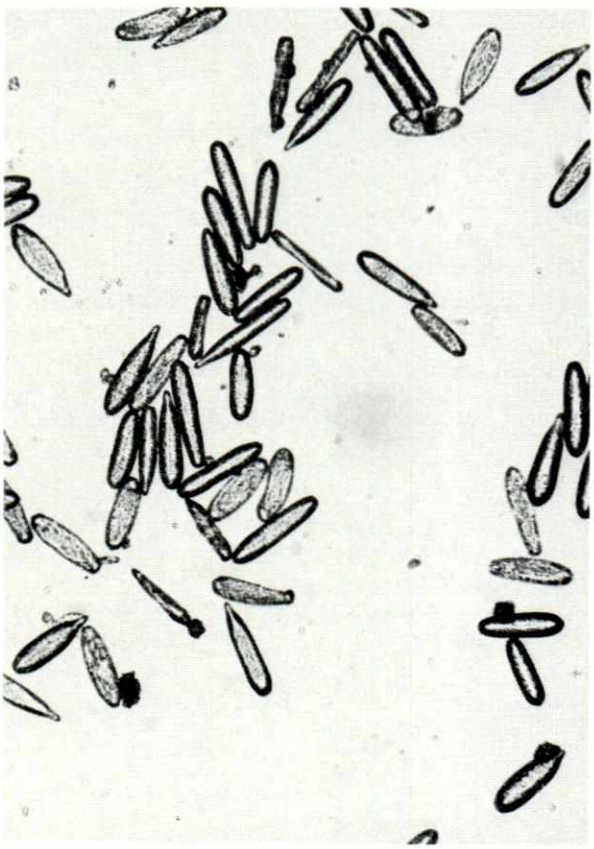

Fig. 5. Conidia of *L. taurica*.

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الفطر (*Leveillula taurica*) على نباتات خضر العائلة الباذنجانية في ليبيا

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المستخلص

بتضمن هذا البحث مشاهدات خاصة بمرض البياض الدقيقي على بعض نباتات خضر (العائلة الباذنجانية) المزروعة بمنطقة الشريط الساحلي في ليبيا . ومن بين العوائل التي لوحظ عليها هذا المرض نباتات الفلفل ، الباذنجان ، والطماطم بينما لم تشاهد أية إصابات على نباتات البطاطس وقد لوحظ ايضا :

١ — أن الإصابة كانت أكثر حدة على النباتات المزروعة تحت أغطية .
٢ — أن البياض الدقيقي كان أكثر إنتشاراً على الفلفل بالمقارنة بالطماطم والباذنجان ، كما أن الأضرار الناجمة عن إصابة الفلفل كانت شديدة في أغلب الأحيان .
٣ — أن إصابة الباذنجان في بعض المناطق قد أحدثت أضراراً كبيرة بالمحصول .
٤ — أن اصابات الطماطم بالبياض الدقيقي لم تلاحظ إلا في أماكن محدودة فقط .

وقد تبين أن العامل السبب للمرض على نباتات الخضر المذكورة آنفاً في المناطق التي شملها البحث هو الطور الكونيدي للفطر (*Leveillula taurica*)