

CONTENT

INTRODUCTION	1
REVIEW OF LITERATURE	3
1 Root rot causal pathogens and symptoms	3
2 Occurrence, frequency and distribution of cucumber root rot pathogens.....	7
3 Frequency of fungi associated with root rot on cucumber	
4 Pathogenicity.....	10
5 Varietal reaction	15
6 DNA analysis	17
7 Biological control	20
MATERIALS AND METHODS	24
1 Collection of infected plant materials	24
2 Isolation of the associated fungi	25
3 Purification of the isolated fungi	26
a- Single spore technique	26
b- Hyphal tip technique	26
4 Identification of the isolated fungi	26
5 Preparation and incubation of the fungal inoculum	26
6 Pathogenicity test	27
7 Evaluation of cucumber varieties to root rot pathogens	28
8 Linear growth and dry weight of the isolated fungi	29
a- Linear growth	29
b- Dry weight	30
9 Random amplified polymorphic DNA analysis.....	30
DNA extraction	30
RAPD procedure	31
Preparation of PCR reactions	31
PCR program and temperature profile	31
Amplification product analysis	32
DNA Data analysis	32
10 Biological control	33
- Isolation and identification of biocontrol fungi	33
- Antagonistic activity of <i>Trichoderma</i> species in dual culture.....	33
- Biocontrol of root rot pathogens by <i>Trichoderma</i> spp. in pots	34
11 Media ingredients and culture preservation	35
1- Potato dextrose Agar medium (PDA)	35
2- Malt extract agar medium	35

3- Czepek liquid medium	36
4- Martin's medium	36
Preservation of fungal isolates	36
12 Disease assessments	36
Infection types (IT)	37
Disease index (DI)	37
13 Statistical analysis	37
EXPERIMENTAL RESULTS	39
1 Symptoms of root rots on cucumber	39
2 Frequency of the isolated fungi	41
3 Pathogenicity test	43
4 Virulence of isolates of different root rot pathogens	49
5 Effect of root rot infection on some agronomic characteristics.....	52
6 Physiological characters of root rot pathogens	55
7 Evaluation of cucumber varieties to root rot pathogens	57
8 Effect of root rot infection on agronomic characters	61
9 DNA analysis	63
10 Biological control	68
11 Antagonistic activity of <i>Trichoderma</i> species in dual culture	68
12 Biocontrol of root rot pathogens by <i>Trichoderma</i> spp. in pots under greenhouse condition	72
DISCUSSION.....	81
SUMMARY	95
REFERANCES.....	98
ARABIC SUMMARY	

SUMMARY

Cucumber is considered one of the most important vegetable crops. This crop is grown in different seasons in open fields; summer and nili seasons. It is also grown under greenhouse condition in winter to satisfy the consumer requirements.

Although different high yielding genotypes are cultivated in Egypt, disease infection with different pathogens is one of the limiting factors in cucumber production.

Cucumber plants are liable to the infection of many diseases. Soil borne pathogens are considered one of the most dangerous groups which attack the crop, reduce the number of plants and consequently the yield.

In the course of the present study, infected materials of cucumber plants were collected from different governorates i.e. Qaluobiya, Minufiya, Kafr El-Sheikh, Giza, Beheira and Dakahkliya. Isolation was carried out for the pathogenic and the associated fungi. The results obtained showed the presence of pathogenic fungi in addition to *Trichoderma* spp., the known biocontrol agent fungi.

The isolated pathogenic fungi were *Fusarium oxysporum* f.sp. *cucumerinum*, *Fusarium solani*, *Fusarium equesti*, *Fusarium moniliforme*, *Rhizoctonia solani*, *Pythium aphanidermatum*, *Macrophomina phaseolina*, *F. chlamydosporum*, *Phytophthora* spp., *Alternaria* spp. and *Trichoderma* spp.

F. solani, *F. oxysporum* f. sp. *cucumerinum*, *R. solani* and *Pythium aphanidermatum* were the most frequent fungi.

Some physiological characters i.e. radial growth, growth rate and dry weight for six pathogens were determined.

Pathogenicity test was carried out against the highly susceptible genotype Beit alpha in pot experiment under greenhouse condition. Results obtained revealed that all tested fungi were pathogenic to the tested genotype. Also the results obtained showed the difference in virulence among the tested isolates of the different fungi.

The effect of infection of the different pathogens on same agronomic characters i.e. shoot length, root length, shoot fresh weight, root fresh weight with significant difference in most cases.

Evaluation for seven cucumber genotypes was carried out under greenhouse conditions against the most common virulent isolates of the pathogenic fungi. The cvs. Beit alpha and Zeina were the highly susceptible genotypes. While cvs. Sweet crunch and Thamine were relatively resistant. The rest of the tested genotypes were moderately susceptible.

Genomic DNA prepared from the seven genotypes was used to screen primer for readily detectable and reproducible polymorphic PCR amplifications. The PCR conditions employed, allowed amplification of many bands on the agarose gel. Bands present in each sample were scored for presence and absence of amplification products. The primer showed a high number of scorable bands (60 bands). 16 fragments were detected among them 12 fragments were polymorphic (75%) and 4 fragments were nonpolymorphic.

To compare the polymorphism among the used genotypes, RAPD markers were studied. The total number of loci detected was 60 with an

average of 8.5 loci per genotype. Among them 32 were polymorphic and 28 were monomorphic. Results obtained showed that the highest number of polymorphic loci was in the relatively resistant cv. Sweet crunch and the lowest numbers were in cv. Beit alpha (the highly susceptible genotype).

UPGMA cluster analysis divided the different genotypes into two clusters; the first included cvs. Bybloss, Sweet crunch and Thamine while the second cluster included cvs. Beit alpha, Zeina, Medina and Mena.

Antagonism among the different isolates of four species of *Trichoderma* i.e. *T. harzianum*, *T. hamatum*, *T. viride*, and *T. glaucum* was studied in dual cultures against six pathogenic fungi i.e. *Fusarium oxysporum* f. sp. *cucumerinum*, *Fusarium solani*, *Fusarium chlamydosporum*, *Rhizoctonia solani*, *Macrophomina phaseolina* and *Pythium aphanidermatum*.

Results obtained showed the superiority of *T. harzianum* against most of the tested pathogens.

Under greenhouse condition, the effectiveness of the bioagents was tested against the different pathogens using the susceptible genotype Beit alpha. Results obtained showed the effectiveness of *T. harzianum* and *T. glaucum* in the biological control.