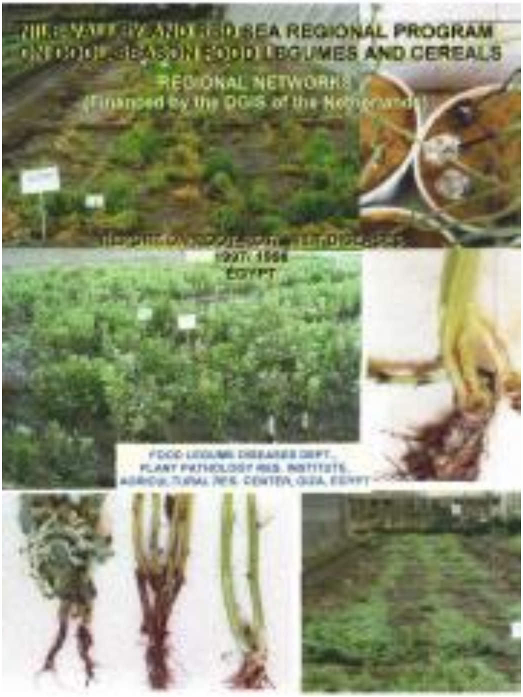
SEA REGIONAL PROGRAM
LEGUMES AND CEREALS
REGIONAL NETWORKS
1997/1998
EGYPT
FOOD LEGUMES DISEASES DEPT.,
PLANT PATHOLOGY RES. INSTITUTE,
AGRICULTURAL RES. CENTER, GIZA, EGYPT

THE 1997/1998 REPORT FOR THE WILT /ROOT-ROTS NETWORK

CONTENTS

Nile Valley and Red Sea Regional Program (NVRSRP)
Regional Networks Project, Wilt/ Root-Rots Network

Workplan of Wilt/ Root-Rots Network 1997/ 1998

Dr. N. M. Abou-Zeid

Contact Scientist, Wilt- Root - Rots Network
Food Legume Diseases Dept., PPRI, ARC, Giza Egypt.

1- Survey and Identification of Major Organisms Causing Root-rot/ Wilt Diseases and Relative Importance in Faba Bean.

Objective: to survey faba bean, fungal diseases in major production areas.
Materials and Methods: Diseases of faba bean, will survey during 1997/1998 growing seasons.
Location in charge: Dakhlia and Menya Governorates.
Scientific in charge: N.M. Abou-Zeid.
Cooperating Scientists: *A. Hassanein,* M.K.Arafa A. El- Garhy and M.Abdel-Azim.

2- Identification of Fusarium Wilt in Chickpea and Pathogen Variability in Lentil Fusarium Wilt in Egypt:

Objective: To identify *F. oxysporum f. sp. ciceri* races using standard differential chickpea plants. and to develop differentials for *F. oxysporum f. sp. lentis.*
Materials and Methods: use of differential chickpea plants to identify races of *F. oxysporum f. sp. ciceri* the causal organism of Fusarium wilt in chickpea and to identify variability of *F. oxysporum* of lentil.
Location: Giza.
Scientific in charge: Hassanein, A.
Cooperating Scientists: N.M. Abou-Zeid, M.K. Arafa and A. El-Garhy.

3- Screening for Resistance to Root-rot/Wilt Diseases in Faba Bean, Lentil and Chickpea, in Sick plots:

Objective: Development for root-rot wilt diseases resistant lines in faba bean, lentil and chickpea.
Materials and Methods: The following Nurseries will be organized distributed:

1- Nile valley and Red sea Regional Chickpea Nursery-Wilt will be dispatched from Ethiopia. DR. Geletu B.
2- Nile valley and Red sea Regional Lentil Nursery-Wilt will be dispatched from ICARDA - Dr. W. Erskine
3- Nile valley and Red sea Regional Faba bean Nursery-Black root-rot will be dispatched from *Ethiopia. Dr. Yohannes.*

Location: Giza.
Scientific in charge: N.M. Abou-Zeid

Cooperating Scientists: A.M. Hassanein and S. A. Mahmoud, A. Khattab A. El-Garhy and M. El- Hady.

4- Integrated Management of Root-rot/Wilt Diseases in Faba Bean, Lentil and Chickpea:

Objective: To develop an effective wilt control system using resistant/tolerant lines, sowing dates and chemicals for lentil and chickpea and crop rotation or solarization for Faba bean.

Materials and Methods: 2 cultivars from each crop (lentil and chickpea) will be used. Seed treatment with 2 fungicides and 3 sowing dates, Pre-, pot-emergence and survival plants will be recorded for Faba bean (solarization and crop rotation).

Location: Malaway for lentil and chickpea, Giza for Faba bean.

Scientific in charge: N. Abou-Zeid

Cooperating Scientists: A.M. Hassanein, and M.K. El-Waraky

Survey and Identification of Major Organisms Causing Root-Rot / Wilt Diseases and Their Relative Importance in Faba Bean in Egypt.

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A. M. El- Garhy; and M. A. Abdel-Aal

Plant Pathology Res. Institute, ARC, Giza, Egypt

Summary:

Intensive systematic survey of root-rot /wilt diseases of faba bean chickpea in the two governorates; Dakhlia (north Egypt) and Minia (middle Egypt) were done twice in Jan. - Feb. and in March-April 1998 .

Fungi associated with diseased samples collected from surveyed fields were isolated, identified and kept in stock cultures for further studies . Also, pathogenic potential of the most important isolated fungi were determined in the three crops .

Obtained data indicate that, the major fungal diseases affecting faba bean crop in Egypt are root-rot caused by *F. solani*.

Introduction:

faba bean is important for human food and animal feed in Egypt and in many other countries in the world . Root- rot / wilt disease complex is considered to be the most important disease affecting this crop productivity in Egypt (Mohamed, 1982)

Several fungi were recorded as causal pathogens of root-rot and wilt diseases on this crop; viz., *Rhizoctonia solani, Fusarium oxysporum, F. solani, Fusarium* spp. *F. moniliforme, Macrophomina phasiolina Verticillium* spp., *Pythium* sp., and *Sclerotium rolfsii* (Abdallah, 1969; Mohamed, 1982; Abou-Zeid *et al.*, 1995).

In spite of the importance of root-rot and wilt diseases in faba bean crop as a causal of considerable yield losses to this crop, intensive field survey have been done for these diseases in Egypt during 1994/1995, 1995/1996 and 1996/ 1997 seasons.
Therefore, this work aimed to survey these diseases, intensively, in two governorates representing different growing legume areas in Egypt. Also, to identify the causal organisms of root-rot/wilt diseases and to study their relative importance.

Materials and Methods:

Field Survey:

Survey of root-rot /wilt diseases infected faba bean, crop was made in two governorates; Dakhlia (north Egypt) and Minia (middle Egypt). The survey was made twice during growth season in Jan. Feb. and in March April 1998 . Number of visited fields of faba bean were 82 , representing the total production acreage of crop in the two governorates . The fields were chosen randomly at every 5 -10 km.

At each field the symptoms of root-rot and wilt diseases existed were expressed and the percentage of infected plants was recorded . Twenty random diseased plants were picked diagonally from each field for laboratory isolation .

Isolation and Identification:

Roots and basal stems of diseased plants showing typical symptoms of root-rot and wilt diseases in each sample were washed carefully with running tap water. Plants in the diseased sample were cut into small pieces, separately, surface sterilized by immersing in 2% sodium hypochlorite for 3 min., then washed twice in sterilized distilled water. The sterilized plant pieces were dried between two sterilized filter papers, and directly plated on PDA medium, 5 pieces / Petri dish, then incubated at 25C for 7 days. Emerged fungi were isolated and purified on PDA plates, then identified according to their morphological characters using compound microscope depending on the descriptions of Smith (1965), Booth (1971), Alexopoulous and Mims (1979), and Nelson *et al* ., (1983). Stock cultures were maintained on PDA slants and kept in refrigerator at 5° C for further studies.

Results:

Field Survey:

Table (1) clearly show that, infected plants with root-rot and wilt diseases were found in all inspected faba bean fields, but the average percentage of infection varied from field to another. Also, the percentage of infection was slightly higher in April survey than in Jan-Fep.

42 fields in 10 districts in Dakhlia Governorate and 40 fields in 6 districts in Minia Governorate were surveyed. Average percentage of infection was higher, in general, in Dakhlia Governorate, than in Minia Governorate. It ranged from 2.3 to 4.0 % and from 3.0 to 8.5 % in Jan and April surveys, respectively in Dakhlia Governorate. The highest percentage of infection was at Aga and Meniat El-Nassrr (4.0 %) while the least was recorded at Sherbeen (2.3 %) in Jan. survey. On the other hand, the average percentage of infection in Minia Governorate ranged from 2.4 to 3.6 % and from 2.4 to 6.2 % in Jan and April surveys, respectively. The highest percentage of infection was recorded at Samalout while the least was at Dear-Mouas districts, in April survey.

Table (1): Average percentage of infected plants with root rot/wilt diseases on Faba bean in two governorates in two periods Jan. and April 1998.

Governorates	District	NSF	% infected plants	
			Jan.	April
Dakahlia	Mit Ghamr	3	3.5	5.5
	Aga	5	4.0	5.3
	El-Mansoura	4	2.5	3.5
	Talkha	5	3.0	5.0
	Blkas	5	2.5	4.5
	Sherbeen	5	2.3	4.0
	Senblaween	5	2.5	3.0
	Dekernes	4	3.0	4.5
	Meniat El- Nassrr	3	4.0	5.5
	Temai El-Amdeed	3	2.5	8.5
	Sub-Total	42		
Minia	Dear-Mouas	8	2.4	2.6
	Malawy	10	3.2	4.1
	Abou-Kerkas	6	3.6	3.2
	El-Minia	4	2.5	4.5
	Samalout	5	3.3	6.2
	Maghagha	7	3.0	2.4
	Sub-Total	40		
Total		82		

NSF = Number of surveyed fields.

Fungi Associated with the Diseased Samples and Their Frequency :

Data in Table (2) show that, the most important fungi isolated from diseased faba bean samples were *R. solani* , *F. oxysporum* , *F. solani* , F. moniliforme, Fusarium spp. *Verticillium spp., and Macrophomina phasiolina;* and their occurrence frequency were 15.2 , 26.3 , 27.3 , 10.6 , 9.6 , 8.1 , and 3.0 % respectively . Some other fungi were isolated from the diseased samples in lower frequencies , i.e. *Cephalosporium* sp., *Sclerotium rolfsii* , and *Pythium* sp. . Occurrence and frequency of the root-rot and wilt diseases pathogens associated with the diseased faba bean samples were in the same trend in both Dakhlia and Minia G. except for *Verticillium* spp. Also, *F. solani* and *F. oxysporum* were found in all districts in both governorates and *R. solani and F. moniliforme* were found in all districts in Minia G., *Macrophomina phasiolina* was found in Aga and El -Mansoura in Dakhlia G. while it was found in the most districts in Minia governorates.

Table (2): Identity, occurrence and frequency of root-rot/wilt fungi isolated from diseased faba bean plants collected From two Governorates during 1997/1998 Season.

Govern-rates	District	%	No. of isolates							Total
Dakahlia	Mit Ghamr	Infection	A	B	C	D	E	F	G	
	Aga	5.5	1	3	2	0.0	1	2	1	10
	El-Mansoura	5.3	2	2	4	1	0.0	0.0	1	10
	Talkha	3.5	0.0	4	2	0.0	0.0	1	0.0	7
	Blkas	5.0	2	3	2	0.0	1	2	0.0	10
	Sherbeen	4.5	0.0	2	4	1	0.0	2	0.0	9
	Senblaween	4.0	1	2	3	1	1	0.0	0.0	8
	Dekernes	3.0	2	3	3	0.0	1	1	0.0	10
	Meniat El- Nassrr	4.5	1	2	2	2	1	1	0.0	9
	Temai El-Amdeed	5.5	2	2	1	0.0	0.0	2	0.0	7
		8.5	1	3	2	2	2	2	0.0	12
Sub-Total			12	26	25	7	7	13	2	92
Frequency %			13	28.3	27.2	7.6	7.6	14.1	2.2	100
El-Minia	Dear-Mouas	2.6	3	4	3	2	2.0	0.0	1	15
	Malawy	4.1	5	7	8	3	1	2	0.0	26
	Abou-Kerkas	3.2	2	5	3	4	2	0.0	1	17
	El-Minia	4.5	3	4	5	1	0.0	0.0	0.0	13
	Samalout	6.2	1	4	4	3	3	1	1	17
	Maghagha	2.4	4	2	6	1	4	0.0	1	18
Sub-Total			18	26	29	14	12	3	4	106
Frequency %			17	24.5	27.4	13.2	11.3	2.8	3.8	100.0
Total			30	52	54	21	19	16	6	198
Frequency %			15.2	26.3	27.3	10.6	9.6	8.1	3.0	100

A) *R. solani* B) *F. oxysporum* C) *F. solani*
B) *F. moniliforme* E) *F. spp.* F.) *Verticillium spp.*
G) *M. phaseolina*

Discussion and Conclusion:

Field inspection and laboratory isolation indicated that, root-rot was the most widespread and damaging disease of faba bean in Egypt. Several fungi involving in occurrence of this disease, especially *F. oxysporum*, *F. solani* and *R. solani*. *R. solani* is a temperate pathogen , so losses from *R. solani* infection are severe in the early season but not in the late season (Mohamed, 1982) . Therefore it cause damping - off and seedling rot in the early growing season.

Researchers, usually, deal with root-rot in faba bean as a complex disease caused by several fungi, especially *F. oxysporum*, *F. solani*, *F. avenaceum*, *R. solani*, *Pythium* sp., and *S. rolfsii* (Abdallah, 1969; Mohamed, 1982; Salt, 1982 and Abou-Zeid *et al.*, 1995). This makes breeding and screening programs for resistant faba bean varieties to root-rot disease unreliable and confusing since we are using mixture of these fungi. This work proved that, the main causal pathogen of root-rot and collar rot of faba bean in Egypt is *F. solani*. This conclusion may help in breeding and screening programs for this disease.

General conclusion: It could be concluded that, the most important diseases infecting roots of faba bean, in Dakhlia (north Egypt) and Minia (middle Egypt) are root-rot (*F. solani*) and vascular wilt (*F. oxysporum*) Breeding and screening programs should be conducted for producing resistant cultivars against these diseases.

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Identification and Pathogen Variability of *Fusarium oxysporum*, the Causal Pathogen of Wilt Disease in Lentil , and Chickpea Crops in Egypt

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Abstract:

Eleven isolates of *F.oxysporum* f. sp. *cineri* isolated from chickpea and six isolates of *F.oxysporum* f. sp. *Lentis* isolated from lentil crops were tested to determine their pathogenic variability. Based on the differential of ten chickpea cultivars to pathogenic isolates of *F.oxysporum* f. sp. *Cineri,* the existence of three races, i.e. the north Egypt isolates were race 0 and middle Egypt isolates were race 3 and the new race (?).

In case of *F.oxysporum* f. sp. *Lentis* isolates, data showed clear variation among isolates and could be subdivided into 5 strains.

Introduction

F.oxysporum is considered an important pathogen causing vascular wilt disease in lentil and chickpea in Egypt (El-Awadi , 1993 ; El-Garhy , 1994 and Haware 1990) all over the world . Regular surveys in Egypt indicate that wilt diseases usually cause a considerable yield losses in legume crops annually (Abou-Zeid *et al* ., 1995 and 1997). *F.oxysporum* has about 80 formae specials (pathotypes specific to species) , and several are subdivided into races (specific to cultivars within a species) . The identified specialized formae that cause wilt disease on legume crops are *F.oxysporum* f. sp. *lentis* on lentil , and *F.oxysporum* f. sp.*ciceri* on chickpea (Booth , 1971; and Armstrong and Armstrong , 1981) .

On the basis pathogenic to studies , *F.oxysporum* f. sp. *ciceri* has been separated into 7 races designated 0 - 6 , four of which were found in India (Haware and Nene , 1982) and three in Spain (Cabrera de la Colina *et al* ., 1985 ; and Jimenez - Diaz *et al.*, 1989) .In iddition *F.oxysporum* f. sp. *lentis* was subdivided into seven or eight strains.

The objective of this work was to study the differences, especially in pathogenic variability, among isolates of *F.oxysporum* isolated from diseased plants of lentil and chickpea .

Materials and Methods:

Pathogen variability of *F.oxysporum* isolates was determined using the spore suspension technique. Inocula of each tested were prepared from infected sand by sprinkling an amount of PDA plates and incubating at 25 °C for seven days. A small agar disk cut from the edge of the growth colony was transferred to a 500-ml bottle containing 150 g autoclaved sand-sorghum medium. The inoculated bottles were incubated at 25 °C for three weeks. Conidial suspensions were obtained by blending cultures of *F.oxysporum* grown on sand-sorghum medium using sterile water, then filtering through three layers of cheese-cloth. The suspensions were adjusted to a concentration of 10^6 condia/ml using a haemocytometer.

The tested cultivars were planted in autoclaved soil in 20 cm sterilized plastic pots 5: seeds/pot of chickpea cultivars, and 10 seeds/pot of lentil cultivars. The seeds were disinfected by immersion in 2% solution of sodium hypochlorite for three minutes and rinsed in distilled water before planting. The pots were kept under greenhouse conditions for 15 days then inoculated with 50-ml spore suspension. The tested isolates were six *F.oxysporum* f. sp. *lentis,* and eleven *F.oxysporum* f. sp. *ciceri*.

Seed source: for race identification of the chickpea eilt pathogen, 10 chickpea cultivars obtained from ICRISAT Germplasm Unit were sown. For pathogen variability of *F.oxysporum* in *lentil,* 15 regional entries obtained from ICARDA were used.

Each treatment was replicated Four times. Uninoculated checks were kept for each cultivar. Pots of each crop were arranged in a randomized complete block desing on benches in the greenhouse where the temperatures were 28 C ± 2 at night, and kept under investigation for 45 days.

Data were recorded after 45 days from planting and scored as follows :

R : Resistant	0 - 20 % wilted plants
M : Moderately susceptible	21 -50 % wilted plants
S : Susceptible	>50% wilted plants

Results and discussion:

In test with 11 isolates of *F. oxysporuim* f. sp . *ciceri* and 10 chickpea cultivars consistent differences in resistance and susceptibility to the pathogen were observed (Table 1) Results indicated . that . of 11 isolates of *F.oxysporum* f. sp. *Ciceri,* two isolates induced wilt syndrome and nine induced the yellowing syndrome. Disease reaction of race differential cultivars to the 11 isolates indicated that races of the pathogen , namely races 0, 3 and new race (?) occur in Egypt .All nine isolates inducing the yellowing syndrome are not pathogenic to cultivar JG.62 which is susceptible to all other known races of the pathogen (Haware and Nene 1982). These 9 isolates were designated as race o (cabrera de la colina et al 1982). Race o, the least virulent of the seven races (Haware and Nene 1982, and Jimenez – Diaz et al 1993) Race o induces a progressive foliar yellowing as compared to severe leaf chlorosis flaccidity , and early wilt induced by races 1-6 (Jimenez – Diaz et al 1989, and Trapero – Cases and Jimenez – Diaz 1985) .

On the other hand , isolate No. 10 were highly virulence on all tested cultivars, which gave wilt syndrome after two weeks from inoculation this isolate need tested with more cultivars for identified. While isolate No. 11 was pathogenic on all cultivars except of C 104 and JG 104 (resistant), this isolate was distinguished as race 3. Haware and Nene (1982).

Race 0 is widespread in Egypt, while new race and race 3 (isolates 10 and 11) are found only in Assute governorate. This results were agreement with Abou Zeid et al., (1997) they reported that, the major fungal disease on chickpea in Egypt is sclerotinia stem rot caused by *Sclerotinia Sclerotiorum.*

Table (1): Reaction of chickpea cultivars to 11 isolate of *fusarium oxysporum f.sp ciceri.*

Isolate No	1	2	3	4	5	6	7	8	9	10	11
Cultivar	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234
JG - 62	RRRR	RRRR	RRRR	RRRR	RRRM	RRRM	RRRR	RRRR	RRRR	SSSS	SSSM
C - 104	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	SSSS	RRRR
GJ - 74	MMMM	MMMM	MMMM	MMMM	SSSS	MMMM	SSSS	SSSS	MMMM	SSSS	RRRR
CPS - 1	RRRR	RRRR	RRRR	RRRM	RRRR	RRRM	RRRR	RRRR	RRRR	SSSS	MMMR
BG - 212	RRRR	RRRR	RRRR	RRRR	RRRR	RRRM	RRRR	RRRR	RRRR	SSSS	MMRR
WR - 315	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	SSSS	SSSM
Annigeri	RRRR	RRRR	RRRR	RRRM	RRRR	RRRR	RRRR	RRRR	RRRR	SSSS	MMMR
Chafa	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	SSSS	MMMR
L - 550	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	SSMM	MMMM
850 - 3/27	MMMM	MMMM	SSSS	MMMM	MMMM	SSSS	SSSS	MMMM	MMMM	SSSSS	MMMM

R: Resistant 0-20% wilted plants.
M: Moderatly 21-50% wilted plants.
S: Susceptible >50% wilted plantes.

Six *F. oxysporum* isolates were tested on 15 lentil nursery. Data in Table (2) indicated that, ILL 1861were resistant to isolates No. 1 and 4. All tested nursery were susceptible to isolate No.2. While, ILL 6994 were resistant to isolates No. 3 and 4, but ILL 4605 were resistant to isolates No.5. and 6. Another nursery were susceptible to moderate susceptible reaction.

In general, results showed clear variation among the tested isolates . According to the obtained data, the tested isolates could be into 5 strains. The first strain is isolate No. 1, the second strain is isolate No. 2, the third strain is isolate No. 3 , the fourth strain is isolate No. 4 and isolates No. 5 and 6are the fifth strain. It is well Known that, *F.oxysporum* f.sp. lentis has several races. Khare et al, (1975) reported eight strain ; Kannaiya and Nene (1978) reported seven straines. Moreover, Kannaiyan and Nene (1976) found thate, cultivars Pusa 3 and Pant L 234 were very promising, while JL 500 and JL 674 were resistant to five out of seven strains of the fungus tested in infested soil.

Table (2): Reaction of lentil regional nursery to *fusarium oxysporum f.sp lentis*.

N0	Isolate No	1	2	3	4	5	6
	Regional nursery	1234	1234	1234	1234	1234	1234
1	ILL 1861	RRRR	SSSS	SSSS	RRRR	SSSS	SSSS
2	ILL 2439	SMMM	SSSS	SMSS	RRMR	SSSS	SSSS
3	ILL 2580	MSMS	SSSS	MMSS	MMSS	SSSS	SSSS
4	ILL 4605	MSSS	SSSS	SSSS	SSSM	RRRR	RRRR
5	ILL 5582	MMSS	SSSS	SSMS	MMSR	SSSS	SSSS
6	ILL 5588	SSSS	SSSS	SSSS	RRSS	MSSS	SSSS
7	ILL 5597	MMSS	SSSS	SSSS	MMMM	MSSS	MMSS
8	ILL 5599	SSMM	SSSS	SSSM	MMSM	MMSS	SSSS
9	ILL 5751	SSSS	SSSS	MSSS	RMRR	SSSS	MMSS
10	ILL 5766	MMMS	SSSS	SMSM	MMSS	SSSS	SSSS
11	ILL 5883	MSSS	SSSS	SMMM	SSSS	SSSS	SSSS
12	ILL 6027	MMMM	SSSS	MSMM	SSSS	SSSS	SSSS
13	ILL 6994	SSSS	SSSS	RRRR	RRRR	SSSS	SSSS
14	G 9	SMMM	SSSS	SSSS	MMRM	SSSS	SSSS
15	ILL 6031	SMMM	SSSS	SSSS	MSSS	SSSS	SSSS

R: Resistant 0-20% wilted plants.
M: Moderatly 21-50% wilted plants.
S: Suceptible >50% wilted plantes.

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Screening for Resistance to Root-Rot / Wilt Diseases in Faba Bean in Sick Plot

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Summary:

Fifty eight faba bean accessions and cultivars were tested for resistance to root-rot and wilt diseases in the Sick Plot at Giza Res. Station .
Results indicate that, 29 were resistant (R) , 22 were moderately resistant (MR) , and 7 were susceptible (S) .

Introduction:

Root-rot and wilt diseases are considered among the most important fungal diseases of faba bean in Egypt . Several soil borne fungi ,i.e. *Fusarium oxysporum* , *F.solani* , *F.moniliforme, Rhizoctonia solani, Sclerotium rolfsii, Macrophomina sp., Verticillium sp.,* and *Pythium sp.,* were reported as causal of these diseases (Abdallah , 1969; Mohamed , 1982 ; and Abou-Zeid *et al.*, 1995).

Several methods for controlling root-rot and wilt diseases have been recommended . None of these methods have proved to be effective , and the most reliable and dependable way of controlling these diseases is to use resistant cultivars .

So, this work aimed to screen the breeding materials as well as the commercial cultivars for resistance to root-rot and wilt diseases.

Materials and Methods :

Fifty eight faba bean accessions, lines, and cultivars were tested in the sick plot at Giza Res. Station . The experiment was planted in a randomized complete block design with two replications on November, 15 th, 1997. Each plot had a single row, 2m long and 30 cm apart with 10 seeds / row . Normal agricultural practices were followed prior to planting.

The sick plot was infested in the 1993/1994 and1994/1995seasons with the causal fungi of root-rot /wilt diseases of faba bean, i.e. *R. solani* , *F. solani* , *M. phaseolina and F. oxysporum.* While, soil of the sick plot was reinfested with *F. oxysporum* the causal fungi of wilt disease in the, 1995/ 1996, 1996/1997 seasons. The infested soil was watered to enhance the fungal growth and to ensure even distribution of the inoculum before planting.

Percentage of wilted plants was recorded 50 and 100 days after planting and used as disease index according to the following rating:

R = Resistant	0 -10% wilted plants
MR = Moderately resistant	11 - 20 % wilted plants
S = Susceptible	21 - 50 % wilted plants
HS = Highly susceptible	> 51 % wilted plants

Results and Discussion:

Results of screening 58 faba bean accessions and cultivars to root-rot / wilt diseases in the sick plot showed wide variation in level of diseases resistance between the tested entries (Table 1). The entries were classified according to their reaction to the diseases. Data recorded 50 days after planting showed that, 29entries exhibited resistance reactions, while 7 entries exhibited susceptible reactions . Meanwhile, 22 entries were categorized in the moderately resistant group. Moreover, recorded percentage of root-rot / wilt diseases 100 days after planting showed that, Only the two entries 936/977/93 and 927/957/93 were susceptible and all other tested materials were highly susceptible . This could be attributed to the weakness and susceptibility of the plants to the diseases in this late growth stage . This means that , screening faba bean materials should be in the early growth stage , around two months from sowing date . In this connection , it should be mentioned that Hashem (1969) found some variation in resistance to wilt disease among different cultivars . He also added , a relationship was found between resistance and the B-alanine content of seeds , roots and root exudates. In resistant seedling , B- alanine was produced during hydrolysis of materials stored in the seed .

Table (1): Screening for Resistance to Root-Rot/Wilt of faba bean entries and cultivars in sick plot at Giza during the1997/1998 season .

No	Entry	% of wilted plants after		No	Entry	% of wilted plants after	
		50 days	100 days			50 days	100 days
1	1001/591/95	26.6	86.7	30	1030/436/96	13.4	77.0
2	1005/571/95	13.4	93.5	31	1032/709/96	13.0	60.0
3	927/930/93	6.7	66.5	32	1010/615/95	9.9	70.1
4	992/343/95	10.0	63.5	33	999/477/95	0.0	77.0
5	comp72/1897/88	23.4	77.0	34	1002/619/95	6.5	80.0
6	1016/733/95	3.0	100.0	35	995/413/95	20.0	73.3
7	999/572/95	3.0	80.1	36	1011/628/95	27.0	67.0
8	939/1055/93	6.7	70.1	37	984/306/95	9.9	56.6
9	917/839/93	13.4	73.3	38	917/820/93	6.7	53.5
10	820/961/92	13.0	70.1	39	1031/674/96	13.0	63.5
11	984/23/95	16.5	93.5	40	822/1073/92	6.7	60.1
12	L.40/93	0.0	76.6	41	998/443/95	13.0	80.1
13	840/1275/92	13.0	83.5	42	1030/445/96	9.9	73.5
14	1014/696/95	6.7	73.3	43	998/427/95	13.0	83.5
15	927/957/93	0.0	47.0	44	1001/534/95	0.0	100.0
16	72/897/88	9.9	53.0	45	985/35/95	6.5	86.6
17	943/1159/93	13.4	73.5	46	998/523/95	20.0	90.0
18	936/977/93	6.7	43.5	47	G.2	9.9	66.6
19	949/433/92	9.9	63.5	48	G.3	20.0	80.1
20	812/743/92	9.9	57.0	49	G.402	13.0	70.1
21	939/1053/93	6.5	56.5	50	G.429	37.0	70.0
22	1002/634/95	3.4	83.5	51	G.674	3.4	70.0
23	814/773/92	3.4	76.6	52	G.714	40.4	80.1
24	732/800/90	20.0	70.0	53	G.716	20.0	93.5
25	922/879/93	16.5	80.1	54	G.717	9.9	66.6
26	1014/693/95	30.0	90.0	55	G.B	16.5	86.6
27	756/1100/95	9.9	100.0	56	G.843	8.4	83.5
28	848/1428/92	16.5	93.5	57	G.402	15.4	73.0
29	1009/875/96	23.5	63.5	58	G.716	19.3	81.5

L.S.D. at 5 % for after 50 days = N.S after 100 days = N.S

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Screening for Resistance to Wilt Diseases in Lentil in Sick-Plot

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Summary

A total of 30 lentil entries (15 regional nursery and 15 Egypt nursery) were screend for resistance to wilt disease in sick plot at Giza Res. Station. The percentage of wilted plants ranged from 10 to 90% for regional entries and from 15.0 to 65.0% four Egypt entries. Four regional entries i.e. ILL 243g , ILL 2580, ILL 2582 and ILL 6994 showed resistant reaction to Wilt/root-rot disease, 7 nursery showed moderat resistant reaction and 4 nursery showed susceptible reaction. While, 11 Egypt entries showed resistant reaction, 3 showed Moderate reaction and 1 susceptable reaction ILL 6031.

Introduction

In Egypt, root-rot and wilt diseases are the most important fungal diseases (Yahia *et al.*, 1994). Hamdi and Hassanein (1996) reported that the major fungal diseases affected lentil in Sharkia governorate in north Egypt are root-rot caused by *Rhizoctonia solani* and vascular wilt caused by *Fusarium oxysporum* with frequency of 41.1% and 23.2%, respectively. In other three governorates named Beheira, north Sinai and Assuit, vascular wilt caused by *Fusarium oxysporum* f. sp. *lentis* was found as the major fungal disease in lentil (Abou-Zeid *et al.*, 1996 , 1997). Screening lentil genotypes for these diseases resistance is a major objective in lentil breeding program in Egypt and in many parts of the world where the diseases are important.

A wilt-sick plot must be developed for screening for resistance (Erskine, 1983). Sources of resistance to the various races of *Fusarium oxysporum* f. sp. *lentis* have been identified in cultivated lentil (Nene *et al.*, 1975; Kannoiyon & Nene, 1976; Kannaiyon *et al.*, 1978; Khare, 1980; Tiwari & Singh, 1980; Hossain *et al.*, 1985; Abou-Zeid 1990; Bayaa & Erskine, 1990; Hamdi *et al.*, 1991). Resistance to wilt was also found among wild relatives of lentil (Bayaa et al., 1995). These may be used as source of resistance in lentil breeding programs.

This study aimed to re-screen the promising lentil breeding material for their reaction to root-rot and Fusarium wilt diseases to identify resistant lines.

Materials and Methods

Sick-plot experiment:

Development of wilt sick-plot at Giza started in November 1993 when the soil artificially infested by fungi inoculum of root-rot/wilt complex. However, in 1995 decision has been made to use the sick-plot for screening to Fusarium wilt only, hence the soil was artificially infested by *Fusarium oxysporum* f. sp. *lentis* only in October

1995, and development of the sick-plot continued in 1996. The procedures used to develop the sick-plot are described in the last years report (Hamdi *et al.*, 1996 , 1997).

In September 1997, the soil was artificially infested by *Fusarium oxysporum* f. sp. *lentis* fungi inoculum again, then irrigated regularly till the planting time in November 1997. A total of 30 lentil entries, (15 regional nursery and 15 Egypt nursery). The entries were grown in the sick-plot in single row, 1 m long and 0.3 m width in two replicates. In each row, 50 seeds were planted; At maturity, a visual rating of percentage of wilted plants has been made during late flowering and early pod filling stages.

Results and Discussion

15 lentil regional entries and 15 lentil Egypt entries were screend for resistant to wilt disease in sick-plot at Giza. Data in Table (1) showed that, significant diffrences between tested entries. In regional entries trial, the range percentage of wilted plants was from 10% for the entry ILL 5582 to 90% for the entry ILL 6027. Four entries i.e. ILL 2439, ILL 2580, ILL 2582 and ILL 6949 were resistant to wilt disease (0 -20 % wilted plants), 7 entries were moderat resistant (21 - 50 % wilted plants) and 4 entries were susceptable (> 50% wilted plants).

In Egypt enteries trial, the range percentage of wilted plants was from 7.5% for the entry ILL 4605 to 35% for the entry ILL 5588 compared with the susceptable chick (ILL 6031) 65%. 11 entries were resistant (0 - 20 % wilted plants) and 3 entries were moderate resistant (21 - 50 % wilted plants). These results indicated that, most Egypt entries showed higher level of resistance for wilt disease than regional entries.

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Table (1): Percentage of wilted lentil plants (Regional nursery) screened for Fusarium-wilt in the Sick plot at Giza Research station in 1997 / 98.

No	Regional nursery	% of wilted plant	Reaction
1	ILL 1861	45.0	M
2	ILL 2439	20.0	R
3	ILL 2580	12.5	R
4	ILL 4605	27.5	M
5	ILL 5582	10.0	R
6	ILL 5588	45.0	M
7	ILL 5597	30.0	M
8	ILL 5599	45.0	M
9	ILL 5751	75.0	S
10	ILL 5766	50.0	M
11	ILL 5883	60.0	S
12	ILL 6027	90.0	S
13	ILL 6994	17.5	R
14	Giza 9	22.5	M
15	ILL 6031	62.5	S
L.S.D at 5%		11.5	

R = Resistant (0-20% wilted plants); M = Moderately susceptible (21-50% wilted plants); S = Susceptible (> 50% wilted plants).

Table (2): Percentage of wilted lentil plants (Egypt nursery) screened for Fusarium-wilt in the Sick plot at Giza Research station in 1997 / 98.

No	Egypt nursery	% of wilted plant	Reaction
1	ILL 2581	17.5	R
2	ILL 4605	7.5	R
3	91S 82105	17.5	R
4	91S 82759	17.5	R
5	91S 83904	15.0	R
6	91S 83910	17.5	R
7	91S 84543	20.0	R
8	91S 87724	32.5	M
9	91S 89712	15.0	R
10	91S 89718	17.5	R
11	ILL 2580	15.0	R
12	ILL 5588	35.0	M
13	ILL 5883	15.0	R
14	ILL 6024	25.0	M
15	ILL 6031	65.5	S
L.S.D at 5%		9.4	

R = Resistant (0-20% wilted plants); M = Moderately susceptible (21-50% wilted plants); S = Susceptible (> 50% wilted plants).

Screening for resistance to wilt disease in chickpea

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Summary:

Fourty two chickpea entries were screend for resistance to root rot/wilt disease in sick plot at Giza Res. Station One entry (Giza 88) were resistant and 8 entries moderate resistant. Also fourteen chickpea entries were tested for resistance to wilt disease caused by *Fusarium oxysporum f sp. ciceri* under artificial infestation in pots. Results indicated that, 4 entries were resistant (R), 4 were moderate resistant (M) and 6 were susceptible (S).

Introduction :

Chickpea (*Cicer arietinum* L.) is one of the important winter crops cultivated in Egypt. Diseases are one of several factors contributing to low yield. Under Egyptian conditions several soil borne fungi were reported as the causal pathogens of wilt and root-rot diseases. The previous work indicated that *Rhizoctonia solani*, *Fusarrism oxysporum* , *Fusarium solani*, *Macrophomina phaseolina and verticillium spp* were the pathogenic fungi (Haw are and Nene , 1996 , El-Awadi 1993 , and Abou. Zeid et. al., 1997) . Wilt/ root-rot and stem rot are the major diseases that cause considerable yield losses in chickpea , (Haware and wene 1980, and Abou. Zeid et.al., 1976) Planting of resistant cultivars is the most practical, economical and effective method to control to root rot / wilt disease. Screening is a major objective in breeding programs in many partes of the world where the diseases are important. (Erskine 1983, Halila et. al., 1984, khattab et al 1997 and Abou-Zeid et. al., 1998).

The objective of this study was to test chickpea entries againstroot rot/ wilt disease under artificial infestation.

Materials and Methods :

This experiment was done to screening for root rot wilt disease resistant in chickpea at Giza Res. Station in the sick plot and pots.

1- Sick plot experiment:

Fourty chickpea entries introduced from ICARDA, in addition to ILC 1929 (susceptible) and Giza 88 (Resistant) as the checks were screened in the sick plot at Giza Res. Station.

2- pots experiment :

14 chickpea entries introduced from ICRISAT were used. Sterilized clay pots , 25 cm in diameter were used. The pots were potted with sterilized light loam soil , and infested with *F. oxysporum f. sp. ciceri* at the rate of 5% (W/W) ,. Four replicates of each entries were used The fungal inoculum were prepared by growing on autoclaved sorghum grains in 500ml bottles and inoculated at 25 C for 3 weeks. Ten seeds from each entries were sown in each pot, 7 days after soil infestation. Data were recorded after 8 weeks from planting and scored as follows:

R= Resistant 0-20% wilted plants

M= Moderately susceptible 2150% wilted plants

S= Susceptible>50% wilted plants

Results and Discussion :

Plant breeders andplant pathologists agree that screening for resistance to Fusarium wilt should normally be done in wilt-sick plots, and that laboratory and greenhouse procedures can be used to confirm the resistance of promising material identified in the field, Jimenez-Diaz et al (1993).

a- Sick plot :

Results presented in table (1) showed variation in chickpea plants reaction to root rot/wilt disease and percentage of germination. Eight entries showed moderate reaction (MR) to wilt disease, viz., Flip 89-126C, Flip 90-144C, Flip 92-49C, Flip 92-104C, Flip 92-140C, Flip 92-148C, Flip 93-23C and UC 15, whereas Giza 88 showed resistant reaction (R). The other tested entries showed susceptible reaction (s).

b- pots :

Date in Table (2) indicated that, four entries showed resistant reaction to wilt disease, i.e. ICCV- 93104, H-86- 20, ICCX 8 50498- 3 P-PBN-SH, and ICCX 850622-BH-1SH- BH, Also , four entries showed resistant reation to wilt disease i.e. ICC-1244,ICCV-14432, ICCV-92 o 34 and ICCL 91125. Another entries were susceptible which gave more than 50% wilted plants.

Table (1) Screening for Resistance to Wilt/Root-Rot in chickpea in the sick plot at Giza, Res. Station 1997/ 1998 season .

No	Entry Name	Germenation %	Wilt %	Reaction
1	ILC240	50	80	
2	ILC267	45	55.6	
3	ILC1278	50	100	
4	ILC1300	20	75	
5	FLIP81-269C	35	57.1	
6	FLIP88-1C	70	50.0	MR
7	FLIP89-126C	55	27.3	MR
8	FLIP90-2C	55	100	
9	FLIP90-124C	35	85.7	
10	FLIP90-131C	55	54.5	
11	FLIP90-144C	35	42.6	
12	FLIP90-155C	45	88.9	
13	FLIP90-181C	5	100	
14	FLIP91-20C	50	60	
15	FLIP91-184C	55	54.5	
16	FLIP91-217C	45	100	
17	FLIP92-48C	30	100	
18	FLIP92-49C	65	33.3	MR
19	FLIP92-104C	70	35.3	MR
20	FLIP92-113C	15	100	
21	FLIP92-140C	50	40	MR
22	FLIP92-148C	30	50.0	MR
23	FLIP93-23C	50	40	MR
24	FLIP93-28C	10	100	
25	FLIP93-54C	35	100	
26	FLIP93-55C	40	100	
27	FLIP93-228C	30	100	
28	S96275	35	57.1	
29	S96276	20	75.0	
30	S96278	65	75.0	
31	S96279	50	92.8	
32	S96280	5	100.0	
33	S96283	25	80.0	
34	S96284	60	91.7	
35	ICCV-2	40	75.0	
36	ICCV 95503	30	100.0	
37	ICCV 95505	50	100.0	
38	ICCV 95506	25	80.0	
39	UC 15	65	38.5	MR
40	UC 27	15	100	
41	ILC1929	50	100	
42	G.88	85	17.6	R

*R: Resistant 0-20% Wilted plants
M: Moderately susceptible 21-50% Wilted plants.
S: Susceptible >50% Wilted plants.

Table (2) : Percentage of wilted plants in chickpea regional nursery in pots at Giza Res. Station, 1997/1998 season.

No	Nursery	Percentage of wilted plants	Reaction*
1	ICC-12442	40.0	M
2	ICCV-14432	45.0	M
3	ICCV-89303	52.5	S
4	ICCV-90217	60.0	S
5	ICCV-91108	60.0	S
6	ICCV-91128	70.0	S
7	ICCV-92034	35.0	M
8	ICCV-93104	20.0	R
9	ICCV-94927	55.0	S
10	H-86-20	15.0	R
11	ICCX 850498-3P-PBN-SH	20.0	R
12	ICCX 850622-BH-1 SH-BH	20.0	R
13	ICCL 91125	40.0	M
14	ICCL 90250	62.5	S
L S D at 5%		7.9	

*R: Resistant 0-20% Wilted plants
M: Moderately susceptible 21-50% Wilted plants.
S: Susceptible >50% Wilted plants.

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Integrated Control of Root-Rot/ Wilt Diseases in Lentil and Chickpea

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Abstract :

An experiment for controlling root-rot/wilt disease in lentil and chickpea has been done in Mallawy Res. Station. Two cultivars from each crop, tow fungicides and three sowing dates were used to study the interaction between all of them .

Results showed that, the interaction between sowing dates, fungicides and cultivars were not significant in two crops. Also, it indicated that, seed treatment with fungicides were effective in controlling of damping-off and root-rot/wilt disease in the two crops especially in the seedling stage. Sowing dates were significantly effect on the incidence of the diseases and seed Yield in chickpea and lentil.

Introduction :

Damping-off , root-rot and wilt diseases still the most important diseases affecting faba bean , lentil and chickpea legume crops in Egypt , causing considerable damage and losses in the annual seed yield. *R.solani* and *F.oxysporum* are the main pathogens of these diseases (Mohamed , 1982 ; Abou-Zeid *et al* ., 1990 ; El-Awadi, 1993 ; and El-Garhy, 1994, and Abou-Zeid et al., 1996).

In order to increase the production , the legume crops should be protected from root-rot / wilt disease complex, and other diseases as well . Integrated control programs of plant diseases are the most successful and economical means in controlling diseases , especially when all available pertinent information regarding the crops, its pathogens, the environmental condition expected to prevail , locality , availability of materials and costs are taken into account in developing the control program (Agrios ,1988) . In these programs , different methods are applied together to reach such target . Healthy seed, host resistance , pesticide application , biological control and cultural practices can be manipulated to reach an economic disease management system that keeps the disease damage below economic threshold (Agrios , 1988) . Hassanein et *al., (*1997) found that, the interaction between fungicides, fungi and cultivars in were significant in faba bean and lentil crops, and not signficant in chickpea crop.

This work is an attempt to study the effect of certain sowing dates, fungicides and cultivars on controlling root-rot and wilt diseases
.lentil and chickpea under field condition at Mallwy Res. Station to reach the best ways for controlling these diseases .

Materials and Methods :

This experiment was carried out in the field at Mallawy Res. Station 1997/98 season, at study the effect of sowing adte, fungicides and cultivars interaction in controlling root rot/wilt disease in lentil and chickpea. Three sowing date i. e. 10/11, 25/11 and 25/12/1997, and 2 fungicide i.e. Benlate - 50 and Rizolex - T at the rate of 3g/kg seed as seed treatment and two cultivars from each crop, Giza88 and Giza 531 for chickpea and Giza 9 and Giza 51 for lentil. Design experiment was split / split plot in four replicates with plot size 3.6 m^2 for chickpea. and three replicates with plot size 2.1 m^2 for lentil. Treated and untreated seeds were planted at the rate of 120 seed / plot for chickpea, and 400 seeds/plot for lentil in each sowing date.

Damping-off, wilted plants, plant hight and seed yield were recorded.

Results and Discussion :

Date in Table (1) indicated that, seed treatment of two chickpea cultivars (G.88 and G.531) with fungicides (Benlate-50 or Rizolex-T) were significantly reduced damping-off compared with control (untreated seed) in the first and second sowing date, but not significant in third sowing date, except of seed treatment of G.531 cultivars with Rizolex -T. the percentage of wilted plants was affected by sowing date, fungicides and cultivars were significant.

Seed yield was significantly affected by sowing date and fungicides . The highest seed yield was obtained in the first sowing date, following by the second sowing date, while the third sowing date was least one. The best treatment was G 531 cultivar seed treatment with Rizolex- T and sowing at 10/11 .

Table (1) Effect of chickpea cultivars, seed treatment with fungicide and sowing date on controlling root-rot/wilt diseases.

Sowing date	Fungicides	Cultivars	Damping off %	Wilted plants %	plant hight (cm)	Yield (g)/ plant
10/11/97	Benlat	G 88	13.1	5.9	75.0	823.3
		G 531	16.4	6.7	78.3	906.7
	Rizolex-T	G 88	11.9	4.4	86.7	813.3
		G531	7.8	2.1	68.3	976.7
	Control	G 88	16.1	3.7	78.3	693.3
		G531	28.1	3.1	78.3	783.3
25/11/97	Benlate 50	G 88	20.0	1.8	81.7	793.3
		G531	23.6	0.0	70.0	816.7
	Rizolex-T	G 88	20.0	1.0	76.7	813.3
		G531	21.4	1.1	75.0	816.7
	Control	G 88	23.3	2.5	76.7	696.7
		G531	30.3	1.6	80.0	763.3
10/12/97	Benlate	G 88	27.8	3.6	63.3	570.0
		G531	40.3	3.7	76.7	390.0
	Rizolex.T	G 88	27.5	1.6	68.3	483.3
		G531	31.9	4.5	73.3	416.7
	Control	G 88	28.9	3.7	68.3	463.3
		G531	40.3	3.9	63.3	413.3
L.S.D at % For : Sowing date (A)			5.5	1.6	NS	80.5
Fungicides (B)			2.9	NS	NS	54.4
Cultivar (C)			3.5	NS	NS	N.S
A X B			NS	NS	NS	N.S
A X C			NS	NS	NS	91.3
B X C			NS	NS	NS	N.S
A X B X C			NS	NS	13.6	N.S

Date in Table (2) showed that, lentil seed treatment with fungicides (Benlate - 50 Rizolex –T) were significantly decreased of damping –off with the two cultivars (G 9 and G 51) compared with the control treatment (untreated seeds). No significant different between cultivars with all treatments.

Seed yield were affected by sowing date, the highest seed yield were obtained at the first sowing date (10/11/97) followed by the second sowing date (25/11/97) and the third sowing date respectively .On the other hand Rixolex-T was effective than Benlate-50 in controlling damping-off root-rot/wilt diseases.

The least percentage of damping-off wilted plant and the highest seed yield were obtained when lentil G 9 cultivar treated with Rizolex-T or Benlate-50 at the first sowing date.

Table (2) Effect of lentil cultivars, seed treatment with fungicide and sowing date on controlling root-rot/wilt diseases.

Sowing date	Fungicides	Cultivars	Damping off %	Wilted plants %	Seed yield g/ plant
10/11/97	Benlate	G 9	5.0	0.31	640
		G 51	8.8	0.31	595
	Rizolex.T	G 9	5.0	0.31	773.5
		G 51	10.0	0.63	590.0
	Control	G 9	13.0	0.56	510.0
		G 51	17.5	0.44	633.8
25/11/97	Benlate	G 9	18.8	0.50	377.5
		G 51	10.0	0.63	300.0
	Rizolex.T	G 9	6.3	0.38	392.5
		G 51	10.0	0.88	290.0
	Control	G 9	22.5	0.50	282.5
		G 51	20.0	1.50	280.0
10/12/97	Benlate	G 9	11.3	1.57	212.5
		G 51	17.5	1.38	160.0
	Rizolex.T	G 9	12.5	1.38	240.0
		G 51	17.5	1.19	190.0
	Control	G 9	20.0	0.94	205.0
		G 51	22.5		157.5

L.S.D at % S For :			
Sowing date (A)	NS	0.40	67.97
Fungicides (B)	3.54	NS	48.57
Cultivar (C)	NS	NS	N.S
A X B	NS	NS	N.S
A X C	NS	NS	N.S
B X C	NS	NS	N.S
A X B X C	NS	N.S	N.S

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Effect of soil solarization on control of Root-rot and Wilt diseases of Food legumes crops (Faba bean , lentil and Chickpea).

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Summary:

An experiment were carried out under artificial infestation with *R.solani* and *F.oxysporum* separately for faba bean, lentil and chickpea at Giza Res. Station. Solarization was carried out on soils moistened by irrigation, two days before mulching, to increase thermal sensitivity of *R.solani* and *F.oxysporum* and improve heat transfer. Soil samples were taken from solarized and control soils, after removal of the polyethylene sheets to assay the population of *R.solani* and *F.oxysporum.*

Soil solarization after 8 weeks reduced significantly the soil population of the pathogens at all period after removed the polyethylene sheets compared to the unmulched treatment. soil solarization were significantly decreased of pre emergence damping off in faba bean from 35% to 10 with *R.solani*, and from 15 to 5% with *F.oxysporum.* Soil solarization significantily decreased damping-off, and increased survival plants in lentil and chickpea compared with control treatment (non-solarized soil).

Introduction:

Soil solarization is a hydrothermal process that occurs in moist soil which is covered by a transparent plastic film and exposed to sunlight during the warm summer months. During solarization, soil temperatures are achieved which are lethal to many plant pathogens and pests and which also cause complex changes in the biological, physical, and chemical properties of soil that improve the growth and development of plants (pullman, *et al* 1981).

Covering moistened field soil with transparent polyethylene sheets during the hot season caused an increase in soil temperature which resulted in the control of *Fusarium solani*, the causal agent of root-rot disease in Faba bean (Sarhan, 1991) *Rhizctonia solani* and ***Fusarium** oxysporum* , causes a serious seed and root-rot and wilt diseases on Food legume crops (Abou-Zeid *et al* 1997).At present control of Root-rot/Wilt diseases in Faba bean, lentil and Chickpea in Egypt depends on chemical, fertilizers, and cultivars methods (Hassanien *et al* 1997) and Hussein *et al* 1991). Soil solarization was reported to be successful in controlling many soil borne pathogens (Katan, 1980, Al-Hassan *et al* 1985 Al-Raddad, 1979, Jones *et al* 1972, Pullman, 1981, Sarhan, 1991, and Zaid *et al* 1989).

The objectives of this work to determine the effect of soil solarization on control of Root-rot/Wilt diseases of Faba bean, lentil and chickpea caused by *R.solani* and *F.oxysporum* .

Materials and Methods :

These experiment were carried out under artificial infestation with *R.solani* and *F.oxysporum* separately for faba bean, lentil and chickpea at Giza Res. Station. Individual pots (25cm diameter) were arranged in a randomized complete block design consisting of three crops each with four replications. Solarization was carried out on soils moistened by irrigation, two days before mulching, to increase thermal sensitivity of *R.solani* and *F.oxysporum* and improve heat transfer. Thereafter, pots were irrigated every 4 to 7 days until the plastic was removed. Pots were mulched with 0.06 mm transparent polyethylene plastic sheets for 8 weeks during July and August.

Soil samples were taken from solarized and control soils, after removal of the polyethylene sheets to assay the population of *R.solani* and *F.oxysporum* using the dilution method as described by Al-Hassan *et. al.*, (1985), and Nash and Snyder (1962), and Sanfored (1952). Four samples were taken at different periods i.e., 0 , 3 , 5, and 6 weeks from removal polyethylene sheets.

Giza 716 (faba bean), Giza 9 (Lentil) and Giza 88 (chickpea) cultivars were used. 5 seeds from each faba bean and chickpea, and 20 seed from lentil were sown in each pot separatily on 15 October 1997.

Data were recorded after 3,5 and 12 weeks from planting for pre- emergence damping - off, post - emergence damping - off and survival plants, respectively.

Results and Discussion :

Soil solarization after 8 weeks reduced significantly the soil population of the pathogens at all period after removed the polyethylene sheets compared to the unmulched treatment (Table 1). Results showed that *R. solani* and *F. oxysporam* populations densities were considerably reduced after Zero, 3, 5, and 6 weeks from removed the polyethylene sheets. The results are in accord with those obtained by Sarhan (1991) and Nelson and Wilhelm (1958), who reported that temperature achieved at the upper layers by soil mulching are in the range of those lethal to plant pathogens.

Table (1) : Effect of soil solarization on the survival of *R. solani* and *F.oxysporam* at different periods after removed polyethylene sheets (Zero, 3, 5, and 6 weeks).

Treatment	*Rizctonia solani* propagules / g dry soil	*Fusarium oxysporium* propagules/ g dry soil
Control*	347.5	242.5
Zero	26.25	12.25
3 weeks	52.50	26.25
5 weeks	66.25	46.25
6 weeks	66.25	46.25
LSD 0.5	9.575	8.643

*Solarized soil without pathogen

Data in table (2) and figure (1) showed that, soil solarization were significantly decreased of pre emergence damping off in faba bean from 35% to 10 with *R.solani*, and from 15 to 5% with *F.oxysporum*, No significant difference between soil solarization and non soil solarization in post emergence damping - off stage . Furthermore, survival plants significantly in creased from 55% 9 (non.) solarized to 88% (solarized) with *R.solani* and from 70% (non- solarized) to 95% (solarized) with *F.oxysporum*

Table (2) : Effect of soil solarization on Root-rot and with diseases of Faba bean under greenhouse conditions.

Treatments	% of pre-emergence		% of post-emergence		% of survival plants	
	R- solani	*F. oxy*	*R- solani*	*F. oxy*	*R- solani*	*F. oxy*
Solarized	10	5	5	0	85	95
non- solarized	35	15	1o	15	55	70
Control*	0	0	0	0	10 0	100
L.S.D at 5%	0.786		N.S		1.404	

*Solarized soil without pathogen

Results in Table (3) and figure (1) indicated that, soil solarization by covered with plastic sheets during summer were significantily decreased damping-off, and increased survival plants in lentil compared with control treatment (non-solarized soil).

Pre-emergence damping-off caused by *R.solani* and *F.oxysporum* were decreased from 55.0 and 27.5% in non solarized soil to 20% and 12% in solarized soil respectively. Post emergence damping-off decreased from 17.5% and 20% in non-solarized soil to 5% and 7.5% in solarized soil, respectively (table 3).

Also, data show that, survival plants were increased from 27.5% and 52% in non-solarized soil to 75% and 80% in solaized soil when infested with *R.solani* or *F.oxysporum* respectively .

Table (3) : Effect of soil solarization on Root-rot and wilt diseases of lentil under greenhouse conditions.

Treatments	%pre-emergence		% post-emergence		% of survival plants	
	R-solani	*F.oxy.*	R-solani	*F.oxy.*	R-solani	*F.oxy.*
solarized	20.0	12.5	5.0	7.5	75.0	80.0
non-solarized	55.0	27.5	17.5	20.0	27.5	52.5
control*	5		0		95	
L-S.D at 5%	2.990		1.261		3.469	

- Solarized soil without pathogen.

Solarization of artificially infested soil decreased root-rot and wilt diseases incidence of chickpea.

Data in Table (4) and figure (1) indicated that, soil solarization were significanlly dcreased of pre-emergence damping-off and in creased of survival plants of chickpea, but not significant effect on post emergence damping-off. Pre emergence damping-off decreased from 50% and 10% in non-solarized soil to 20% and 0.0% in solarized soil, when infested soil with *R.solani* and *F.oxysporum* respectively. Also percentage of survival plants were increased from 40.0% and 60% to 75.0% and 90.0% respectively.

Soil solarization controls population of many important soilborne fungal and bacterial plant pathogens (El-More 1997). Also decreased wilt disease incidence of lupin, Morsy. *et. al*., (1995).

The success of soil solarization is based on the fact that most plant pathogens and pests are mesophylic, i.e. unable to grow at temperature above 31 c to 32 c they are Killed directly or indirectly by the temperatures achieved during the solar heating of moist soil under transparent plastic films (De Vay, 1991). Thermotolerant and thermophylic soilborme micro-organisms usually survive the soil solarization (Stapleton and Devay 1984). However, all soilborne organisms, if not directly inactivated by heat, may be weakened and become vulnerable to changes in thegas environment in solarizing soil or to changes in the populations of other organisms which may exert a form of biological control (Katan, 1985 and Stapleton and Devay 1982).

On other hand, Stapleton (1991) reported that. availability of many mineral nutrients is increased following solarization, particularly those tied up in organic fraction, sush as NH4 - N, NO3 - N, P, Ca, and Mg. These increases in nutrient availability are an additional advantage to solarization, and may provide the equivalent of a pre-plant fertilizer dosage.

Table(4): Effect of soil solarization on Root-rot and wilt diseses of chickpea under greenhouse conditions.

Treatments	% pre-emergence		% post-emergence		% of survival plants	
	R. solani	*F. oxy*	*R. solani*	*F. oxy*	*R. solani*	*F. oxy*
solarized	20.0	0.0	5.0	10.0	75.0	90.0
non-solarized	50.0	10.0	10.0	30.0	40.0	60.0
control*	0		0		100	
L.S.D. at 5%	15.519		N.S		15.689	

* Solarized soil without pathogen.

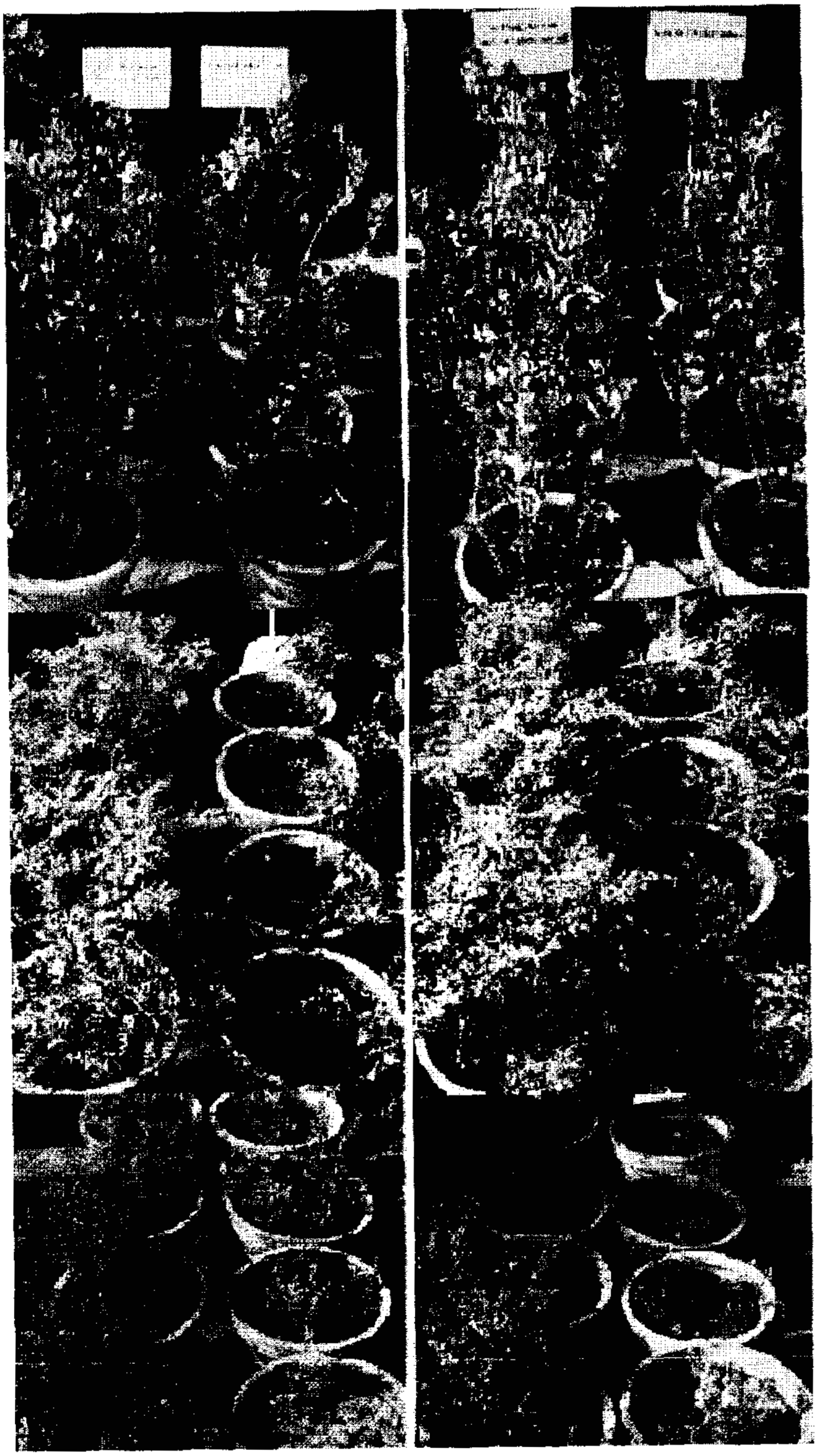

Figure (1): Effect of soil solarization on wilt / root- rot diseases caused by *Rizotonia solani* (left) and *Fusarium oxysporum* (right) on Faba bean (upper), chickpea (middle)

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