Foliar Diseases of Alfalfa in Egypt

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ABSTRACT

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A survey was made from October 1977 through May 1981 in several regions of Egypt to determine the incidence and severity of leaf and stem diseases of alfalfa. Rust (*Uromyces striatus*), common leaf spot (*Pseudopeziza medicaginis*), and Stemphylium leaf spots (*Stemphylium botryosum, S. vesicarium,* and *S. globuliferum*) were the most severe disease problems. Powdery mildew (*Erysiphe* sp.), downy mildew (*Peronospora trifoliorum*), black stem and leaf spot (*Cercospora zebrina*), and viruses were of lesser importance. Foliar diseases were more prevalent and severe in northern Egypt than in the south. Peak disease periods varied with specific diseases, location, and weather conditions.

Numerous foliar diseases of alfalfa (*Medicago sativa* L.) cause losses of yield and quality wherever the crop is grown (1). In Egypt, however, only common leaf spot caused by *Pseudopeziza medicaginis* has been reported (2) and no evaluations have been made in the major production areas. This paper reports the incidence and severity of leaf and stem diseases of alfalfa as determined by systematic surveys during the period 1977–1981.

MATERIALS AND METHODS

Incidence and severity of leaf and stem diseases of alfalfa were determined in the main areas of production, including New Valley, Esna, Siwa Oasis, and Tahrir and also in research plots at Giza and Kafr El-Sheikh (Fig. 1). Fields were entered at a corner. Plants were collected at random, without regard to disease symptoms or signs, along a diagonal line bisecting the field. Incidence (percent of plants with symptoms) and severity (percent of diseased leaflets per plant) were evaluated on 1,000 and 100 plants, respectively, at each location and each sampling time. Samples were collected at various times each year to determine the period of highest incidence and severity of disease.

Fungi were collected or isolated and identified and tested for pathogenicity. Rust uredospores and teliospores were collected from leaf sori, placed in sealed glass tubes, and refrigerated. Powdery and downy mildews were identified on the leaves. Nonobligate pathogens were isolated by incubating diseased leaf and stem tissues in moist chambers or on water agar at 27 C after treatment with hydrogen peroxide. Hyphal-tip and single-spore techniques were used to separate mixtures.

Stored rust spores and fungus cultures were used to inoculate common varieties from New Valley, Esna, and Siwa Oasis to determine pathogenicity. For each variety, four replicates, each consisting of 10 2-mo-old plants, were inoculated with each isolate. Tween 20 was added to inoculum suspensions at the rate of 35 μL/100 ml. Inoculated plants were incubated in the dark for 24 hr (rust) or 48 hr (other fungi) in saturated humidity at 27 C, then transferred to a greenhouse for symptom development. Koch's postulates were satisfied whenever feasible by reisolating and identifying fungi from plants developing symptoms in the greenhouse.

RESULTS AND DISCUSSION

Incidence and severity of rust and the leaf spot complex are shown in Table 1. Rust was present every year in the six locations and was severe enough each year at Tahrir and Giza to be considered a major disease problem; rust was a minor

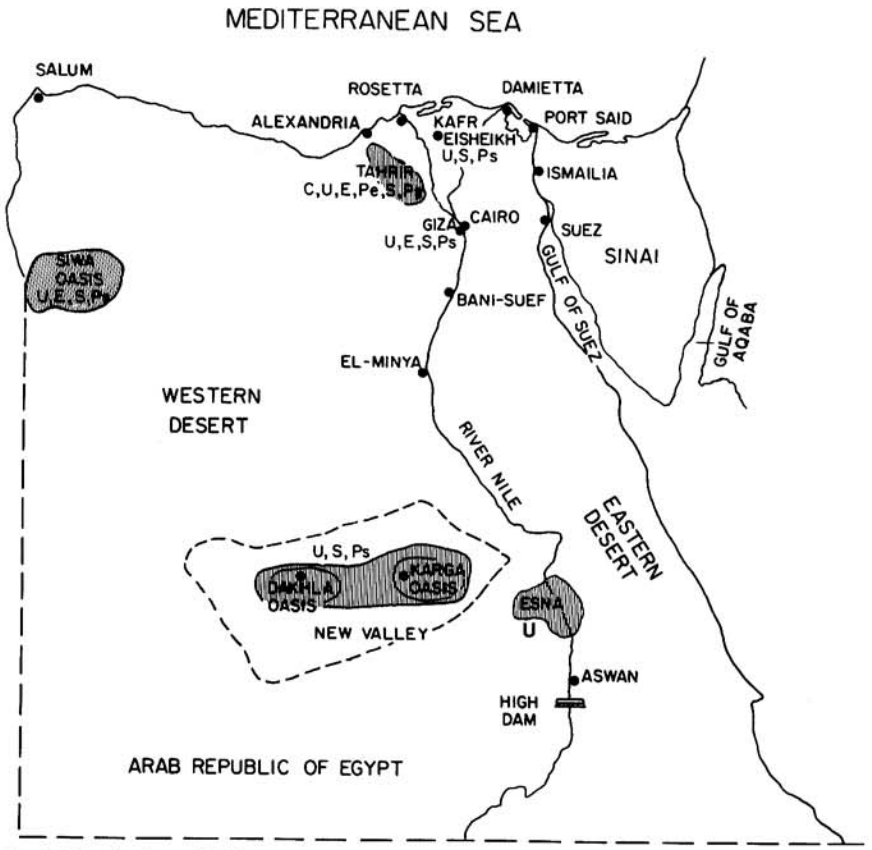

Fig. 1. Distribution of foliar pathogens of alfalfa at major production areas and other sampling sites in Egypt. U = *Uromyces striatus*, E = *Erysiphe* sp., Pe = *Peronospora trifoliorum*, S = *Stemphylium* sp., Ps = *Pseudopeziza medicaginis*, and C = *Cercospora zebrina*. Shaded areas indicate main areas of alfalfa production.

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Table 1. Maximum incidence, severity, and peak activity period for rust and leaf spots of alfalfa at six locations in Egypt

Location	Rust			Leaf spot complex[a]		
	Incidence[b] (%)	Severity[c]	Peak months	Incidence (%)	Severity	Peak months
New Valley	20	L	Mar., Apr.	20	L	Mar., Apr.
Esna	1	L	Mar., Apr.	0	O	...
Giza	100	M	Sept., Oct.	25	M	Jan., Feb.
Siwa Oasis	20	L	Sept., Oct.	1	L	Sept., Oct.
Tahrir	100	S	May, June	100	S	Jan., Feb., Mar., Apr.
Kafr El-Sheikh	5	L	May, June	1	L	Jan., Feb.

[a] Individual leaf spots not differentiated.
[b] Percent of 1,000 randomly selected plants with disease.
[c] Severity of disease: L = < 20%; M = 20 to 50%; S = > 50% of leaflets on affected plants with disease symptoms.

problem elsewhere. Leaf spots were present at most locations each year but were only serious at Tahrir. Powdery mildew reached 19% incidence in October at Siwa Oasis and some plants were severely attacked. Powdery mildew was minor at Giza and Tahrir and not found at the other sites. Downy mildew was found on 1% of the plants only at Tahrir in October. Virus mosaic symptoms were moderately severe on 29% of the plants at Siwa Oasis in October and severe on 30% of the plants at Kafr El-Sheikh in June. Virus mosaic symptoms occurred on only 1% of the plants at both Esna and Tahrir. Aphid populations appeared greater by visual estimate at Siwa Oasis and Kafr El-Sheikh than at any other location.

Geographic distribution of the various foliar pathogens is shown in Figure 1, and identification of fungi isolated from diseased plant leaves and stems was as follows: Several fungi isolated from diseased leaves were not pathogenic in subsequent greenhouse inoculations and are not discussed in this paper. Fungi considered pathogenic but not tested further included the powdery mildew fungus (*Erysiphe* sp. Hedw. F. ex Fr.), the downy mildew fungus (*Peronospora trifoliorum* de Bary), and *Pseudopeziza medicaginis* (Lib.) Sacc., which were identified directly from leaf material. The rust fungus (*Uromyces striatus* Schroet. var. *medicaginis* (Pass.) Arth.), *Stemphylium botryosum* Wallr., *S. vesicarium* Wallr., *S. globuliferum* Vest., and *Cercospora zebrina* Pass. were all pathogenic in greenhouse tests and were recovered from inoculated greenhouse plants.

Uromyces, *Pseudopeziza*, and *Stemphylium* caused the most severe foliar diseases on alfalfa in Egypt. *Erysiphe* was a problem only at Siwa Oasis, and alfalfa mosaic virus may have affected yield at Siwa Oasis and at Kafr El-Sheikh. Stem diseases or downy mildew were not serious at any location.

Alfalfa grown at Esna and New Valley in southern Egypt was relatively free of disease, probably because of the high temperatures and low relative humidities in these areas. Climatic conditions at Tahrir and Giza provided cool humid conditions for extended periods that were sufficient for major disease development. Low incidence of foliar diseases at Kafr El-Sheikh may have been due to the small amount of alfalfa in the area and the relative isolation of the plots.

Resistance to *Pseudopeziza* and *Uromyces* should be given high priority in breeding projects to develop alfalfa varieties for northern Egypt. Esna and New Valley hold promise as areas well suited to alfalfa seed production because of the low incidence of leaf and stem diseases; however, Fusarium wilt and Rhizoctonia root rot could be limiting (3).

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