Egypt. J. Phytopathol., Vol. 37, No. 1, pp. 35-46 (2009)

Effect of Garlic and Onion Extracts or their Intercropping on Suppressing Damping-off and Powdery Mildew Diseases and Growth Characteristics of Cucumber

S.M. Morsy[*]; Elham A. Drgham[**] and Gehad M. Mohamed[*]

* *Plant Pathol. Res. Inst., Agric. Rec. Centre, Giza.*

** *Field Crops Dept. Nuclers Rec. Centre, Anshas.*

Fusarium oxysporum, F. solani, Sclerotium rolfsii, Rhizoctonia solani and *Macrophomina phaseolina* were associated with cucumber damping – off disease in the newly reclaimed lands. *F. oxysporum* however, was the most frequent and constituted 23% of the recovered fungi. All the tested cultivars were susceptible in varied degrees to *F. oxysporum*. Americana Beta-Alpha cultivar showed the lowest percentage of pre- and post–emergence damping-off and Denmark Beta- Alpha cultivar, recorded the highest percentages. Plant extracts of garlic and onion reduced linear growth of *F. oxysporum*, *F. solani* and *S. rolfsii*. The highest suppressive effect on *F. oxysporum* was obtained when garlic extract was added to the medium at 1.5ml/plate. Pre-and post- emergence damping- off were decreased by soaking cucumber seeds in the extracts of garlic or onion at 6% concentration for 60 minutes before sowing. Natural infection by cucumber powdery mildew was decreased by spraying garlic or onion extracts at concentration of 9% and increased of length, fresh and dry weight of shoots and roots as well as number of flowers/plant compared with control. Intercropped cucumber with garlic or onion decreased percentage of pre- and post-emergence damping–off as well as increased leaves number and number of flowers/plant.

Keywords: Cucumber, damping-off, garlic extract and onion extract.

There is a great need for intensifying agricultural production in Egypt. In this respect cucurbits as a major vegetable crop was taken into consideration. Family cucurbitaceae contains approximately about 90 genera, but three are widely grown in Egypt, *i.e., Cucumis* spp. (melon and cucumber), *Citrullus* spp. (watermelon) and *Cucurbita* spp. (Squash and Pumpkin). In Egypt, cucumber (*Cucumis sativus*) is among the most important cucubitaceous crops and leading export vegetable. Unfortunately, in Egypt and several countries cucumber is infected by several soilborne fungi causing damping–off disease which affected on both quantity and quality of the yield. *Fusarium oxysporum* (Schlecht), however, is considered the most important pathogen involved (Kordali and Demirci 1998, Vakalounakis *et al.*, 2004 and Yan *et al.*, 2004). Several methods were suggested for controlling of damping-off of cucumber, *i.e.* chemical control (El–Shami *et al.*, 1988), biological control (Kim and Gee 1988 and Mohamed, 1996), and plant extracts (Shalaby and Atia, 1996, Ehteshamul *et al.*, 1998 and Tohamy *et al.*, 2002).

The present study, therefore, was conducted to; (1) isolate the pathogens of cucumber damping- off; (2) evaluate the relative susceptibility of the widely grown cucumber cultivars; (3) study the effect of plant extracts on linear growth of soilborne fungi causing damping-off; (4) role of garlic and onion extracts or intercropping on damping–off control and (5) effect of spraying the suspensions of some plant extracts on powdery mildew incidence.

Materials and Methods

Fungi associated with cucumber root – rot and wilt disease:

During 2006 and 2007 growing seasons, samples of cucumber plants exhibiting damping–off were collected from different fields in El-Behera Governorate. Samples were washed thoroughly with tap water. Small portions of the damping–off diseased samples were surface sterilized in 3% sodium hypochlorite solution (Clorox) for 3 minutes, rinsed in sterilized water and dried between folds of sterilized filter papers. The portions were plated on PDA medium and incubated at 25°C. The developed colonies were purified using hyphal tip or single spore techniques (Tuitte, 1969). Identification of the fungi detected was conducted according to Booth (1971), Barnett (1972) Gilman (1957) and Ramirez (1982). Stock cultures were maintained on PDA slants and kept in a refrigerator at 5°C for further studies.

Pathogenicity test and varietal reaction:

Inoculums of the most frequent fungus was prepared by growing each of recovered fungi in 500 ml, conical flasks containing 150g autoclaved sorghum medium, (sorghum, sand and water in 1:20:4 ratio) according to Abd El-Rehim, (1984) and incubated at 25°C for 15days. Sterilized pots, 25cm in diameter, were filled with 8 kg autoclaved sandy loam soil and infested with the inoculum of the fungus tested at the rate of 5g/kg soil. Each pot was sown one week after fungus infestation with four surface–sterilized cucumber seeds. The tested cucumber cultivars were Americana Beta Alpha, Americana IBB, Beta–Alpha (Hybrid Japanese) and Denmark Beta–Alpha. Check treatments were carried out in pots filled with sterilized sandy loam soil (non–inoculated). Four replicates were used for each treatment. Pre-, and post–emergence damping–off of seedlings were recorded at 10 days intervals for a period of two months. The data obtained were statistically analyzed using complete randomized block design (Snedecor and Cochran, 1973).

Laboratory experiments:

Effect of plant extracts on linear growth of soil- borne pathogens:

Tissue extracts of garlic bulbs and onion were prepared by blending 10g of frozen plant materials with 100ml water for 5 minutes. The resilient was filtered through a double cheesecloth fabric and centrifuged for 10 minutes at 300 rpm. Sterilization was made by 0.2 µm Millipore filters. The extract was added (1.5 ml/plate) to the gliotoxin fermentation medium (GFM) as described by Brian and Hemoming (1945). The plates were inoculated with *Fusarium oxysporum*, *F. solani* and *Sclerotium rolfsii*. Control (check) plates devoid of extracts were inoculated and

incubated under similar conditions at 28°C. Retardation as % of reduction in linear growth was determined according to Tohamy *et al.* (2002) formula:

$$\text{Reduction (\%)} = \frac{[(G1 - G2) \times 100]}{G1}$$

Whereas:
G1 = Linear growth in check treatment.
G2 = Linear growth in treatment.

Greenhouse experiment:
Cucumber seed treatment with plant extracts:

Plant extracts of garlic and onion were prepared as mentioned before to give a series of concentrations of each plant extract (3, 6 and 9%) were prepared from the crude extract. Cucumber seeds (Denmark Beta-Alpha) were soaked in the prepared dilutions for 60 minutes or in pure water for check treatment. The seed were then sown in infested soil at the rate of 4 seed /pot under greenhouse conditions. Four replicates were used for each treatment Check treatment was carried out in pots filled with sterilized sandy loam soil (uninoculated, untreated). Data of pre- and post–emergence damping – off were recorded at 7 day-intervals for 45 days. Final, cucumber plant was gently pulled-off from the soil and washed with running tap water. Number of leaves and flowers / plant were recorded.

Control of powdery mildew disease with garlic or onion extracts:

The plant extracts were used to control powdery mildew under greenhouse conditions. Cucumber cultivar Denmark Beta– Alpha was used. One week–old cucumber plants received a weekly spray with the original garlic or onion extracts (9%) until 50 days. Five replicates were considered for each treatment, each replicate was sown with five seeds. Results were recorded as disease incidence, disease severity, average length of shoot and root/plant, fresh weight of shoot and root/plant, dry weight of shoot and root/plant and number of flowers/ plant until two months.

Field experiments:
Effect of intercropping:

Garlic Chinese cv., and onion were used for intercropping with cucumber. Field experiments were conducted during 2006 and 2007 growing seasons. The experimental design was randomized complete block design (RCBD) with three replicates. The experiments were conducted in plots 27m2, 6 m in length and 3 rows, between both of them 1.5 m under natural infection in the open field. Cucumber (cv. Denmark Beta Alpha) was intercropped by garlic or onion plants. Methods of intercropping hill/hill was used for each garlic and onion to cucumber entries. Data were calculated to determine the effect of intercropping onion or garlic with cucumber on the development of pre – and post emergence damping-off and growth parameters 15 and 50 days after sowing.

Statistical analysis:

All data obtained were statistically analyzed according to Gomez and Gomez (1984).

Results and Discussion

Fungi causing root rot and wilt disease on cucumber

Data in Table (1) show that several species of Fusarium were isolated from the fields in El-Behera Governorate. *Fusarium oxysporum* was the most prevalent fungus as constituted 23% followed by *F solani* which ranked 18.3%. *Sclerotium rolfsii*; *Rhizoctonia solani*; *Macrophomina phaseolina*; and *F moniliforme* were isolated at frequencies of 14.7, 13, 11 and 9%, respectively. *F semitectum*; *Pythium* sp.; *Aspergillus niger* and *Alternaria alternata* were also isolated but at lower frequencies 5, 3, 2 and 1%, respectively. These results are in harmony with those reported from Egypt and other parts of the world (Kordali and Demirci 1998; Pushpa *et al.*, 1999; Yan *et al.*, 2004 and Mohamed, 2007).

Table 1. Frequency of fungi isolated from cucumber plants showing root-rot and wilt symptoms collected from El-Behera Governorate during growing seasons 2006 to 2008

Isolated fungus	Frequency (%)*
Fusarium oxysporum Schlecht.ex fr.,	23.0
Fusarium solani (Mart.) App. and Wr	18.3
Sclerotium rolfsii sacc.,	14.7
Rhizoctonia solani Khun	13.0
Macrophomina phaseolina (Maub.) Ashby	11.0
Fusarium moniliforme Sheld	9.0
Fusarium semitectium Berk and Rav.	5.0
Pythium sp.	3.0
Aspergillus niger van Tighem	2.0
Alternaria alternata (Fr.) Keissler	1.0
Total number of isolated fungi	300

* Frequency (%) = $\frac{\text{Number of the isolated isolate} \times 100}{\text{Total number of the isolated fungi (300)}}$

Pathogenicity tests and varietal reactions

Pathogenicity tests were conducted on four cucumber cultivars, *i e* Americana Beta–Alpha, Americans IBB, Beta–Alpha (Hybrid Japanese) and Denmark Beta - Alpha revealed that *F oxysporum* was pathogenic to cucumber cultivars tested Table (2). All the tested cultivars were susceptible in varied degrees to *F oxysporum*. High of pre–emergence damping–off (31.75%) was incited on cv. Denmark Beta Alpha, while, (43.75%) post-emergence damping- off was incited on the same cv. However, cv. Americana Beta-Alpha showed the lowest percentage of pre-and post-emergence damping-off. These results are in harmony with those reported by Mohamed (2007).

Table 2. Pathogenicity and varietals reaction of *F. oxysporum* on cucumber cultivars

Cucumber cultivars	Pre-emergence damping-off (%)	Post-emergence damping –off (%)
Americana Beta-Alpha	13.00	19.25
Americana IBB	19.25	25.00
Beta-Alpha (Hybrid Japanese)	25.25	31.50
Denmark Beta-Alpha	31.75	43.75
Control (non-inoculated)	1.00	1.00
L.S.D. at 0.05%	13.67	26.98

Date are mean of 4 replicates each replicate sown with for 4 seeds.

Laboratory Experiment:

Effect of plant extracts on the mycelial growth of the tested soil-borne fungi

Data in Table (3) reveal that garlic extract caused the highest suppressive effect on linear growth of *Fusarium oxysporum*, *S. rolfsii* and *F. solani* being 68.1, 59.63 and 53.7% respectively. However, onion extract showed low effect being 46.67, 24.07 and 37.78%, respectively.

The highest suppressive effect on *F. oxysporum* (68.1%) was obtained when garlic extract was added to the medium. This effect might be due to presence of certain disulfide amino acids in garlic extract as mentioned by Abd-El-Moity (1981). Garlic extract contains as well special materials which inhibit the activity of hydrolytic enzymes produced by the pathogen (Kurucheve and Padmavath, 1997).

Table 3. Effect of plant extracts on the mycelial growth of tested soil-borne fungi

Plant extract	Reduction (%) in linear growth of		
	F. oxysporum	*F. solani*	*S. rolfsii*
Garlic	68.10	53.70	59.63
Onion	46.67	37.78	24.07

* Data are means of 3 replicates

L.S.D. at 0.05% for: Extract= 1.53, Fungi = 1.87, E × F = 2.64

Greenhouse experiment:

Effect of cucumber seed treatments with plant extracts in different concentration on damping-off disease:

Data in Table (4) indicate that the plat extracts three concentrations of the plant extracts tested were effective in controlling damping–off on cucumber cv. Denmark Beta–Alpha damping–off disease. The percentage of per- and post-emergence damping-off were decreased however, by increasing the concentration from 3 to 6%. This might be due to more active ingredient in plant extract at concentration of 6%. These results are in agreement with those obtained by Dived and Singh (1998) and Tohamy *et al.* (2002).

Table 4. Effect of cucumber seed treatment with plant extracts in different concentration on damping–off disease

Plant extract	Concentration (%) of plant extract					
	3		6		9	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
Garlic	19.00	19.00	19.00	25.00	31.50	25.00
Onion	37.50	31.50	25.25	25.00	43.75	43.75
Check	50.00	43.75	37.50	31.25	50.00	43.75

L.S.D. at 0.05 % for:

		Pre-	post-
Plant extract (PE)	=	13.87	12.66
Between conc. (BC)	=	n.s.	n.s.
Interaction (PE × BC)	=	n.s.	n.s.

Effect of spraying with plant extracts on cucumber powdery mildew:

Data in Table (5) indicate that natural infection of cucumber powdery mildew was decreased by weekly spray with dilutions of garlic and onion extracts. Extracts of garlic cloves was the most effective in inhibiting percentage of disease infection as decreased to 27%, compared with 74% of the control. Meantime, onion extract gave 29% infected plants with powdery mildew. These results are in agreement with those obtained by Ahmed (1995) and Tohamy (2002).

Table 5. Effect of plant extract on cucumber powdery mildew disease under greenhouse conditions

Plant extracts	Infection (%)	Disease severity (%)	Efficiency (%)
Garlic	27.0	21.0	68.8
Onion	29.0	25.4	64.17
Check	74.0	71.2	-
L.S.D. at 0.05%	1.74	1.41	-

Effect of plant extracts on cucumber growth characteristics:

Data in Table (6) indicate that garlic or onion extracts significantly improved all plant growth characteristics, *i.e.* number of leaves/plant, number-of flowers/plant, shoot and root length, and fresh and dry weight of shoot and root system compared with non sprayed plants as control. Spraying of garlic extract weekly at the rate of 9% gave the highest growth where the highest No. of leaves/plant (24.4), No. of flowers/plant (17.6) and other characteristics of growth were obtained.

Table 6. Effect of plant extracts on growth characteristics of cucumber under greenhouse condition

Plant extract	Growth parameter *							
	Plant length (cm)		Fresh weight (g/plant)		Dry weight (g/plant)		No. of leaves/ plant	No. of flowers/ plant
	Shoot	Root	Shoot	Root	Shoot	Root		
Garlic	54.28	38.2	194.76	128.3	23.6	4.02	24.4	17.6
Onion	50.08	34.64	190.14	124.9	11.04	2.36	21.6	14.8
Check	40.22	23.4	155.54	102.3	10.8	1.32	19.2	12.6
L.S.D. at 0.05%	2.04	1.47	3.79	1.77	0.88	0.77	1.14	2.13

* Data are recorded 60 days after sowing. Each figure represented average of 5 replicates.

Field experiment:

Intercropping of onion or garlic with cucumber:

Data shown in Table (7) and Fig. (1) show the a significant reduction in percentage of pre-emergence damping-off of cucumber plants intercropped with garlic or onion plants during the two growing seasons (2006 and 2007). Intercropping of cucumber plants with garlic was more effective in decreasing pre-emergence damping off (21.7 and 21.7%) compared with onion (26.2 and 24.6%) during the two growing seasons, respectively. While, for post-emergence damping-off no significant difference was found with cucumber plants intercropped with garlic or onion plants during the same two growing seasons. In general, intercropping cucumber plants with garlic or onion decreased diseases incidence compared with control. These results are in agreement with those reported by Algandour (2003).

Table 7. Effect of intercropping of onion and garlic with cucumber on pre- and post-emergence damping-off

Intercropping	Pre-emergence (%)		Post –emergence (%)	
	2006	2007	2006	2007
Onion	26.2*	24.6	10.0	6.7
Garlic	21.7	21.7	7.5	6.7
Control (cucumber alone)	30.0	31.7	13.8	6.8
L.S.D. at 0.05 % for	0.4	0.7	n.s.	n.s.

* Data are mean of 4 replicates Pre-and post – emergence damping – off were recorded 15 and 45 days after sowing, respectively.

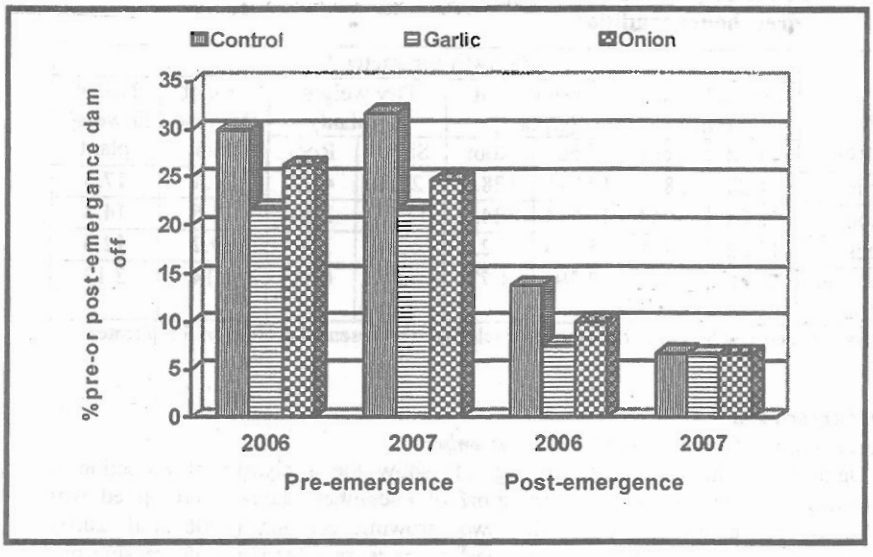

Fig. 1. Effect of intercropping garlic and onion crops with cucumber on pre-or post-emergence damping-off during 2006 and 2007 growing seasons.

Effect of intercropping of garlic and onion with cucumber plants on some growth parameter in the two successive seasons

Data presented in Table (8) and illustrated by Fig.(2) indicate that there was an increase in the number of leaves and flowers/plant in case of cucumber plants intercropped with garlic or onion during the two successive growing seasons of 2006 and 2007. Intercropping of cucumber plants with garlic was more effective than onion in increasing leaves number. Number of leaves/plant were 20.1, 20.7 with garlic compared with 15.6 and 15.9 with onion during the two growing season 2006 and 2007, respectively. Also, number of flowers/plant was increased during 2006 growing season when cucumber plants was intercropped with garlic. Intercropping of onion with cucumber was found to be best than garlic during 2007 growing season. In general, intercropping cucumber plants with garlic and onion increased the number of leaves and flowers/plant compared with control

Table 8. Effect of garlic and onion intercropping with cucumber cv. Denmark Beta-Alpha on number of leaves and flower/plant in two successive growing seasons of 2006 and 2007

Intercropping / Entry	No. of leaves / plant				No. of flowers / plant			
	2006		2007		2006		2007	
	Garlic	Onion	Garlic	Onion	Garlic	Onion	Garlic	Onion
Cucumber with intercropping	20.1*	15.6	20.7	15.9	23.4	22.7	22.5	22.9
Control (cucumber without intercropping)	19.6	13.1	19.9	13.9	21.5	20.9	22.1	21.6
L.S.D. at 0.05	n. s.	1.4	n.s.	1.1	1. 6	1.4	n. s.	0.5

* Mean of 4 replicates.

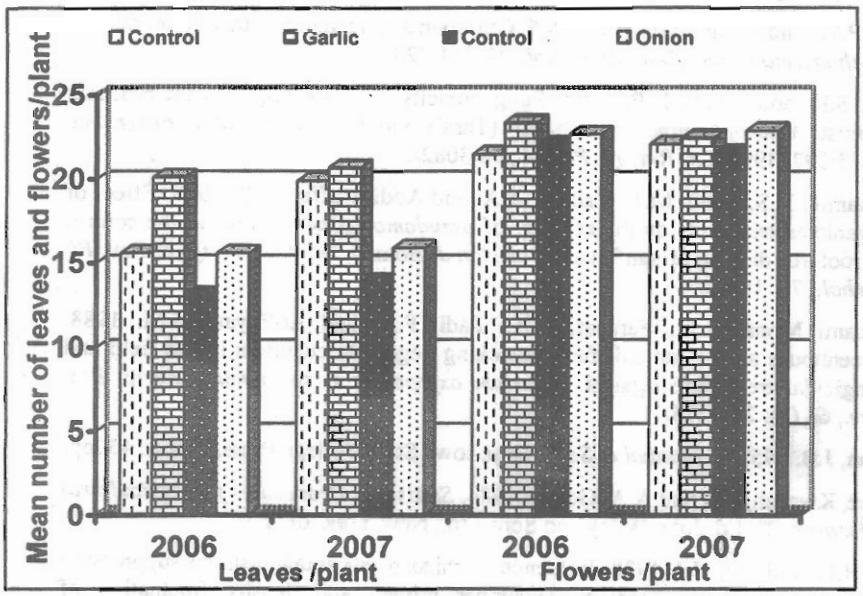

Fig. 2. Effect of intercropping garlic and onion crops with cucumber on the number of leaves and flowers/plant during 2006 and 2007 growing seasons.

References

Abd El-Moity, T.H. 1981. Further studies on the biological control of white rot disease of onion. Ph.D. Thesis, Fac. Agric., Minufiya Univ. 135pp.

Abd El-Rehim, M.H. 1984. Biological studies on *Sclerotium cepivorum* Berk- the incident of white rot of onion. M.Sc. Thesis, Fac. Agric., Assiut Univ. 128pp.

Ahmed, S.E. 1995. Pathological studies on powdery mildew disease on cucurbitaceous. M.Sc. Thesis, Fac. Agric. Al-Azhar Univ.

Alghandour, S.A. 2003. Pathological studies on white stem-rot of chickpea. M.Sc. Thesis, Fac. Agric., Damanhour, Alex. Univ. 83pp.

Barnett, H.L. 1972. *Illustrated Genera of Imperfect Fungi*. Morgantown West Virginia Burgess Publishing Co.

Booth, C. 1971. *The genus Fusarium*. Commonwealth Mycological Institute, Kew, Surrey, England, 237pp.

Brain, P.W. and Hemoming. H.G. 1945. Gliotoxin a fungistatic metabolic product of *Trichoderma viride*. *Ann. Appl. Biol.*, **32**:214-220.

Dived, S.K. and Singh, K.P. 1998. Fungi toxicity of some higher plant products against *Macrophomina phaseolina* (Tassi) Gold. *Flavour and Fragrance J.*, **13**:397–399. (C.f. *Rev. Pl. Pathol.*, **78**:3082).

Ehteshamul, H.S.; Zaki, M.J.; Vahidy, A.A. and Abdil Gaffer, A.B. 1998. Effect of organic amendments on the efficacy of *pseudomonas aeruginosa* in the control of root–rot disease of sunflower. *Pakistan J. Botany*, **30**: 45- 50. (C.F. *Rev. Pl. Pathol.*, **78**: 1486).

EL-Shami Mona, A.E.; Farahat, A.A.; Fadl, F.A. and El-Zayat, M.M. 1988. Greenhouse studies on soil fungi attacking vegetable cucurbits in the field and fungicidal treatments against *Fusarium oxysporum* f. sp. *niveum*. *Agric. Res. Rev.*, **66** (2): 265-275.

Gilman, J.B. 1957. *A Manual of Soil Fungi*. Iowa State College Press, U.S.A. 450pp.

Gomez, Kwanchai A. and A.A. Gomez 1984. *Statistical Procedures for Agricultural Research*. 2nd Ed. John Wiley and Sons Ltd., New York, 680pp.

Kim, H.K. and Jee, H.J. 1988. Influence of rhizosphere antagonists on suppression of cucumber wilt, increased cucumber growth and density fluctuation of *Fusarium oxysporum* f.sp. *cucmerimum* Owen. *Korean J. Plant Pathol.*, **4**:10-18.

Kordali, S. and Demirci, E. 1998. *Fusarium* species from various vegetables in Erzincan, Turkiy. *J. Turkish Phytopathol.*, **27** (2-3): 131-136.

Kurucheve, V. and Padmavath, R. 1997. Fungi toxicity of selected plant products against *Pythium aphanidermatum*. *Indian Phytopathol.*, **50**: 529-535. (C.f. *Rev. Pl. Pathol.*, **78**: 1370).

Mohamed Gehad, M. 1996. Studies on biological control of some soil-borne phytopathologic agents. M.Sc. Thesis Agric Bot. Dept. Fac. Agric. Kafr El-Sheikh, anta Univ.

Mohamed, Somaya A.A. 2007. Pathological studies on nematodes and fungi affecting vegetables in newly reclaimed soils. M.Sc. Thesis, Fac. Agric., Alex. Univ. 67 pp.

Pushpa, K.; Borkar, G.M.; Patil, D.V. and Kamble, A.M._1999. Studies on seed borne pathogens of pumpkin, cucumber, watermelon and muskmelon. *J. Soils and Crops*, **9**(2): 234-238.

Ramirez, C. 1982. *Manual and Atlas of the Penicilla.* Elserier Biomedical Press. Amsterdam, New York, Oxford.

Shalaby, M.S. and Atia, M.M. 1996. Biological and Chemical control of watermelon and cantaloupe root- rot in the reclaimed soils. *Zagazig J. Agric. Res.*, **22**: 1113-1130.

Snedecor, G.W. and Cochran, W.C. 1973. *Statistical Methods.* 6th Ed. Iowa State University Press Ames, Iowa U.S.A.

Tohamy, M.R.; Aly, A.Z.; Abd-El-Moity, T.H.; Atia, M.M. and Abd-El-Moneim Maisa, L. 2002. Evaluation of some plant extracts in control damping–off and mildew diseases of cucumber. *Egypt. J. Phytopathol.*, **30** (2): 71-80.

Tuitte, John. 1969. *Plant Pathological Methods. Fungi and Bacteria.* Burgess Publishing Company, Minneapolis, Minn., USA. 239pp.

Vakalounakis, D.J.; Wang, Z.; Fragkiadakis, G.A.; Skaracis, G.N. and Li, D.B. 2004. Characterization of *Fusarium oxysporum* isolates obtained from cucumber in China by pathogenicity, VCG and RAPD. *Plant Dis.*, **88**: 645-649.

Yan, M; Li Ping, M.; Li Feng, A.; Zheng, P. and Sun, H.Q. 2004. *Screening and initial identification of Fusarium spp. in cucumber* [Chinese]. *Editorial Dept. southwest China Agric. Sci Sichuan, China,* **17** (3): 345-347.

(Received 23/02/2009;
in revised form 28/04/2009)

تأثير مستخلصات البصل والثوم أو تحميلهما على الموت المفاجئ والبياض الدقيقى وصفات النمو على الخيار

صابر محمد مرسى* ، إلهام عباس ضرغام ، جهاد محمد محمد***

١- معهد بحوث أمراض النبات – مركز البحوث الزراعية – الجيزة – مصر.

٢- قسم بحوث المحاصيل الحقلية – مركز البحوث النووية.

تم عزل فطريات فيوزاريوم أوكسيسبورم وفيوزاريوم سولانى وسيكليروشيم رولفسياى وريزوكتونيا سولانى وماكروفومينا فاصوليينا المصاحبة لمرض سقوط البادرات فى نبات الخيار فى عينات تم جمعها من الأراضى المستصلحة بنسبة وصلت الى ٢٣% وأظهرت دراسة العدوى بالفطر فيوزاريوم أوكسيسبورم على الاصناف المختبرة أن الصنف بيتا ألفا أمريكانا كان الأكثر تحملاً للإصابة بين الأصناف المختبرة لسقوط البادرات قبل الظهور وبعد الإنبات مقارنة بالصنف بيتا ألفا دنماركى فكان أقل مقاومة. كما أحدث مستخلص الثوم أو البصل عند إضافته لبيئة نمو الفطريات بمعدل ١.٥ ملى / طبق تثبيطاً للنمو يتراوح ما بين (٢٤.٠٧ % إلى ٦٨.١ %) وكان أكثر تثبيطاً على الفطر فيوزاريوم أوكسيسبورم (٦٨.١ %) عند استخدام مستخلص الثوم.

وفى تجارب الصوبه وجد أن غمس بذور الخيار فى مستخلص الثوم أو البصل لمدة ساعة قبل الزراعة بتركيز ٦% يقلل من الإصابة بعفن البذور وموت البادرات ويزيد من أعداد النباتات السليمة .

كما وجد أن رش مستخلص الثوم أو البصل بتركيز ٩% اسبوعياً يقلل من الإصابة الطبيعية بفطر البياض الدقيقي ويزيد كلاً من طول النبات والوزن الرطب والجاف وعدد الاوراق وعدد الأزهار / نبات مقارنة بالكنترول .كما وجد أن تحميل الخيار على الثوم أو البصل يؤدي إلى تقليل الإصابة بأعفان البذور وموت البادرات وزيادة أعداد الأوراق وعدد الأزهار/ نبات مقارنة بالكنترول الغير معامل.