

J. CENTER ARAB GULF STUDIES UNIV. BASRAH
PLANT DISEASES OF SOUTHERN IRAQ

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INTRODUCTION

Many investigations have been instituted from time to time into various aspects of plant diseases in Iraq. Al-Adhami (1953) and Mustafa (1965) have published lists of plant diseases reported from different areas of Iraq.

After the establishment of Plant Protection Research Station by the Ministry of Agriculture, in Basrah (1959) and the college of agriculture in Basrah University (1970) the need for revealing the exact status of plant diseases in Southern part of Iraq became ever greater.

The authors, therefore, started an extensive survey of plant diseases regarding their distribution, occurrence and severity so as to guide further research, extension and educational programmes in the area. This publication contains a comprehensive list of the plant pathogenic species of fungi, bacteria, nematodes and phanerogamic plants collected and identified by the authors during 1969 to 1975.

MATERIALS AND METHODS

Cultivated areas in the Southern parts of Iraq were surveyed for plant diseases on frequent trips made at different seasons of the year. Field observations on symptoms, distribution and disease incidence were recorded.

Specimens of affected plant parts were collected in plastic bags and stored under cold conditions (3-70 °C) until they were examined in the laboratory for disease diagnosis.

Diseased specimens showing fructifications were mounted and examined by direct microscopy. Representative specimens were kept in the

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Phytopathological Herbarium either in formalin or pressed and mounted in Riker mounts. Bacterial and fungal pathogens, with no evident fructifications were isolated from the affected plant tissues on appropriate agar media. Pure cultures of the fungus pathogens were then examined microscopically and their species determined with the help of mycological keys and host indices of plant diseases. Cultures of bacterial isolates were examined for their morphological and biochemical features. These features were compared with descriptions in Manual of Bacterial Plant Pathogens (Elliott, 1951). Koch's postulates were performed on those pathogen species which were not reported before in Iraq (Dowson, 1957).

Species determination of the nematode genus *Meloidogyne* was based on the characteristics of the female perineal patterns (Southey, 1965).

Symptomtology alone was employed for the identification of virus diseases (Bos, 1964).

RESULTS AND DISCUSSION

Occurrence, prevalence and severity of the plant diseases collected and identified during 1969-1974 are summarized in table 1. The names of pathogens or primary causes of the diseases are listed in alphabetical order, by causative groups, under their respective hosts. Host plants are also grouped alphabetically by their common names.

Downey Mildews: The downey mildew was observed attacking only spinach in Shat-al-Arab area. Its severity varied considerably depending on the season and on the fluctuations in weather conditions from year to year.

Severe outbreaks of *Peronospora spinaciae* on spinach were observed in some fields of Shat-al-Arab in 1971 and 1973, whereas its occurrence in other years was mild to moderate.

Powdery Mildews: The powdery mildews were widely distributed throughout Basrah province. The most widespread and serious powdery mildew

diseases causing considerable losses were those on Cucurbits (*Erysiphe cichoracearum*), on grapes (*Uncinula necator*), hollyhock (*Leveillula* sp.) and on Okra (*E. cichoracearum*).

Powdery mildew pathogens which caused moderate chronic infections on their hosts every year but caused heavy losses in occasional years were those of carrots (*E. polygoni*), pepper (*Leveillula* sp.), rose (*Sphaerotheca pannosa*) and egg plant (*Leveillula* sp.)

Other powdery mildew diseases of minor economic importance were encountered and are listed in table 1.

RUSTS: The rust pathogens were very common in Basrah area although many of them were of minor economic importance. Cereal rusts were almost *coexistent* with their hosts throughout province but were never observed to cause any losses.

Puccinia allii on garlic (in Safwan area), *P. Porri* on leek and *Uromyces phaseoli* on cow-pea (in general) were observed to be generally severe . Avery severe out-break of *P. porri* on leek was noticed in March, 1972 in Modaina area.

The rusts of alfalfa (*Uromyces striatus - medicaginis*), beans (*Uromyces* sp), onion (*P. porri*) and broad beans (*U. fabae*) were of general distribution and caused occasionally losses of economic concern.

Other rust diseases which were of minor economic importance are listed under their respective host plants in table 1.

SMUTS: Smut diseases were found to be widely spread in the cereal fields but only occasionally causing any losses of economic concern. *Urocystis tritici* and *Neovosia indica* were not observed attacking wheat in this region. *Sphacelotheca sorghi* and *Tolyposporium ehrenbergii* on sorghum were encountered every year and were found to be severe in some fields of Shat-al-Arab and Modaina area.

VASCULAR WILTS: The vascular wilt diseases caused by *Fusarium oxysporum* were found to be restricted in their distribution but were very severe

in the areas where they occurred. They seem to threaten the muskmelon production in Safwan and Al-Hartha areas, although they occur in other areas of the region as well. The disease incidence was observed to be much less in spring crop as compared with summer crop probably due to low soil temperature in spring season.

F. oxysporum f. lycopersici caused serious damage to tomatoes in Mod-aina area but the distribution of the pathogen in different fields was limited to small patches.

Other wilt diseases of mild to moderate economic importance are presented in table 1.

BACTERIAL DISEASES: Several diseases on different plants were suspected to be caused by bacteria but only *Erwinia carotovora* (soft-rot organism) and *Xanthomonas phaseoli* (bacterial blight of beans) could be identified.

E. carotovora was observed to cause moderate to severe losses on cucumber, cabbage, muskmelons and tomatoes whereas *X. phaseoli* was of minor economic importance.

ROOT-KNOT NEMATODES: Root-knot disease caused by *Meloidogyne javanica* was observed to cause severe damage on many cultivated and wild host plants especially on species of Amargillidaceae, Chenopodiaceae, Cucurbitaceae, Leguminaceae and Solanaceae. *M. javanica* was also observed attacking date palms but the damage done was of minor importance.

The disease was widespread in Shat-al-Arab, Abul-Khaseeb, Alhartha, and Al-Qurna areas whereas it was restricted to some fields in Safwan area. Frequent infestations, of moderate to severe intensity, by nematodes seem to be probably due to the favourable temperature and soil conditions during most of the year and also due to the continuous cropping of susceptible crops all the year round.

PHANEROGAMIC PARASITES: The phanerogamic plant parasite belonging to the genus *Cuscuta* was common and serious pathogen especially on alfalfa. Damage caused to other plants like grape vines, gasorinia, rose,

cucumber, snake cucumber cotton and tomatoes was occasionally of any economic significance.

Virus Diseases: The virus diseases were found to be causing serious losses throughout the region especially on Cucurbits and Solanaceous hosts. The symptoms presented quite a complex picture, however, the mosaic virus was the most prevalent amongst all.

Following statement deals with phytopathological observations of special economic importance which do not fall under any of the previously discussed groups.

FIELD CROPS: Moderate to sometimes severe losses were observed on some field crops attacked by the following pathogens: *Helminthosporium* spp. on barley, wheat, corn and sorghum; *Piricularia oryzae* on rice, and *Pythium* spp. on wheat, barley and alfalfa throughout the province wherever these crops were growing.

FRUIT CROPS: *Taphrina deformans* was found to be the damaging pathogen on peach and was very prevalent and serious especially in house gardens where control measures were rarely practised. A gummosis disease of undetermined nature was found to be severe on pomegranate.

Apples suffered occasionally, in Abul-Khaseb area, from the scab fungus *Venturia inaequalis* and very commonly from die-back disease.

In citrus orchards, three diseases of major importance were commonly encountered: the die-back *Alternaria* leaf spot and wilt, probably caused by a combined action of nematodes (*Tylenchulus semipenetrans*) and *Fusarium oxysporum*.

Date palms, the most important fruit crop in Basrah region, suffered very seriously from the inflorescence-rot pathogen *Mauginiella scaetiae* and terminal bud-rot pathogen *Thielaviopsis paradoxa* especially in Southern area of this region.

Inflorescence-rot disease was observed to reach epiphytotic level in the years with rainy springs. This observation is in agreement with Hussain's report of 1965.

VEGETABLE CROPS : *Alternaria* leaf spot disease on lettuce, spinach, cabbage and pepper, although widespread, was only of economic concern in Shat-al-Arab, Al-Hartha and Abul-Khaseeb areas where the high humidity favours its development.

Alternaria solani on tomato and eggplant was found to be widespread and serious, *Rhizoctonia solani* and *Pythium* sp. causing occasionally Serious losses on tomatoes were prevalent in Modaina area.

Cercospora leaf spots were also encountered on different vegetables throughout the region and were of moderate importance.

A market disease of potato tubers, the dry-rot caused by *Fusarium caeruleum* was observed to be of great economic value.

SUMMARY

A plant disease survey was started in 1969, which is still in progress, to collect, identify and preserve specimens of plant diseases occurring on economic crops in Basrah province. A total of 173 different plant diseases caused by 71 species of pathogens occurring on 48 host species were encountered. This list included 111 diseases caused by fungal species, 5 by bacterial species, 20 by nematodes, 6 by phanerogamic parasites, 13 by viruses and 15 by unknown causes. Three diseases were found to be caused by non-parasitic causes. Of these, the previously unrecorded diseases for Basrah province were marked with an asterisk which are 56 in number. The distribution, prevalence and relative importance of the diseases and major disease groups were discussed.

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Table 1

LIST OF PLANT DISEASES COLLECTED AND IDENTIFIED IN BASRAH PROVINCE
DURING 1969-74.

* Plant diseases being reported for the first time.

Host	Cause	Location Observed	Occurrence & Severity	Common Name or Major Symptom
FIELD AND FORAGE CROPS				
alfalfa	<i>Cuscuta</i> sp.	Shat-al-Arab, Abul-Khaseeb, Hartha & Qurma	severe	dodder
	<i>Erysiphe polygoni</i>	Shat-al-Arab, Abul-Khaseeb	some times severe	powdery mildew
	* <i>Leveillula</i> sp.	do	do	do
	* Physiologic disorder	Shat-al-Arab area	occasional	cold injury
	<i>Uromyces stratus</i>	do	some times severe	rust
Barley	<i>Erysiphe graminis</i>	Abul-Khaseeb	mild	powdery mildew
	<i>Helmintosporium graminum</i>	general	some time severe	leaf stripe
	<i>Puccinia hordei</i>	do	mild	leaf rust
	<i>Pythium</i> spp.	do	mild	damping-off

	<i>Ustilago hordei</i>	do	mild	covered smut
	<i>U. nuda</i>	do	mild	loose smut
Corn	<i>Helminthosporium turcicum</i>	do	some time severe	leaf stripe
Cotton	* <i>Alternaria</i> sp.	Shat-al-Arab and Abul-Khaseeb	some times severe	leaf spot
	<i>Aspergillus niger</i>	do	mild	boll-rot
	<i>Cuscuta</i> sp.	Shat-al-Arab	mild	dodder
	<i>Rhizopus stolonifer</i>	Abul-Khaseeb	do	boll-rot
Rice	* <i>Alternaria</i> sp	Modaina area	mild	leaf spot
	<i>Cochliobolus miyabeanus</i>	do	mild	leaf spot
	<i>Piricularia oryzae</i>	do	sometime severe	blast
Sorghum	* <i>Helminthosporium</i> sp.	general	severe	leaf stripe
	<i>Sphacelotheca sorghi</i>	do	sometime severe	covered kernel smut
	<i>Tylosporium ehrenbergii</i>	do	do	long smut
Wheat	<i>Anguina tritici</i>	do	very rare	ear cockle
	* <i>Fusarium</i> sp. .	do	mild	foot rot
	* <i>Helminthosporium</i> sp	do	severe	leaf spot
	<i>Puccinia recondita</i>	do	mild	leaf rust
	<i>Puccinia striiformis</i>	do	do	stripe rust
	* <i>Pyrthium</i> sp.	do	do	damping-off
	<i>Tilletia caries</i>	do	do	covered smut
	<i>Tilletia foetida</i>	do	do	do
	<i>Ustilago tritici</i>	do	do	loose smut

Fruit Crops

Apples	Cause complex undetermined.	Abul-Khaseeb	severe	die back
	<i>* Rhizopus stolonifer</i>	In market	sometimes severe	fruit rot
	Unknown	Abul-Khaseeb	rare	gummosis
	<i>Venturia inaequalis</i>	do	moderate	scab
Apricot	<i>Cercospora</i> sp	do	not severe	leaf spot
	<i>* Coryneum carpophilum</i>	do	do	shot hole
Bananas	<i>* Aspergillus niger</i>	do	do	fruit rot
	<i>* Fusarium</i> sp	do	do	do
Citrus	<i>Alternaria citri</i>	general	severe	leaf spot and fruit rot
	<i>Capnodium citri</i>	Abul-Khaseeb	mild	soft mold
	Cause complex undetermined	general	severe	die back
	do	do	do	wilt
(Fusarium oxysporum and Tylenchulus Semipenetans complex suspected)				
	<i>Phytophthora citrophthora</i>	Abul-Khaseeb	rare	brown rot gummosis
	<i>Stereum</i> sp.	do	very rare	stem rot
Date palm	<i>Aspergillus niger</i>	general	mild	fruit rot
	<i>Didymosphaeria smaragdina</i>	do	do	leaf spot
	<i>Graphiola phoenicis</i>	do	moderate	leaf spot
	<i>Manginiella scaetiae</i>	especially in Fau area	very severe	inflorescence rot
	<i>* Meloidogyne</i> sp	Abul-Khaseeb, Um-	rare	root knot
		Qasar		

	<i>Rhabdospora</i> sp .	general	Severe	leaf spot
	<i>Rhizopus nigricans</i>	do	mild	fruit rot
	<i>Thielaviopsis paradoxa</i>	Abul-Khaseeb & Fae	severe	terminal bud rot
Fig	<i>Alternaria fici</i>	especially		
	<i>Meloidogyne javanica</i>	general	mild	leaf spot
Grape		do	mild to moderate	root knot
vine	<i>Cuscuta</i> sp	do	mild. rare	dodder
	<i>Uncinula necator</i>	especially	Abul-Khaseeb severe	powdery mildew
Mulberry				
	<i>Mycosphaerella mori</i>	Shat-al-Arab	mild	leaf spot
	*Undetermined	do, Basrah, Abul-Khaseeb	do	stem rot
Peach				
	* <i>Sphaerotheca pannosa</i>	Abul-Khaseeb	mild	powdery mildew
	<i>Taphrina deformans</i>	do, Shat-al-Arab	restricted, severe	leaf curl
	<i>Tranzschelia pruni spinosa</i>	do	moderate	rust
	Undetermined	do	mild	leaf spot
Pomegranate				
	<i>Rhizopus nigricans</i>	general	mild	fruit rot
	*Undetermined	Shat-al-Arab, Abul-Khaseeb	severe	gummosis
	do	do	mild	leaf spot

<i>Zizyphus Alternaria</i> sp	Abul-Khaseeb, Al-Harthia	mild	do
VEGETABLE CROP			
Basil(Rehan) <i>Meloidogyne javanica</i>	Abul-Khaseeb, Shat-al-Arab	severe	root knot
*Undetermined	general	moderate	leaf spot
Beans <i>Alternaria tenuis</i>	Al-Qurna, Abul-Khaseeb Nishwa area	mild	do
<i>Fusarium oxysporum</i>	do	mild	wilt
<i>meloidogyne javanica</i>	do	moderate	root knot
Mosaic virus	do	moderate	mosaic
<i>Uromyces phaseoli</i>	do	do	rust
Broad beans <i>Alternaria</i> sp	general	moderate	heavy spot
<i>Ascochyta</i> sp	do	mild	leaf spot
Mosaic virus	do	mild	mosaic
*Physiological disorder	do	severe	cold injury
<i>Uromyces fabae</i>	do	not severe	rust
<i>Xanthomonas phaseoli</i>	do	mild	blight

Cabbage				
& Cauli				
flower	<i>Alternaria brassicae</i>	Al-Hartha, Nishwa	severe	leaf spot
	* <i>Betryus</i> sp	"	moderate	seedling blight
	<i>Erwinia carotovora</i>	"	severe	soft rot
	<i>Rhizoctonia solani</i>	"	moderate	damping off
Carrot	* <i>Erysiphe polytoni</i>	general	"	powdery mildew
	* <i>Oidium</i> sp	"	"	"
Celery	<i>Cercospora apii</i>	"	mild	blight
	<i>Meloidogyne</i> sp	"	"	root knot
	* <i>Oidium</i> sp	"	"	powdery mildew
	<i>Septoria api-graveolentis</i>	"	severe	blight
Cow pea	<i>Fusarium oxysporum</i>	Al-Hartha, Modaina, Nishwa, Qurna	mild	wilt
	<i>Meloidogyne javanica</i>	"	moderate	root knot
	Mosaic virus	"	mild	mosaic
	* <i>Undetermined</i>	"	"	leaf spot
	* <i>Uromyces</i> sp	"	severe	rust
Cucum-	* <i>Cuscuta</i> sp			
ber & snake		general	mild	doddar
cucum-	<i>Erwinia carotovora</i>	general	moderate	soft rot
ber				

	<i>Erysiphe cichoracearum</i>	do	severe	powdery mildew
	<i>Fusarium oxysporum</i>	do	mild	wilt
	Mosaic virus	do	severe	mosaic
Egg plant	* <i>Alternaria solani</i>	general	severe	leaf spot & fruit rot
	* <i>Fusarium oxysporum</i>	"	mild	wilt
	* <i>Leveillula</i> sp	"	mild	powdery mildew
	<i>Meloidogyne javanica</i>	"	very severe	root knot
	Mosaic virus	"	mild	mosaic
GARLIC	* <i>Meloidogyne</i> sp.	Sufwan Zubair	mild	root knot
	<i>Puccinia allii</i>	"	severe	rust
Leek	* <i>Fusarium oxysporum</i> general	"	mild	wilt
	* <i>Meloidogyne</i> sp	"	severe	root knot
	<i>Puccinia porri</i>	"	"	rust
Lettuce	* <i>Alternaria</i> sp	Shat-al-Arab, Al-Hartha	sometimes severe	leaf spot
	* <i>Cercospora</i> sp	"	"	"
	<i>Meloidogyne javanica</i>		mild	root knot
	Mosaic virus	Nishwa, Qurna	"	mosaic
	<i>Rhizoctonia solani</i> , Kuhn		moderate	root knot
Musk	<i>Erwinia carotovora</i>	Modaina, Safwan, Al-	mild	soft rot
melon		Hartha		
	<i>Erysiphe cichoracearum</i>	do	do	powdery mildew
	<i>Fusarium oxysporum</i>	do	very severe	wilt

	<i>Meloidogyne javanica</i>	do	mild	root knot
	Mosaic virus	do	severe	mosaic
Mint	* <i>Meloidogyne</i> sp	Al-Harthah, Qurna, Shat-al-Arab	moderate	root knot
	* Undetermined	do	severe	leaf spot
Okra	* <i>Alternaria</i> sp	general	moderate	leaf spot
	<i>Erysiphe cichoracearum</i>	do	severe	powderymilde
	<i>Fusarium oxysporum</i>	do	mild	wilt
	<i>Meloidogyne javanica</i>	do	severe	root knot
Onion	<i>Meloidogyne javanica</i>	do	mild	root knot
	<i>Puccinia porri</i>	do	mild	rust
	<i>Aspergillus</i> sp	do	severe in market	Black mold
Parsley	* <i>Meloidogyne javanica</i>	do	mild	root knot
	<i>Oidium</i> sp.	do	mild	powdery mildew
Pumpkin	<i>Erysiphe cichoracearum</i>	Abul-Khaseeb, Al- Hartha, Safwan	severe	do
	<i>Fusarium oxysporum</i>	do	moderate	wilt
	Mosaic virus	do	severe	mosaic
	* Undetermined	do	moderate	leaf spot
Pepper	* <i>Alternaria</i> sp	general	moderate	leaf spot
	* <i>Fusarium</i> sp	do	mild	root rot
	* <i>Leveillula</i> sp	do	severe	powdery mildew

Purslane	* <i>Cercospora</i> sp	Shat-al-Arab, Al-Harthia severe	leaf spot
Radish	* <i>Cercospora</i> sp	Nishwa	do
Spinach	* <i>Alternaria</i> sp	do	mild
		Shat-al-Arab, Nishwa, sometimes severe	do
		Qurna	
	<i>Cercospora</i> sp	do	do
	<i>Cladosporium macrocarpum</i>	do	mild
	* <i>Meloidogyne</i> sp	do	do
	* <i>Peronospora spinaciae</i>	do	sometimes severe
Squash	<i>Alternaria</i> sp	general	mild
	<i>Erysiphe cichoracearum</i>	do	severe
	<i>Fusarium oxysporum</i>	do	mild
	Mosaic virus	do	severe
Tomato	<i>Alternaria solani</i>	do	do
	* <i>Cuscuta</i> sp	do	mild
	<i>Erwinia carotovora</i>	do	moderate
	<i>Fusarium oxysporum</i> f. <i>lycopersici</i>	do	severe
	<i>Meloidogyne javanica</i>	do	do
		do	do
	* Physiological disorder	Nishwa, Safwan	sometimes severe
	Mosaic virus complex	general	severe
			cold injury
			mosaic

	<i>Rhizopus nigricans</i>	do	moderate	fruit rot
	<i>Rhizoctonia solani</i>	do	severe	damping off
	Undetermined	do	mild	blossom end rot
Turnip	<i>Albugo candida</i>	Shat-al-Arab	rare	white rust
	<i>Fusarium oxysporum</i>	Shat-al-Arab, Qurna	mild	wilt
	Mosaic virus	do	do	mosaic
Water-melon	<i>Erysiphe cichoracearum</i>	Safwan, Nishwa, Mod-aina	sometimes severe	mildew powdery
	<i>Fusarium oxysporum</i>	do	mild	wilt
	<i>Meloidogyne javanica</i>	do	mild	root knot
	Mosaic virus	do	severe	mosaic
	*Undetermined	do	mild	leaf spot
Others				
Gasorinia	* <i>Cuscuta</i> sp	general	moderate	dodder
Hollyhock	* <i>Leveillula</i> sp	General	severe	powdery mildew
	<i>Meloidogyne javanica</i>	do	mild	root knot
Rose	* <i>Cuscuta</i> sp	do		dodder
	<i>Sphaerotheca pannosa</i>	do	mild	powdery mildew
	*Undetermined	do	mild	leaf spot