Egypt. J. Phytopathol., Vol. 41, No. 1, pp. 185-198 (2013)

Evaluation of some Plant Extracts on Controlling Damping-Off and Root-Rot Diseases of Bean (*Phaseolus vulgaris* L.)

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The most dangerous effects of *Rhizoctonia solani* Kuhn. and *Sclerotium rolfsii* Sacc. are occurred due to pre- and post-emergence damping-off diseases. Garlic, jojoba and marjoram plant extracts with different concentrations (1.5, 3.0 and 6.0%) caused reduction in growth of the tested fungi *in vitro*. Reduction in growth of *R. solani* was significantly higher than in *S. rolfsii*.

All plant extracts with different concentrations reduced the incidence of pre- and post-emergence damping-off and increased the crop parameters under greenhouse conditions. Concentration 3% was the most effective one. Garlic and jojoba were the most effective extracts, when they recorded the highest plant stand and the best yield components in comparison with the control.

Using garlic extract under field conditions as seed treatment at the concentration 3% significantly reduced disease incidence and also increased the percentage of yield components, *i.e.* the number and weight of pods/plant and dry weight of 100 seeds followed by jojoba extracts during the two successive growing seasons 2008 and 2009. On the other hand, marjoram showed the lowest effect as compared to the control.

Keywords: Bean, control, damping-off, garlic, jojoba, marjoram, plant extracts, *Rhizoctonia solani*, root-rot and *Sclerotium rolfsii*

Bean crop is exposed under greenhouse and field conditions to infection with several foliar and root diseases at all stages of growth. *R. solani* and *S. rolfsii* are considered the most important as casuals of damping-off and root-rot diseases. They are able to reduce seed germination; seedling emergence and plant stand causing great losses in the yield of the affected plants (Papavizas and Collins, 1990; El-Mougy, 2001; Vinale *et al.*, 2008; Sennoi *et al.*, 2010; Valentin, 2010 and Yaquelyn *et al.*, 2010).

Garlic extract showed high suppressive effect on linear growth of *R. solani* and *F. solani*. (Kuruchve and Padmavathi, 1997 and Abd El-Moniem, 2001). Jojoba seeds oil extract at different concentration "1% and 10%" gave good control for powdery mildew disease incidence on different plants (Hicks, 2001).

In vitro, studies were carried out to determine the antifungal activity of five plant extracts against *F. oxysporum* f. sp. *lycopersici*, *Botrytis cinerea* and *R. solani*. The most effective plant extracts were *Allium sativum*, *Carum carvi* and *Eugenia caryophyllus* (Aba Alkhail, 2005).

Plant extracts of carnation (*Dianthus caryophyllus*), cinnamon (*Cinnamomum burmannil*), garlic (*Allium sativum*), thyme (*Thymus vulgaris*), fennel (*Foeniculum vulgare*), marjoram (*Origanum majorana*) and chamomile (*Matricaria hamomilla*) at different concentrations "1,3 and 6%" showed inhibitory effect on *F. solani* and *R. solani* damping-off disease incidence. Concentration 6% of their extracts was the most effective one (El-Mougy and Abdel-Kader, 2007).

Marjoram oil "*Origanum majorana*" significantly reduced root-rot diseases in *Vicia faba* and gave higher plants (Qari, 2008). 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 1.5 ml/plate (Morsy *et al.*, 2009).

Using different plant oils (cumin, carnation, marjoram, garlic and rocket) completely inhibited the sporulation of *B. fabae* only. *In vivo*, results of the two seasons 2007/2008 and 2008/2009 confirmed the positive return of the tested compounds in additional to highest increase in fresh, dry weight, plant height, number of branches, pods/plant and seeds/pod of faba bean plants in comparison with control treatment (El-Metwally *et al.*, 2010).

Seed treatment with different extracts such as neem leaf, garlic clove, marjoram leaf and onion bulb extracts were significantly reduced the percentage of *F. oxysporum*, *F. solani*, *R. solani* and *S. rolfsii* as damping-off of three vegetables over untreated control (Islam and Faruq, 2012).

This research was designed to evaluate the effect of different concentrations of some plant extracts, *i.e.* garlic, jojoba and marjoram, on damping-off and root-rot diseases of bean (*Phaseolus vulgaris* L.).

Materials and Methods

Isolation of the root-rot pathogens:

Samples of root-rotted bean plants were collected from two locations, *i.e.* Nivex Organic Farms, Suez Governorate and Kamar (5) Organic Farm, Fayoum Governorate, Egypt. The infected roots were washed in tap water, air dried, surface sterilized by dipping in 5% chlorine solution for 3 minutes, washed several times with sterilized distilled water and dried between two sterilized filter papers. The surface sterilized roots were cut into small pieces with sterilized scalpel and aseptically transferred to ready GFA plates, each contained 15 ml Gliotoxin fermentation agar (GFA) medium (Brian and Hemming, 1945).

Plates were incubated at 25°C and examined periodically. The developed mycelial growth of each emerged fungus was picked up and transferred onto GFA plates. Purification of each isolated fungus was carried out using the hyphal tip technique (Brown, 1924 and Hawker, 1960). Identification of the isolated fungi was carried out according to their cultural and morphological characteristics described by Gilman, 1957; Barnett and Hunter, 1987 and Singh, 1982. Stock cultures were maintained on GFA slants and kept in a refrigerator at 5°C for further studies.

Pathogenicity tests:

Pathogenicity tests were carried out in a greenhouse located at the Integrated Control Research Dept., Plant Pathology Res. Institute, Agriculture Research Centre (ARC), Giza, Egypt. Plastic pots 20 cm were sterilized by dipping in 5% formalin for 5 min and then left in open air till dryness. Soil (clay loam soil) disinfestation was accomplished with 5% formalin, mixed thoroughly. Then each plastic pot was filled with 2.7 kg sterilized light clay soil infested by 50 sclerotia of *S. rolfsii* isolate "A or B" or 10 g corn sand meal medium supplemented with 0.2% peptone solution bearing the growth of *R. solani* isolate "A or B" isolated from bean infected roots (Abd El-Moity, 1985; Abd El-Moniem, 1996 and Ahmed, 2005).

Seeds of bean variety Bolista obtained from Field Crop Institute, ARC, Giza were used in this experiment. In all cases, soil infestation was performed 10 days before sowing. Seeds of the tested crop were sown in the potted infested or non-infested (control) soil at the rate of 5 seeds/pot and five pots were used as replicates for each particular treatment. Pathogenic fungi were re-isolated from infected plants and Koch's postulates were followed.

In vitro effect of different concentrations of plant extracts on the linear growth of the pathogenic fungi:

Different extracts of garlic bulbs, jojoba seeds and marjoram leaves were used. Jojoba extract was obtained from EL Baraka 2002 firm in Hurghada, Egypt. Garlic bulbs and marjoram leaves extracts were prepared by mixing 10 gm frozen plant material with 100 ml of water using electric blender for 5 minutes. The plant extracts were filtrated through double layers of cheesecloth (Abd El-Moniem, 2001 and Tohamy *et al.*, 2002). The filtrated plant extracts were centrifuged at 3000 rpm for 10 minutes then sterilized through centred glass filtrate and added individually to conical flasks containing sterilized GFA before solidification to obtain concentrations of "1.5, 3.0 and 6.0%" and mixed thoroughly with Tween 80 at concentration 0.3% (El-Mougy *et al.*, 2007 and El-Shahawy, 2009). Separate GFA flasks free of extracts were used as control treatment. The supplemented media were poured into Petri dishes (9 cm). All plates were inoculated at the centre with equal discs (5 mm) obtained from the peripheral growth of *R. solani* or *S. rolfsii* 5 days old cultures then incubated at 25◦C. Three plates were used for each particular treatment. The experiment was terminated when mycelial mats covered the medium surface in control treatment, all plates were examined and percentage of reduction in mycelial growth of *R. solani* or *S. rolfsii* means were calculated using the formula suggested by Abd El-Moity (1985).

$$\text{Linear growth reduction (\%)} = 100 - [(G2 / G1) \times 100]$$

Whereas, G1: Growth of pathogenic fungi alone.

G2: Growth of pathogen in response to the antagonist.

Greenhouse studies:

These experiments were conducted in a greenhouse belonging to Nivex Military III, Farm in Suez Governorate, Egypt. No artificial infestation was carried out since the soil of this greenhouse is highly infested naturally. In all greenhouse experiments, three replicated plots were used for each treatment (plot=1×3 m^2), each

plot comprised of 3 rows of highly infested soil and 20 seeds of bean variety Bolista were planted in each row.

Evaluation of different plant extracts at different concentrations in controlling root-rot pathogens under greenhouse conditions:

Three different plant extracts were used (garlic, jojoba and marjoram). Obtained extracts were considered as 1.5% and other concentrations (3.0 and 6.0%) were prepared on this basis for seed treatment. Bean seeds were soaked in 5% Arabic gum and then mixed in the different concentrations of the tested plant extracts with Tween 80 at concentration 0.3% for 12 hours. For each plant extract, 3 treatments in addition to control treatment were used. Seeds were soaked in water only for the same period to act as control. Treated seeds were sown in infested soil of the greenhouse at the rate of 20 seeds/replicate and 3 replicates were used for each treatment.

Field experiments:

All field experiments were carried out at two locations, i.e. Nivex Mohamed Ismail Organic Farm, Suez Governorate, on September 15th 2008 and Kamar (5) Organic Farm, Fayoum Governorate, on September 15th 2009.

All the experiments were conducted in a complete randomized block design with three replicated plots, the area of the experimental plot was 9 m^2 and comprised of 3 rows (3m×25cm) with about 50 cm apart. Each row was planted with 60 seeds of bean variety Bolista in naturally infested soil.

Effect of treating bean seeds with different plant extracts at concentration 3% under field conditions during 2008 and 2009 growing season:

In this experiment, according to the results obtained from the greenhouse experiments, garlic, jojoba and marjoram plant extracts were prepared as mentioned before. Rustled extracts, considered as 3.0%, were applied on this basis for seed treatment. Treated seeds were sown in the naturally infested soil. Plots sown with non-treated seeds were served as control treatments. Three plots were used as replicates for each treatment, each comprised of 3 rows.

Disease assessment:

In all greenhouse and field experiments, percentages of pre-, post- emergence damping-off and root-rot diseases were determined after 10, 21 and 60 days, respectively from sowing according to the method described by El-Helaly *et al*. (1970) and Ahmed (2005). The survived plants were counted 90 days after planting. The fresh and dry weights of plant shoots and roots as well as number of pods/plant and yield components of bean were determined.

Statistical analysis:

All the obtained data were subjected to statistical analysis and compared according to the least significant difference (L.S.D.) as mentioned by Snedecor and Cochran (1989).

Results

Isolation and identification of root-rot pathogens:

Data in Table (1) indicate that *R. solani* and *S. rolfsii* were the most frequently isolated fungi from the rotted samples of bean collected from the two governorates. The recorded number of the isolated fungi was higher in Suez governorate than Fayoum Governorate. Identification was carried out according to the cultural and morphological characters.

Table 1. Frequency of fungi isolated from the rotten roots of bean collected from two locations

Isolated fungus	Frequency of fungi isolated from:			
	Fayoum		Suez	
	No.	(%)	No.	(%)
Fusarium oxysporum (Schlecht)	2	9.5	3	11.1
F. solani (Mart.)	2	9.5	3	11.1
Rhizoctonia solani (Kuhn)	7	33.3	9	33.3
Sclerotium rolfsii (Sacc.)	9	42.9	10	37.1
Pythium spp. (Pringsheim)	1	4.8	2	7.4
Total	21		27	

Pathogenicity tests:

Data in Table (2) illustrate that the most dangerous effects of each of *R. solani* and *S. rolfsii* have occurred at the stage of pre-emergence damping-off. *R. solani* (B) caused significantly higher pre-emergence (60.0%) than *R. solani* (A) (46.7%), while *S. rolfsii* (A) caused significantly higher pre-emergence (80.00%) than *S. rolfsii* (B) (73.3%). In all cases, the highest incidence of pre-emergence damping-off was due to infection by *S. rolfsii* isolate (A). The opposite trend was true for the post-emergence damping-off. Incidence of post-emergence damping-off caused by *R. solani* (26.7%) was significantly higher than those caused by *S. rolfsii* (20.0%). However, no significant variations were detected between the two isolates of each pathogen particularly at the post-emergence stage. In all cases, *S. rolfsii* significantly showed the lowest percentages of survived bean seedlings followed by *R. solani*, isolates B and A, respectively.

Table 2. Effect of infection by *R. solani* and *S. rolfsii* on the incidence of pre- and post- emergence damping-off of bean under greenhouse conditions

Tested fungus	Pre-emergence (%)	Post-emergence (%)	Plant survival (%)
R. solani (A)	46.7	26.7	26.7
R. solani (B)	60.0	26.7	13.3
S. rolfsii (A)	80.0	20.0	00.0
S. rolfsii (B)	73.3	20.0	06.7
Control "Untreated"	00.0	00.0	100.0
L.S.D at 5%	0.9	0.48	1.2

In vitro effect of different concentrations of some plant extracts on growth of the pathogenic fungi:

Data presented in Table (3) reveal that, the three tested plant extracts resulted in significant reduction in the linear growth of the two tested fungi compared to the control treatment. This reduction was gradually increased by increasing the concentration of the tested plant extracts from 1.5, 3.0 to 6.0 %. The respective averages of linear growth were 38.8, 50.4 and 100 %, respectively. In addition, the extract of marjoram was the most efficient in this regard followed by the extract of garlic then the extract of jojoba, being 78.5, 76.4 and 72.9%, respectively. In addition, *S. rolfsii* was greatly affected by the tested plant extracts than *R. solani*, being 66.9 and 59.7, respectively.

Table 3. Effect of different concentrations of plant extracts on the percentage of reduction in the linear growth of pathogenic fungi at 25±1°C for 5 days

Plant extract	Tested fungus	Reduction (%) in the linear growth of tested fungus			Mean	General mean
		1.5*	3.0	6.0		
Marjoram	*R. solani*	72.2	83.3	100	85.2	78.5
	S. rolfsii	46.6	68.8	100	71.8	
Garlic	*R. solani*	53.3	61.1	100	71.5	76.4
	S. rolfsii	38.8	51.1	100	63.3	
Jojoba	*R. solani*	60.0	66.6	100	75.5	72.9
	S. rolfsii	38.8	72.2	100	70.3	
Control	untreated	00.0	00.0	00.0	00.0	
Mean	*R. solani*	46.4	52.8	100	66.4	--
	S. rolfsii	31.1	48.0	100	59.7	--
General mean		38.7	50.4	100	--	
L.S.D at 1% for: Plant extracts (P)= 0.33 Concentrations (C)= 0.34 Fungi (F) = 0.28 P × C = 0.59 P × F = 0.47 C × F= 0.48 P × C × F =0.83						

* Concentrations of plant extracts (%).

Evaluation of different plant extracts at different concentrations on controlling root-rot pathogens under greenhouse conditions:

Results in Table (4) show that all plant extracts and their concentrations (1.5, 3.0 and 6.0%) were effective in reduction the disease incidence and significantly increased the survived plants. The most effective extracts were garlic and jojoba at 3% concentration which gave the highest plant stand, being 46.7% and 45.7%, respectively without significant differences compared to the control treatment. On the other hand, marjoram was less effective and gave 33.95% in survived plants when used at 3% concentration.

Table 4. Effect of treating bean seeds with different concentrations of plant extracts, on the incidence of damping-off and root-rot under greenhouse conditions

Tested plant extract	Concentration (%)	Damping-off (%)		Root-rotted plants (%)	Healthy plants (%)
		Pre-emergence	Post-emergence		
Garlic	1.5	23.20	19.30	15.50	42.00
	3.0	18.90	19.00	15.40	46.70
	6.0	22.50	24.10	16.50	36.90
Jojoba	1.5	20.70	20.00	17.20	42.10
	3.0	19.10	19.30	15.90	45.70
	6.0	19.13	18.40	18.50	43.97
Marjoram	1.5	25.30	26.20	15.60	32.90
	3.0	25.25	25.40	15.40	33.95
	6.0	27.40	29.10	17.40	26.10
Control (Untreated)		37.50	31.50	18.00	13.00
L.S.D at 5%		0.77	0.74	0.84	1.66

Effect of treating bean seeds with plant extracts on fresh and dry weights of shoots and roots and number of pods/plant:

Data in Table (5) reveal that all plant extracts and their concentrations (1.5, 3.0 and 6.0%) significantly increased the fresh and dry weights of shoots and roots, as well as, number of pods in comparison with the control. The concentration 3% was the most effective one. Garlic and jojoba were the most effective extracts when used at the concentration 3% where they significantly increased the fresh and dry weights of shoots (40 and 10g.) and roots (2.6 and 0.7g.), respectively. On the other hand, marjoram was the least effective one which significantly increased the fresh and dry weight of shoots (35.7 and 9.6g.) and roots (2.5 and 0.6g.), respectively, in comparison with the untreated control.

Table 5. Effect of bean seed treatment with different concentrations of plant extracts on fresh and dry weight of shoots and roots as well as number of pods per plant under greenhouse conditions

Tested plant extract	Concentration (%)	Fresh weight (g)		Dry weight (g)		No. of pods/plant
		Shoots	Roots	Shoots	Roots	
Garlic	1.5	39.50	2.60	9.90	0.65	13.40
	3.0	40.00	2.60	10.00	0.70	13.50
	6.0	38.20	2.50	9.80	0.60	13.30
Jojoba	1.5	39.80	2.40	9.90	0.50	13.40
	3.0	40.00	2.60	10.00	0.70	13.50
	6.0	38.70	2.50	9.80	0.60	13.20
Marjoram	1.5	35.00	2.40	9.00	0.50	13.20
	3.0	35.70	2.50	9.60	0.60	13.00
	6.0	34.50	2.30	8.90	0.45	13.10
Control (Untreated)		31.90	2.20	9.10	0.50	13.00
L.S.D at 5%		0.70	0.24	0.28	0.14	0.44

All plant extracts at the 3% concentration showed significantly the highest increase in the number of pods, Garlic and jojoba gave the highest significant increase in the number of pods, being 13.5 and 13.5, respectively in comparison with the untreated control treatment being 13.0.

Effect of treating seeds with different plant extracts at suitable concentration 3% under field conditions during 2008 and 2009 growing seasons:

Data in Table (6) clearly demonstrate that all plant extracts treatments significantly reduced disease incidence and increased the percentage of healthy plants comparing with control treatment during the two growing seasons 2008 and 2009. Garlic extract was the most effective one in decreasing the incidence of both pre- and post- emergence damping-off by efficacy 33.28 and 37.61% followed by jojoba 23.55 and 32.72% during 2008 and 2009 the two growing seasons, respectively. On the other hand, marjoram extract was the least effective. Meanwhile, it reduced the incidence of pre- and post- emergence damping-off by efficacy 16.28 and 26.64% during the two seasons 2008 and 2009, respectively.

Table 6. Effect of treating bean seeds with different plant extracts at the concentration 3% on damping off disease incidence under field conditions during 2008 and 2009 growing seasons

Tested plant extract	2008 growing season				2009 growing season			
	Pre- (%)	Post- (%)	Plant survival (%)	Efficacy* (%)	Pre- (%)	Post- (%)	Plant survival (%)	Efficacy (%)
Garlic	5.80	2.50	91.70	33.28	10.80	7.60	81.60	37.61
Jojoba	10.40	4.60	85.00	23.55	11.90	9.40	78.70	32.72
Marjoram	10.50	9.50	80.00	16.28	15.10	9.80	75.10	26.64
Control	17.90	13.30	68.80	00.00	22.40	18.30	59.30	00.00
LSD at 5%	0.47	0.49	1.02		0.43	0.50	0.74	

* Efficacy of survival (%)= ((Treatment/Control)×100) -100.

Effect of treating bean seeds with plant extracts on plant fresh and dry weight:

Data in Table (7) reveal that garlic extract exhibited significantly the highest increase of fresh and dry weights of shoots 90.7 and 32.5g and roots 7.9 and 1.3g, respectively during 2008 growing season. The same trend was also true during 2009 growing season where garlic extract gave the highest increase in fresh and dry weight of shoots (84.0 and 31.5g) and roots (7.5 and 1.3g), respectively, compared to the control treatment. On the other hand, no significant differences were noticed between both jojoba and marjoram in some plant growth characteristics. In general, using seeds treated with any of the tested plant extracts led to conspicuous improvement in the aforementioned plant parameters during the two successive growing seasons 2008 and 2009.

Table 7. Effect of treating bean seeds with different plant extracts at the concentration 3% on fresh, dry weight of shoots and roots in "g" of plants grown under field conditions during 2008 and 2009 growing seasons

Tested plant extract	2008 growing season				2009 growing season			
	Fresh weight (g)		Dry weight (g)		Fresh weight (g)		Dry weight (g)	
	Shoots	Roots	Shoots	Roots	Shoots	Roots	Shoots	Roots
Garlic	90.70	7.90	32.50	1.30	84.00	7.50	31.50	1.30
Jojoba	88.00	7.50	31.90	1.25	82.70	7.20	30.10	1.00
Marjoram	83.50	6.90	31.30	0.95	81.30	6.50	29.80	0.80
Control	75.00	4.70	28.00	0.68	73.70	4.40	26.80	0.65
L.S.D at 5%	1.44	0.17	0.55	0.10	0.68	0.30	0.86	0.12

Yield components:

Presented data in Table (8) show that using garlic extract coating bean seeds at the concentration 3% was significantly the highest increase in the number and weight of pods/plant as well as the dry weight of 100 seeds, being 40.5, 121.5 and 48.3 followed by jojoba extract 38.3, 114.9 and 47.6, respectively during the growing season 2008. On the other hand, marjoram was the less effective one in comparison with the control. The same trend was also true during 2009 growing season where garlic extract gave significant increase in the number, weight of pods/plant and dry weight of 100 seeds, being 39.1, 117.3 and 40.3, respectively.

Table 8. Effect of treating bean seeds with different plant extracts at concentration 3% on some yield components of plants grown under field conditions during 2008 and 2009 growing seasons

Tested plant extract	2008 growing season			2009 growing season		
	Number of pods/ plant	Weight of pods/plant (g)	Dry weight of 100 seeds (g)	Number of pods/ plant	Weight of pods/plant (g)	Dry weight of 100 seeds (g)
Garlic	40.50	121.50	48.30	39.10	117.30	40.30
Jojoba	38.30	114.90	47.60	37.50	112.50	39.50
Marjoram	36.70	110.10	44.40	35.80	107.40	37.50
Control	29.70	89.10	41.00	27.80	83.40	35.50
L.S.D at 5%	0.70	1.18	0.76	0.55	0.95	0.77

D i s c u s s i o n

Recently, human realized that using many chemical pesticides might have injury on the environment and human health. Due to their highl toxic effects in agriculture, great disturbance in biological balance has occurred. This disturbance led to the appearance of new pests which are able to cause reduction in the number of the natural enemies and increase the accumulated toxic chemicals in human food chain.

Organic biodynamic and ecological food show that no synthetic chemicals were added during production or processing. The present work was designed to reduce using toxic chemicals in agriculture process by producing food of high quality in sufficient quantity and enhancing biodiversity system. In addition, an attempt was investigated to find out the most suitable plant extract that has the ability to protect bean plants against soilborne fungal diseases.

Data obtained indicated that both *Rhizoctonia solani* and *Sclerotium rolfsii* were the most frequently isolated fungi from naturally rotted roots of bean plants. Both pathogens varied in their effect against bean plants and particularly significantly decreased survivals of bean plants. *S. rolfsii* was found to be the most severe destructive pathogen for bean plants (Ahmed, 2005). These results are in agreement with Papavizas and Collins (1990) and Sennoi *et al.* (2010) they mentioned that the destruction on bean root caused by *R. solani* and *S. rolfsii* was due to the synergistic action between polygalactuonase and oxalic acid produced by these pathogenic fungi.Effect of adding three plant extracts (garlic, jojoba and marjoram) at different concentrations (1.5, 3 and 6%) on the linear growth of *R. solani* and *S. rolfsii* was investigated. Data obtained indicated that marjoram extract caused the highest suppressive effect on the linear growth of *R. solani* when it was added to the medium. This effect might be due to that marjoram extract can synthesize secondary metabolites and some of them as well as their derivatives have antimicrobial effect such as phenolic compounds, which may sensitize the phospholipids which hinter the movement of fungi as mentioned by Abd El-Moniem (2001); El-Mougy and Abdel-Kader (2007); Qari (2008) and El-Metwally *et al.* (2010).

However, jojoba extract showed the highest suppressive effect on the linear growth of *S. rolfsii*. The highest effect on *S. rolfsii* might be due to that this extract contains wax esters, which are derived from esterification of monoethylenic acids and monoethylenic alcohols, these compounds block the movement of the pathogenic fungi (Hicks, 2001).

Results indicated that marjoram extract caused the highest reduction followed by jojoba extract and garlic extract. The effect of garlic extract on both *R. solani* and *S. rolfsii* might be due to the presence of sustain disulfide amino acid and special materials in garlic extract which may inhibit the activity of hydrolytic enzymes produced by the pathogen. Due to the inhibition of this group of enzymes, the pathogen cannot digest the complex materials in medium to convert them to simple food stuff necessary for its metabolism. These results are in agreement with those obtained by Abd El-Moniem (2001).

Data of the present investigation revealed that all plant extracts (garlic, jojoba and marjoram) and their concentrations (1.5, 3 and 6%) clearly reduced the disease incidence and significantly increased the plant survival, the fresh and dry weights of shoots and roots, as well as, number of pods in comparison with the untreated control. Concentration 3% was the most effective one followed by 1.5%, whereas 6% concentration showed the lowest effect. Garlic and jojoba were the most effective extracts when used at the concentration 3% where they gave the highest plant stand and yield components. On the other hand, marjoram was the less

effective one in increase of plant survival and yield components in comparison with the control treatment. In general, using seeds treated with any of the tested plant extracts led to conspicuous improvement in the aforementioned plant parameters. Degree of improvement in these parameters depended, in general, on the parameter itself, status of soil infestation and the kind of plant extract used as seed treatment. This phenomenon may be also due to the antioxidant material, volatile oil compounds which were found as a major content of these extracts and liberated from the carrier. The obtained data are in harmony with those obtained by Abd El-Moniem (2001); El-Mougy and Abdel-Kader (2007); Morsy *et al.* (2009) and El-Metwally *et al.* (2010).

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(Received 25/03/2013;
in revised form 28/04/2013)

تقييم بعض المستخلصات النباتية في مكافحة أمراض سقوط البادرات وأعفان الجذور لنباتات الفاصوليا

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** المعمل المركزى للزراعة العضوية – مركز البحوث الزراعية.

أظهرت الدراسة المعملية أن معظم التأثيرات الضارة للفطريات *Rhizoctonia solani* و *Sclerotium rolfsii* على نبات الفاصوليا قد حدثت في مرحلة الموت قبل وبعد إنبات البذور. وقد سببت جميع المستخلصات النباتية "ثوم ، جوجوبا وبردقوش" بتركيزاتها المختلفة "١.٥ ، ٣ و ٦%" تثبيطا لنمو الفطريات الممرضة المختبرة. وكان متوسط التثبيط فى النمو الميسليومى للفطر *R. solani* أعلى مما هو فى الفطر *S. rolfsii*.

جميع المستخلصات النباتية بتركيزاتها المختلفة تحت ظروف الصوبة أدت الى خفض معنوى فى نسبة موت البادرات وأعفان الجذور مع زيادة معنوية فى نسبة البادرات الحية المتبقية والقياسات المحصولية" الوزن الرطب والجاف للنموات الخضرية والجذرية"، بالأضافة الى زيادة عدد القرون لنباتات الفاصوليا. وكان تركيز ٣% لجميع المستخلصات النباتية أعلى فى التأثير. وكانت مستخلصات الثوم والجوجوبا عند تركيز ٣% الأكثر فاعلية فى زيادة االقياسات المحصولية مقارنة بالكنترول.

وتحت ظروف الحقل ، كانت معاملة بقاوى الفاصوليا بمستخلص الثوم بتركيز ٣% الأكثر معنويا فى خفض نسبة الإصابة بأمراض سقوط البادرات وعفن الجذور مع زيادة فى قيم الوزن الحى والوزن الجاف لنباتات الفاصوليا بالأضافة الى زيادة القيمة المحصولية " عدد ووزن القرون/نبات والوزن الجاف لكل ١٠٠ بذرة" ويليه فى الفاعلية مستخلص الجوجوبا وذلك خلال موسمى الزراعة ٢٠٠٨ و ٢٠٠٩ . وقد ظهر أن مستخلص البردقوش كان أقل فاعلية من المستخلصين السابقين مقارنة بالكنترول.