Review Article مراجعة علمية

AN ANALYSIS OF POWDERY MILDEW PROBLEMS IN LIBYA

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Abstract

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This article attempts to present current picture of the powdery mildew disease situation in Libya placing emphasis on the distribution of powdery mildew species in the country and their importance on different crops. In all, 20 species belonging to five genera are recorded in the country on 74 host species. Besides, there are a few *Oidium* spp. recorded on certain hosts. *Erysiphe* species predominate and are most prevalent on several cultivated and wild plants. Cereals, vegetables, legumes, fruit trees, ornamentals and many different kinds of weeds are affected in the country. Grape powdery mildew, cereal powdery mildew, cucurbit powdery mildew and pea powdery mildew are recognized as most serious diseases caused by this group of fungi, occasionally inflicting enormous losses to the growers.

Additional keywords: Powdery mildew, Libya.

Introduction

Libya with a Mediterranean coastline of 1900 km has supposedly very congenial climate for powdery mildew fungi. Up till 1979 only 9 species and 6 form-species of powdery mildew fungi on forty host species were on record. Pucci (1960) was first to publish a short account of plant diseases in Tripolitania (Western Libya) which included *Oidium tuckeri* Berk.; anamorphs of *Sphaerotheca pannosa* (Wall.) Lev., *Podosphaera oxyacanthae* (Wall.) de Bary, *Leveillula taurica* (Lev.) Arn., *Erysiphe cichoracearum* DC. and *E. polygoni* DC.; and anamorph and teleomorph of *Erysiphe graminis* DC. In a later publication, he recognized *Uncinula necator (Schw.)Burr., S. pannosa, E. graminis, E. cichoracearum* and *E. polygoni* as major powdery mildews in Libya (Pucci, 1963). In 1965, he recorded *Oidium* spp. on several crops of economic importance; *E. graminis* on cereals; and *L. taurica* on solanaceous vegetables (Pucci, 1965). Kranz (1962) reported occurrence of *Podosphaera leucotricha* (Ell. Everth.) Salm., *U. necator, E. graminis, L. taurica, E. cichoracearum* and *Oidium* sp. from Cyrenaica (Eastern Libya). Most of these publications appear to be of causal nature, based on sporadic information, without emphasizing the importance of the pathogen in the Libyan context. Their identity were doubtful as no indications are available with regard to the basis of their identification or whether teleomorphs of the powdery mildew species were observed or not.

In recent years (1978 - 1982) efforts were made to study the distribution of powdery mildew fungi in the country and to identify and enlist them infecting different cultivated and wild plants in Libya. Their relative importance were assessed and occurence of teleomorph of some of the species were recorded. Some observations were also made to understand their mode of survival under Libyan conditions (2, 3, 4, 6, 7, 8, 9, 10). As a result, a new picture of powdery mildew problem of the country that has emerged is analysed in the present article to highlight the various aspects of the problem.

Distribution of Powdery Mildews

A perusal of informations now available in the country leads one to conclude that powdery mildews are countrywide in distribution. They are most prevalent in the coastal belt of the country, since crop cultivation and vegetabion are mostly concentrated in this region. Nevertheless, powdary mildews are found on crops grown in oases and in newly developed farms of agricultural projects in the vast desert of the country. Species of five genera viz., *Erysiphe, Sphaerotheca, Leveillula, Podosphaera and Uncinula* are recorded on approximately 74 cultivated and wild plants. Besides, *Oidium* spp. (anamorphs) are reported on several hosts, the identity of some of which is not yet ascertained. *Erysiphe* with its twelve species is most dominant genus followed by *Sphaerotheca* with its four species; and *Podosphaera* with its two species. With single species each, *Leveillula* and *Uncinula* are the other genera occurring in the country (Table 1).

An analysis of powdery mildew fungi reported to occur on various host crops indicates that nine species are recorded on cultivated plants and 14 on wild plants. Vegetables are attacked by three species; cereals by one; fruit trees by four; legumes and ornamentals each by two species. Some other cultivated plants are attacked by three species of powdery mildew fungi (Table 2).

Species of *Erysiphe* are known to infect 42 host species, largest number infected by species of any genus in the country (Table 3). *Erysiphe betae* (Vanha) Welt. Exclusively occurs on cultivated plants. *Erysiphe convolvuli* DC., *E. galeopsidis* DC., *E. polygoni* DC., *E. sordida* Junell and

E. urticae (Wall.) Blumer are confined to wild plants. *E. cichoracearum* DC., *E. communis* (Wall.) Lind., *E. graminis* DC., *E. heraclei* DC., *E. pisi* DC. and *E. trifolii* Grev. are present both on cultivated and wild host species (Table 3). *E. cichoracearum* has largest number of host distributed in three families. Identity of species on some of its hosts, however, recorded by Pucci (1963, 1968) are doubtful. For example, this species does not infect members of Brassicaceae and Solanaceae as claimed by him. Perphaps he could not establish the identity of *E. communis* and *L. taurica* (Lev.) Arn., now established to occur on these families respectively. *E. graminis and E. pisi* are exceedingly serious on cereals and legumes respectively. *E. cichoracearum, E. trifolli* and *E. heraclei* are other economically important species of *Erysiphe* in the country (Khan and Mussa, 1979; Khan, 1980, 1982; Khan and Faraj, 1982).

Five species of *Sphaerotheca* infect 20 host species, the second largest number infected by the species of any genus in the country (Table 4). *Sphaerotheca fluiginea* (Schtecht.) Poll. is The most widely occurring species infecting all cultivated cucurbits in the country (Khan and Faraj, 1982; El-Ammari, 1983) as well as some cultivated and wild species in Asteracea. *Sphaerotheca erodii* (Jacz.) Rayss. and *S. euphorbiae* (Castag.) Salmon are exclusively recorded on wild plants while *S. pannosa* (Wall.) Lev. and *S. pannosa* var. *persicae* Woron. infect roses and stone fruits respectively.

L. taurica (Lev.) Arn., *U. necator* (Schw.) Burr., *P. leucotricha* (Ell.& Everth.) Salm. and *P. oxyacanthae* var. *tridactyla* (Wall.) Salmon are other species of powdery mildew in the country infecting cultivated plants (Table 5). *L. taurica occurs throughout the country on solanaceous vegetables and some cucurbits, infecting at least seven cultivated hosts. Similarly, U. necator* is wide-spread on grapes. *P. leucotricha* and *P. oxyacanthae* var. *tridactyla* infect some fruits in the family Rosaceae, particularly in the eastern coast (Kranz, 1962; Khan, 1982).

New Records

Studies of Khan and his associates (Khan and Mussa, 1979; Khan, 1980, 1982; Khan and Faraj, 1982; El-Ammari and Khan, 1983) added several new host species of the country to host indices of powdery mildew fungi. Reports of existence of *E. communis* on *Brassica tournefortii* Gouan., *E. graminis* on *Avena barbata* Pott. Link. *A. eriantha* Durieu, *Lophochloa cristata* (L.) Hyl. and *Bromus diandrus* Roth.; *E. cichoracearum* on *Amberboa lippii* L. and *Conyza bonariensis* (L.) Cornq. and *S. fuliginea* on *Bidens bipinnata* L. were new world host records.

E. heraclei, E. sordida, E. euphorbiae, E. urticae, E. trifolii, E. convolvuli, E. erodii, E. betae, E. galeopsidis and *E. fuliginea* were new addition to the powdery mildew flora of Libya. Besides, *E. communis, E. pisi* and *E. polygoni* were redesignated on their respective hosts according to the current taxonomic status. Several host species were found new to the country. *E. graminis* on *B. diandrus, Phalaris minor* Retz., *Ayena barbata, A. eriantha* and *Lophochloa cristata; E. heraclei* on *Torilis nodosa* (L.) Gaertner and *Foeniculum vulgare* Mill.; *E. sordida* on *Plantago lagopus* L.; *E. urticae* on *Urtica urens* L.; *E. communis* on *Sisymbrim irio* L. *Papaver dubium* L., *Rapistrum rugosum* (L.) Alld. and *B. tournefortii; E. cichoracearum* on *Hedyopnois cretica* L., *C. bonariensis* and *Chrysanthemum carinatum* L.; *E. pisi* on *Lens esculentus* L. *Vicia monantha* Roth. *Medicago Lupulina* L. and *Medicago sativa* L.; *S. euphorbiae* on *Euphorbia terracina* L.; *E. trifolii* on *Melilotus indicus* (L.) Alld.; *E. convolvuli on Convolvulus arvensis* L. and *Ipomea hederacea* (L.) Jacq.; *E. polygoni* on *Polygonum equisetiforme* Sibth & Sm.; *S. fuliginea* on *Cucumis sativus* L., *Cucurbita maxima* Duch., *C. pepo* L., *Cucumis melo* L., *Lagenaria leucantha* (Duch.) Rusby and other cucurbits, *Calendula officinalis* L., *C. arvensis* L. and *Bidens bipinnata; S. erodii* on *Erodium malacoides* (L.) Herit., *E. laciniatum* (Cav.) Willd.; *E. betae* on *Beta vulgaris* var. *cicla* L.; *E. galeopsidis* on *Lamium amplexicaule* L. and *L. taurica* on *Cucumis sativus L. emerged as new records for the country.*

Perithecial Production

Perithecia (teleomorphs) of powdery mildews are formed on certain hosts but rather infrequently in Libya. Six species of *Erysiphe* and one of *Sphaerotheca* are recorded in perithecial stage (Table 1). *E. cichoracearum* is recorded in perithecial stage on two weeds of Asteraceae. On cultivated hosts, it has been observed only in condial stage. Similarly, perithecial stage of *E. communis, E. sordida* and *E. galeopsidis* are recorded on weeds only. *E. graminis* and *E. heraclei*, however, have been found to produce perithecia both on cultivated and wild hosts (Tables 1, 3). Production of perithecia in *E. graminis* on cereals and grasses is rather common. *S. fuliginea* is the only species of *Sphaerotheca* recorded to produce its teleomorph on *C. pepo*. Production of perithecia in this species seems to be very infrequent. Environmental relationships of perithecial production in different powdery mildew species in the country should receive adequeate study.

Importance of Powdery Mildews on Different Crops

Powdery mildews on cucurbits: Cucurbits are one of the important groups of cultivated plants in Libya and are grown in glasshouses, plastic tunnels and outdoor plots. Cucumber, squash, watermelon cantaloupe are cultivated on a large scale, while pumpkins, longmelon, snapmelon, spongegourd and bottlegroud on a limited scale. Powdery mildew appears on most of the cucurbits every year and sometimes leads to eventual crop failure especially in indoor cultivations. A recent survey by El-Ammari (1983) indicated that all the cucurbits are affected by the disease with cropwise or locality-wise variations in the incidence and intensity. Indoor and outdoor cucumbers and squashes are most severely affected cucurbits. Other cucurbits are less severely attacked. Watermelon is, however, usually found free from the disease particularly in field plots. In general, the disease is more frequent in indoor cultivations than in outdoor plots.

As much as three species of powdery mildews, *S. fuliginea, E. cichoracearum* and *L. taurica*, are reported on cucurbits (El-Ammari, 1983; Khan, 1981; El-Ammari and Khan, 1983). *S. fuliginea* is most prevalent on indoor and

outdoor cucurbits throughout the country. *E. cichoracearum* and *L. taurica* are confined to indoor cucurbits especially on cucumber. Mixed cropping of cucumber, tomato and pepper in separate but adjacent stands in the same indoor cultivation units is common. Pepper being most favourable host of *L. taurica* becomes initially infected and possibly serves as source of infection for cucumber. Difference in the sowing time of cucurbits in indoor and outdoor cultivations apparently ensures availability of cucurbits throughout the year for perpetuation of the pathogen and recurrence of the disease.

Powdery mildew on solanaceous vegetables: Plants of all ages of peppers (both hot and sweet), eggplant and tomato are infected by *L. taurica* in the coastal belt of the country with greater incidence and intensity in indoor cultivations than in outdoor fields. Peppers suffer more than eggplant or tomato (Khan and El-Ammari, 1982). The disease appearing every year causes substantial damage to these cash crops. Environmental conditions available in indoor cultivations favour the spread and development of the disease.

L. taurica does not seem to be important on other crops of economic importance, though several crops known to be host species of this powdery mildew fungusare grown in the country. *Solanum nigrum* L., a common solanaceous weed is reported to be infected with *L. taurica* (Pucci, 1965) and may be a factor in the annual recurrence of the disease.

Powdery mildew on other vegetables: Lettuce, cabbage, radish and carrot are among the other vegetables in the country known to be affected by the powdery mildew (Anon. 1968). Identity of the species infecting each of these crops are not properly ascertained. The author during his studies did not find powdery mildews on these crops. But *E. communis*, *E. heraclei* known to be important parasites of cabbage and carrot families respectively were observed on non-cultivated hosts.

Powdery mildew on cereals: *E. graminis* recurs every year on wheat, barley and oats and is especially destructive on barley. The damage caused is not properly assessed but apparently substantial damage is caused to barley and wheat. Several grasses are also infected by *E. graminis* in different parts of the country (Khan and Mussa, 1979; Khan, 1980, 1982). Proper attention and effective measures are required to control the disease.

Powdery mildew of legumes: *E. pisi* and *E. trifolii* attack legumes in Libya. *E. pisi* causes considerable damage especially on pea. Lentil crops are also badly affected in certain years. Certain leguminous weeds are also infected by *E. pisi* (Khan, 1980, 1982). Mode of its survival is not known, but it appears regularly and under favourable weather conditions assumes severity in a widespread area. Proper control measures are not adopted since its importance is not well recognized in the country. *E. trifolii* known to infect *M. indicus* and *T. foenicu-graecum* also assumes severity in certain years. But it is not as important as *E. pisi.*

Powdery mildew on grapes and other fruits: *Uncinula necator* is definitely the most important powdery mildew of fruits. It appears regularly in the country and causes enormous loss to grapes under favourable environmental conditions rendering entire crops in some years useless due to poor fruiting and premature fall of fruits. In terms of acreage and production, grape is one of the most important fruit crops of the country. General awareness about the control measures to prevent the disease is lacking.

Other fruits like apples, almonds, peaches, apricot are also affected by powdery mildew but occasionally. The disease is not considered potentially damaging in the country.

Powdery mildews on ornamentals: Roses are infected by *S. pannosa* but not regularly. Annual composit ornamentals like *E. elegans*, *C. officinalis* and *Chrysanthemum* sp. are infected by *S. fuliginea* and *E. cichoracearum.*

A perusal of the information available on the importance of the powdery mildews on the different crops in terms of damage and annual recurrence, indicates that powdery mildew of cereals, *E. graminis* appears to be most destructive especially on barley among field crops. Cucurbit powdery mildew caused by *S. fuliginea* which appears almost every year on a number of indoor and outdoor cucurbits inflicts enormous damage. Occurrence of three species, *S. fuliginea*, *E. cichoracearum* and *L. taurica* on cucurbits adds to the seriousness of the problem. *S. fuliginea* does not spare cucurbits grown in deserts as well. The powdery mildew of pea, next in the order of imprtance, causes heavy crop loss especially under facourable weather conditions. Peppers also suffer greatly due to *L. taurica* every year. Powdery mildews on other field crops, although encountered frequently, seemingly do not cause appreciable damage except occasionally in certain years.

Grapes among fruits is most destructively damaged by the powdery mildew and the disease is exceedingly serious. Disease appears almost every year; the intensity, however, may vary. Other fruits are not so harmed by the powdery mildews as grapes.

Recurrence of Powdery Mildews

Observations made in Libya on this aspect of the problem is negligible. Certain factors like cropping patterns, cultivation in outdoor fields during mild summer and indoor units during intense winter, inadequate weed management practices and moderate climate of the country seem to be important in this context, and may ensure the existence of these fungi throughout the year. Observations made with regard to powdery mildew of cucurbits, *S. fuliginea* demonstrates that transfer of inoculum from indoor to outdoor field in summer and from outdoor to indoor units at the onset of winter is possible mode of survival of the fungus throughout the year. By the time crops mature in glasshouses in early summer outdoor become available for attack. Late sown and cucurbits maintained in outdoor field till early winter serve as sources of infection. The same pattern of inoculum transfer may be possibly true for *L. taurica* as its major host-pepper, tomato and eggplant, are grown in indoor and outdoor units. Though not investigated, perithecia formed regularly in *E. graminis* may have some role in the annual recurrence of the disease. Role of several grasses infected with

E. graminis may also be envisaged. Mode of survival of important and potentially damaging species like *E. pisi* and *U. necator* is also not known. These aspects need to be investigated.

Table 1. Genera and species of powdery mildew fungi recorded in Libya.

Genera	Species
Erysiphe	*betae, cichoracearum*, communis *, convolvuli, galeopsidis *, graminis *, heraclei *, pisi, polygoni, sordida *, trifolii* and *urticae.*
Sphaerotheca	*erodii, euphorbiae, fuliginea ** and *pannosa.*
Podosphaera	*leucotricha* and *oxyacanthae* var. *tridactyla.*
Leveillula	*taurica.*
Uncinula	*necator.*

* *Species recorded in perithecial stage.*

Table 2. Distribution of species of powdery mildew fungi on various host-crops.

Host crops	Recorded species
Cultivated plants	(9)*
Vegetables	(3) *Erysiphe cichoracearum* *Sphaerotheca fuliginea* *Leveillula taurica*
Cereals	(1) *Erysiphe graminis*
Fruit trees	(4) *Sphaerotheca pannosa* *Podosphaera leucotricha* *Podosphaera oxyacanthae* *Uncinula necator*
Legumes	(2) *Erysiphe pisi* *E. trifolii*
Ornamentals	(2) *Erysiphe cichoracearum* *Sphaerotheca fuliginea*
Other cultivated plants	(3) *Erysiphe heraclei* *E. pisi* *E. trifolii*
Wild plants	(14) *Erysiphe heraclei* *E. cichoracearum* *E. graminis* *E. sordida* *E. urticae* *E. communis* *E. pisi* *E. trifolii* *E. convolvuli* *S. euphorbiae* *S. fuliginea* *S. erodii* *E. galeopsidis* *E. polygoni*

* Figures in parentheses indicate number of powdery mildew species recorded.

Table 3. *Erysiphe* species and their host species recorded in Libya.

Fungus species	Host family	Host species	Reference
Erysiphe cichoracearum	Asteraceae (Compositae)	*Zinnia elegans*	Pucci, 1960, 1965; Khan, 1980.
		Amberboa Lippii *	Khan, 1980
		Hedypnois cretica *	
		Conyza bonariensis	
		Sonchus oleraceous	
		Chrysanthemum carinatum	Khan and Faraj, 1982
	Cucurbitaceae	*Citrullus vulgaris*	Pucci, 1963
		Cucumis sativus	El-Ammari, 1983.
	Brassicaceae (Cruciferae)	*Raphanus sativus*	Anon., 1968.
		Brassica oleracea var. *capitata.*	Pucci, 1963.
	Solanaceae	*Lycopersicum esculentum*	Pucci, 1963.
E. graminis	Poaceae (Graminae)	*Triticum aestivum*	Kranz, 1962. Pucci, 1965.
		Avena sativa	Pucci, 1965.
		Bromus diandrus *	Khan and Mussa,

Table 3 (Contd.)

Fungus species	Host family	Host species	Reference
		Hordeum vulgare *	1979.
		Phalaris minor	Khan, 1980.
		Avena barbata	Khan, 1982.
		A. eriantha	
		Lophoclloa cristata *	
		Poa pratensis	
E. pisi	Fabaceae (Papilionaceae)	*Pisum saticum*	Khan, 1980
		Lens esculentus	
		Vicia monantha	
		Medicago lupulina	
		M. sativa	Khan and Faraj, 1982.
		Vicia villosa	
E. communis	Brassicaceae	*Sisymbrium irio* *	Khan, 1980
		Brassica tourenfortii	Khan and Faraj
		Rapistrum rugosum	1982
	Chenopodiaceae	*Beta vulgaris*	Anon. 1968.
	Papaveraceae	*Papaver dubium*	Khan and Faraj, 1982
E. trifolii	Fabaceae	*Melilotus indicus*	Khan, 1980
		Trigonella foenicum -graecum	
E. heraclei	Apiaceae (Umbelliferae)	*Torilis nodosa* *	Khan and Mussa, 1979
		Foeniculum vulgare *	Khan, 1980
E. convolvuli	Convolvulaceae	*Convolvulus arvensis*	Khan, 1980
		Ipomea hederacea	Khan, 1982.
E. betae	Chenopodiaceae	*Beta vulgaris* var. *cicla.*	Khan, 1982
E. polygoni	Polygonaceae	*Polygonum equiseteforme*	Khan, 1982
E. sordida	Plantaginaceae	*Plantago lagopus* *	Khan and Mussa, 1979 E. sordida
E. urticae	Irticaceae	*Urtica urens*	Khan, 1980
E. galeopsidis	Lamiceae (Labiatae)	*Lamium amplexicaule* *	Khan, 1982.

* Recorded in perithecial stage.

Table 4. *Sphaerotheca* species and their host species recorded in Libya.

Fungus species	Host family	Host species	Reference
Sphaerotheca fuliginea	Cucurbitaceae	*Cucumis sativus*	Khan, 1981.
		Cucurbita pepo *	El-Ammari and Khan, 1985.
		C. maxima	Khan and Faraj, 1982.
		C. moschata, Lagenaria leucantha, Luffa cylindrica, Cucumis melo, C. melo var *utilissimus, C. melo* var. *momordica, Citrullus vulgaris.*	El-Ammari, 1983.

Table 4. (Contd.)

Fungus species	Host		Reference
	family	species	
	Asterareae	*Calendula officinalis*	Khan and Faraj, 1982.
		C. arvensis	
		Bidens bipinnatae	Khan, 1982.
S. pannosa var. *persicae*	Rosaceae	Almond, peach, plum	Anon. 1968.
S. pannosa	Rosaceae	*Rosa* sp.	Khan, 1982.
S. erodii	Geraniaceae	*Erodium laciniatum*	Khan, 1982.
		E. malacoides	
S. euphorbiae	Euphorbiaceae	*Euphorbia terracina*	Khna, 1980

* *Recorded in perithecial stage.*

Table 5. Species of *Leveillula*, *Podosphaera* and *Uncinula* and their host species recorded in Libya.

Fungus species	Host		Reference
	family	species	
Leveillula taurica	*Solanaceae*	*Solanum nigrum*	Pucci, 1965.
		Capsicum frutescens	Kranz, 1962; Khan and Faraj, 1982.
		Lycopersicon esculentum	Khan and El-
		Solanum melongena	Ammari, 1982.
	Cucurbitaceae	*Cucumis sativus*,	El-Aınmari and
		Cucurbita moschata,	Khan, 1983.
		C. maxima	
Podosphaera leucotricha	*Rosaceae*	*Apple*	*Kranz, 1962.*
P. oxyacaṇthae var. *tridactyla*	Rosaceae	*Armeniaca vulgaris*	Khna, 1982.
		Prumus armeniaca	
Uncinula necator	Vitaceae	*Vitis vinifera*	Kranz, 1962; Pucci, 1983.

Table 6. *Oidium* species* recorded on various hosts in Libya.

Fungus species	Host		Reference
	family	species	
Oidium tuckeri	Vitaceae	*Vitis vinifera*	Pucci, 1960.
O. ceratoniae	Apiaceae	Carrot	Anon. 1968.
O. crysiphoides	Apiaceae	Carrot	Anon. 1968.
O. obliqua	Chenopodiaceae	*Rumex* sp.	Anon. 1968.
Oidium sp.	Rosaceae	*Prunus persica*	Pucci, 1965.
		P. armeniaca	
	Fabaceae	*Trigonella foenicum -graecum*	Pucci, 1965.
		Pisum sativum, beans, pea-nut, *Medicago* sp.	Anon. 1968.
	Cucurbitaceae	Cucurbits	Anon. 1968.

Table 6. (Contd.)

Fungus species	Host family	Host species	Reference
	Brassicaceae	Cabbage, cauliflower	Anon. 1968.
	Asteraceae	*Cychorium inlytens*	Anon. 1968.
		Lactuca sativa	
		Carthamus tinctorius	
		Cineraria folium	
		Verbena officinalis	
		Zinnia elegans	
		Chrysanthemum sp.	
	Solanaceae	Tobacco, potato	Anon. 1968.
	Malvaceae	Okra	
	Convolvulaceae	*Convolvulus* sp.	

• Includes *Oidium* records not assigned to any species passed on conidial characters.

الملخص

م. و. خان. 1987. دراسة حول مرض البياض الدقيقي ومشاكله في ليبيا. مجلة وقاية النبات العربية 5: 46 - 39

هذه المقالة هي محاولة وصف المظاهر المختلفة لمرض البياض الدقيقي في ليبيا، إذ أن مشاكله لم تستكشف نسبياً. أنجزت في السنوات الأخيرة دراسات حول «فلورا» مرض البياض الدقيقي وذلك لتوضيح نواح أخرى عنه على بعض المحاصيل. وتستعرض هذه المقالة المعلومات المتوفرة حتى الآن والرقع الحالي للمرض على عدد كبير من المحاصيل ذات الأهمية الاقتصادية، وخاصة توزيع أنواع الفطريات المسببة للمرض في ليبيا وأهميتها النسبية والمشاكل التي تسببها للمحاصيل. هذا بالإضافة إلى استعراض الظروف المناخية والمحاصيل المهمة والأهمية التاريخية للبحوث على فطريات البياض الدقيقي. لقد سجل حتى الآن عشرون نوعاً تنتمي إلى خمسة أجناس من هذه الفطريات على 74 نوعاً من العوائل، بالإضافة إلى ذلك هناك عدة أنواع من الاويديوم (*Oidium* spp.) هذا وتسود أنواع الايريسيفي (*Erysiphe*) خاصة على النباتات المزروعة والبرية، مثل الحبوب والخضار والبقوليات والأشجار المثمرة ونباتات الزينية وعدة أنواع من الأعشاب. إن الأمراض ذات الأهمية الكبيرة هي البياض الدقيقي على الكرمة والحبوب والخيار والبزلاء التي تصاب بتلك الفطريات ويتسبب عن ذلك في بعض الأحيان خسائر جسيمة.

آمل من خلال هذه المقالة أن ألفت نظر الباحثين إلى هذا المرض وتشجيع القيام ببحوث أخرى حول الفطريات المسببة له كي يصبح لدينا صورة واضحة خاصة عن المرض في ليبيا بحيث يصبح من الممكن في المستقبل حل مشاكل مرض البياض الدقيقي بصورة فعالة ومناسب.

كلمات مفتاحية: البياض الدقيقي، ليبيا.

References

1. Anon. 1968. **List of plant diseases recorded in Libya.** Ministry of Agriculture and Animal Wealth. Plant Protection Department, Memiograph.
2. El-Ammari, S.S. 1983. Studies on certain aspects of powdery mildews of cucurbits in Libya. M. Sc. Thesis, Faculty of Agriculture, Alfateh University, Tripoli.
3. El-Ammari, S.S. and M. Wajid Khan. 1983. *Leveillula taurica* powdery mildew on greenhouse cucumber in Libya. Plant Disease 67: 553 - 555.
4. El-Ammari, S.S. and M. Wajid Khan. 1985. *Sphaerotheca fuliginea* (perithecial stage) on cucurbits in Libyan Arab Jamahiriya. FAO Plant Prot. Bull. 33: 42 - 44.
5. Hirata, K. 1966. Host range and geographical distribution of the powdery mildews. Niigata University, Japan.
6. Khan, M. Wajid and A.E.A. Mussa. 1979. Powdery mildews in the Libyan Jamahiriya. I. Identity of certain powdery mildew fungi. Libyan J. Agr. 8: 161 - 167.
7. Khan, M. Wajid. 1980. Powdery mildews in Libyan Jamahiriya. II. Identity of certain powdery mildew fungi. Libyan J. Agr. 9: 137 - 143.
8. Khan, M. Wajid. 1981. *Sphaerotheca fuliginea*, causing powdery mildew on cucumber-a new record for Libyan Jamahiriya. Libyan J. Agr. 10: 145 - 150.
9. Khan, M. Wajid. 1982. Powdery mildews in the Libyan Jamahiriya. IV. Identity of certain powdery mildew fungi. Libyan J. Agr. 11: 127 - 132.
10. Khan, M. Wajid and I.S. Faraj. 1982. Powdery mildews in the Libyan Jamahiriya. III. Identity of certain powdery mildew fungi. Libyan J. Agr. 11: 121 - 126.

المراجع

11. Kranz, J. 1962. Plant disease in Cyrenaica. FAO Pl. Prot. Bull. 10: 121 – 125.

12. Pucci, E. 1960. **Rassegna dei principali casi fitopatologici osservati in Tripolitania.** Riv. Agric. Subtrop. Trop. Anno. LIV No. 1 – 3.

13. Pucci, E. 1963. **Actual situation of major plant diseases in Libya.** Ministry of Agriculture and Animal Wealth. Plant Protection Department, Memiograph.

14. Pucci, E. 1965. **Lista preliminaré della malattie déllé pianté osservaté in Tripolitania.** Dal 1959 Al 1964. Sintomi danni lotta. Riv. Agric. Subtrop. Trop. Anno. LIX No. 7 – 9.