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Efficacy of Different Natural Products as Safe Management of Guar Damping-off Disease in Egypt

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Fusarium oxysporum Shelct., *Macrophomina phaseolina* (Tassi) Goid., *Rhizoctonia solani* Kühn and *Sclerotium rolfsii* Sacc. were isolated from infected roots and basal stem parts of guar plants collected from different localities in Egypt. *R. solani* and *S. rolfsii* were the most pathogenic fungi in pathogenicity trials, whereas *M. phaseolina* was the least.

Topsin M and Vitavax/Thiram as well as clove essential oil (4000 ppm) have completely inhibited the mycelial growth of the four fungi. In contrast, bauhinia, damsis, lemon grass and marjoram wastes (3 g/l media) were the least effective treatments in this respect. Moreover, the two tested fungicides, as well as lemon grass and clove oils (4000 ppm) were the superior treatments against sclerotial formation of *M. phaseolina*, *R. solani* and *S. rolfsii*.

In greenhouse trials, fungicides and essential oils, applied as seed dressers, completely reduced percentages of damping-off in soil infested with *M. phaseolina*. Whereas, Topsin M and clove oil (*F. oxysporum*) as well as Topsin M and Vitavax/Thiram (*R. solani*) were superior against pre- and post- emergence, respectively. Bauhinia and damsis wastes recorded (62.7% and 69.0%) and 100% reduction in pre- and post- emergence caused by *F. oxysporum*, respectively. All treatments increased percentages of healthy survival seedlings for all fungi compared with their check. *R. solani* was the most affected fungus using all treatments, whereas *S. rolfsii* was the least affected one when plant wastes and essential oils were used.

Under field conditions, all fungicides, essential oils and plant wastes have significantly minimized the percentages of damping-off incidence as well as, improved plant height and increased number of branches/plant. However, the two former treatments were the best ones while plant wastes were the least in this respect. Moreover, the same effect was realized as for number of pods, pods weight and gum yield per plant with superiority to Topsin M and lemon grass oil.

Key word: Damping-off, guar, management and natural products.

Guar (*Cyamopsis tetragonoloba* L.) is a drought resistant annual legume plant which has been grown as an agricultural crop in India and Pakistan, where it is still commonly used as food and in animal feeding. Guar seeds are considered as an important source of gum (Ahmed, 1956) which represents 11-23 to 23-26% of seeds

weight (Stafford, 1975). On the other hand, guar gum is used extensively in paper industry, mining explosives, food pharmaceuticals, cosmetics, textile and reconstituted tobacco industries (Tripathi and Sirvastaval, 1975). It is also used in oil industry as a stabilizing material in the drilling muds.

Guar has been introduced to Egypt as a folder plant to face the increase demand for forages. Moreover, guar is used as a medical plant where served as pharmaceutical ingredients.

Guar plants are attacked by several pathogens which cause root rot and wilt diseases (Singh, 1951; Singh & Singh, 1955; Vir & Grewl, 1972 and Singh & Solanki, 1974). The impact of these diseases on yield is remarkable (Matlock & Oswalt, 1964; Singh & Solanki, 1974 and Arab, 1983). Several soil borne fungi were frequently reported as the casual organisms of these diseases namely; *Rhizoctonia solani, Sclerotium rolfsii, Fusarium equisti* and *F. coeruleum* (Singh, 1951; Vir & Grewl, 1972; Arab, 1983 and Morsy *et al.*, 1978).

Chemical control is the main strategy for guar diseases management in many countries all over the world. On the other hand, the present study was planned to evaluate the antifungal activity of certain fungicides, essential oils and plant wastes against mycelial growth and sclerotial germination of soil borne fungi pathogenic to guar plants. However, it is mainly aimed to evaluate the efficacy of these treatments as seed dressers in damping-off management under greenhouse and field conditions. In this respect, percentages of pre- and post- emergence damping-off as well as healthy survival seedlings (greenhouse) in addition to measurements of some plant vegetative growth and yield parameters in a field experiments were included in this study as disease indicators.

Materials and Methods

I. Isolation, purification and identification of causal pathogens:

Diseased guar plants showing root rot symptoms were collected from different localities in Egypt. The infected roots and basal stem parts were thoroughly washed with running tap water, cut into small fragments, superficially sterilized with sodium hypochlorite (1%) for 3 minutes, washed several times with sterile distilled water and dried between sterilized filter paper. The sterilized pieces were transferred into ready PDA plates and incubated at 30°C for 7 days. The fungal colonies were purified using single spore or hyphal tip techniques suggested by Dhingra and Sinclair (1984). Identification of purified fungi was kindly confirmed by the Mycol. and Plant Dis. Surv. Dept., Plant Pathol. Res. Inst., ARC, Giza, Egypt.

II. Pathogenicity studies:

Groups of formalin-sterilized soil were separately infested with fungal inocula of the four pathogenic fungi (15-days-old) grown on barley sand medium (5%, w/w), then slightly watered every other day for a week. Soil provided with the same amount of barley sand medium and free from fungal inocula were used as check. The infested and uninfested soils were packed in formalin-sterilized pots (35-cm-diam.). Guar seeds superficially sterilized with 1% sodium hypochlorite were

planted at the rate of 15 seeds/pot. A set of 5 replicates were used for each fungus or check treatments. Percentages of pre- and post- emergence damping-off as well as healthy survival seedlings were determined after 15, 30 and 90 days, respectively, as indicators of disease incidence.

III. Effect of essential oils, plant wastes and fungicides on guar pathogenic fungi:

Extraction of five different medicinal and aromatic plants, *i.e.* bauhinia, clove, damsis, lemon grass and marjoram were used in this study.

1- On mycelial growth:

Lemon grass (leaves) and commercial clove (flower buds) were extracted to obtain their pure essential oils using the steam distillation method according to Guenther (1960), Extraction of plants was carried out in Medicinal and Aromatic Plant Res. Lab., El-Kanater El-Khairia Sta., Hort. Res. Inst., ARC, Egypt. Dilutions of these oils were prepared by mixing 5 ml of each oil with 0.5 ml acetone, then emulsified in sterile distilled water to obtain concentrations of 1000, 2000, 3000 and 4000 ppm. The efficacy of essential oils on mycelial growth was evaluated by applying the filter paper disc method described by Jain and Jain (1973). Two discs (5-mm-diam) of each fungus tested, cut from 7-days-old PDA cultures were posed side by side at distance of six cm on each PDA plate. A disc of sterilized filter paper (6-mm-diam) saturated with either of the diluted oils was placed at the centre of the inoculated Petri dish. For check treatment, a similar disc provided with 1 ml sterile distilled water as well as 2 drops of acetone was used.

Five replicates of each particular treatment were incubated at 30°C and colony diameters were, however, measured when the fungal growth completely covered the check plates. Percentages of reduction in colony diameters were determined according to the formula suggested by Dikshit *et al.* (1982) as follows:

$$\text{Reduction (\%)} = \frac{A - B}{A} \times 100$$

Whereas: A= Growth diameter in check treatments and
B= Growth diameter in essential oil treatments.

Wastes of lemon grass (leaves) resulted from essential oil extraction process as well as damsis and marjoram (herbs) and bauhinia pods (without seeds) were dried at 60°C in electric oven for 2 hours and used as powder at the rate of 3g waste/l media. Topsin M and Vitavax/Thiram at the rate of 4000 ppm were used for comparison in this test. All plant wastes as well as tested fungicides were added to PDA medium before solidifying in Petri dishes, then inoculated at the centre with 5 mm disc growth of the tested fungi and incubated at 30°C. Inoculated plates free of plant wastes or fungicides were used as check treatments. Replication for each particular treatment and determination of reduction in mycelial growth were applied as mentioned before.

2- On sclerotia germination:

Effect of the aforementioned essential oils, plant wastes and fungicides on sclerotial germination of the 3 sclerotia-forming fungi tested was studied using the

filter paper method of Singh *et al.* (1992). Sclerotia of *M. phaseolina*, produced on cellophane on PDA medium, were washed with sterile phosphate buffer (0.1 M, pH 6.5), centrifuged at 1000 rpm for 3 min. and decanted to remove mycelial fragments as well as exogenous inhibitors. Sterilized filter paper discs (5-mm.-diam.), saturated with different concentrations of essential oils or fungicide suspensions tested were placed separately at the centre of agar plates. Whereas, plant wastes (3 g/l media) were added to the agar medium before solidification and poured into sterilized Petri dishes. Sclerotial suspension (300 sclerotia) of *M. phaseolina* as well as ten mature ones of *R. solani* and *S. rolfsii* were planted in each plate containing Czapek's agar medium (*R. solani*) or PDA medium for the other two fungi tested (Chaudhuri and Chitreshwar, 1982). For check treatments, sterilized filter paper dipped in sterile distilled water or Petri dishes free from plant wastes were used and 5 plates were applied for each particular treatment. Percentages of germinated sclerotia were calculated after 4 days from incubation at 30°C.

IIII. Effect of some essential oils and fungicides on damping-off diseases of guar under greenhouse conditions:

Guar seeds (local variety) were dressed with each particular essential oil (5000 ppm) or Topsin M of Vitavax/Thiram as fungicides (3 g/kg seeds). However, essential oils used for seed dressing were applied at higher rates since they might be exposed to evaporation as well as dilution by irrigation water. Fifteen treated or untreated seeds (check treatments) were planted in each formalin-sterilized pot (30-cm-diam.) packed with formalin-sterilized soil and infested separately with either of the tested pathogenic fungi at the rate of 5% (w/w). Whereas, plant wastes of lemon grass, damsis, marjoram and bauhinia were added to another pots with infested soil or uninfested one (check treatments) at the rate of 6 g/kg soil, then watered every other day for a week and sown with guar seeds (15 seeds/pot).

Percentages of pre- and post- emergence damping-off as well as those of healthy survivals were calculated after 15, 30 and 90 days, respectively from sowing.

V. Effect of essential oils and fungicides on damping-off incidence of gaur, some vegetative growth and yield parameters under field conditions:

Two field experiments were carried out at Ismailiya Governorate during two successive seasons (2003 and 2004). Guar seeds (local cv.) were sown in May, 15 in 2003 and 2004 growing seasons. Experiments were conducted in a randomized complete block design consisting of nine treatments including the check and each treatment was replicated in three plots (5.25 m^2). The same experimental materials used in greenhouse trial were applied at the same rates and procedures of application however; plant wastes were added to soil before sowing at the rate of 6 g/hill. For check treatments, untreated seeds were sown in three replicates with untreated soil.

Percentages of infection as well as some vegetative growth parameters, *i.e.* plant height (cm), No. of branches/plant and yield criteria [No. of pods, pods weight (g) and gum yield (g/plant)] were also determined. Guar gum was extracted according to the method described by Anderson (1949) who mentioned that samples of guar seeds were heated with boiling water, then precipitated by alcohol, filtered and the filtration were dried and weighed.

Chemical component of different plant parts used:

Chemical compositions of different plant parts used in this investigation are listed in Table (1) as reported by Mahran (1967) and Balbaa (1976).

Table 1. Chemical composition of plant parts used

Plant name	Plant part	Chemical composition	Phenolic compound
Bauhinia	Pods	Alkaloids, Resin, Tamin	+
Clove	Buds	Eugenol, Cloven, Resin	+
Damsis	Herb	Ambrosin, Damsin	-
Lemon grass	Leaves	Citral, Myrcine, Geraniol, Nerol	+
Marjoram	Herb	Terpinol, Carvacol, Eamphene, Thymol, 8-terpinene, P-cymene	+

Results and Discussion

Isolation trials from diseased roots and basal stem parts of guar plants resulted in four pathogenic fungi, *i.e. Fusarium oxysporum* Shlect., *Macrophomina phaseolina* (Tassi) Goid., *Rhizoctonia solani* Kühn and *Sclerotium rolfsii* Sacc.

Pathogenicity tests:

Data in Table (2) indicate that all the tested fungi significantly caused pre- and post-emergence damping-off to guar plants subsequently, decreased the percentages of healthy survival plants compared with the check treatment. *Rhizoctonia solani* followed by *Sclerotium rolfsii* were the most pathogenic fungi as they recorded percentages of pre- and post- emergence by (53.3% and 34.7%) and (46.7% and 41.3%), respectively. On the contrary, *Macrophomina phaseolina* was the least pathogenic one recording the lowest percentages of these criteria, *i.e.* 20% and 44%. It was also observed that the percentages of pre-emergence damping-off in all tested fungi, except *M. phaseolina*, were higher than those of post emergence. These results might be due to some factors such as the environments, the host and the pathogenic fungus itself which affected disease development (Singh and Singh, 1955; Vir and Grewl, 1972; Abd El-Moity *et al.*, 2002 and Tohamy *et al.*, 2002).

Effect of essential oils and plant wastes on mycelial growth and sclerotial germination of guar pathogenic fungi:

Data in Table (3) show that both of the two tested fungicides (Topsin M and Vitavax/Thiram) and clove essential oil at 4000 ppm have completely inhibited the mycelial growth of the four pathogenic tested fungi. In contrast, all treatments of plant wastes at the rate of 3.0 g/l media were the least effective in this respect. Also, inhibition activity of the two tested essential oils evidently increased by increasing their concentration. Moreover, inhibition effects were not observed at the concentration of 1000 and 2000 ppm for lemon grass and at 2000 ppm clove only.

Table 2. Pathogenic ability of four soilborne fungi on damping-off incidence of guar plants under greenhouse conditions

Treatment	Pre-emergence damping-off (%)	Post-emergence damping-off (%)	Healthy survivals (%)
Fusarium oxysporum	35. 7	30.7	30.7
Macrophomina phaseolina	20.0	44.0	36.0
Rhizoctonia solani	53.3	34.7	12.0
Sclerotium rolfsii	46.7	41.3	12.0
Check	00.0	00.0	00.0
L.S.D. at 5%	5.7	6.3	

Table 3. Inhibitory effect of some essential oils, plant wastes and fungicides on mycelial growth of guar pathogenic fungi

Treatment		Concentration (ppm)	Mycelial growth inhibition (%)			
			R. solani	*S. rolfsii*	*M. phaseolina*	*F. oxysporum*
Essential oil	Lemon grass	1000	0.0	0.0	0.0	0.0
		2000	0.0	0.0	0.0	0.0
		3000	50.3	52.0	0.0	52.5
		4000	100	100	57.7	100
	Clove	1000	0.0	0.0	0.0	0.0
		2000	0.0	0.0	68.8	33.3
		3000	77.0	100	100	52.0
		4000	100	100	100	100
Wastes	Bauhinia	3 g/l	22.2	11.1	0.0	40.0
	Damsis	3 g/l	11.1	33.3	0.0	40.0
	Lemon grass	3 g/l	0.0	0.0	20.1	33.3
	Marjoram	3 g/l	33.3	0.0	22.2	57.7
Fungicides	Topsin M	4000	100	100	100	100
	Vitavax/Thiram	4000	100	100	100	100
Check			0	0	0	0
L.S.D. at 5%			10.7	11.3	11.3	10.8

These results were also previously reported by many investigators on the other crops (Narian *et al.*, 1981; Linskens & Jackson, 1991; Jiratko & Vesela, 1992; Zygadlo *et al.*, 1994; Zambonelli *et al.*, 1996; Ali, 1999; Chao *et al.*, 2000; Tohamy *et al.*, 2002 and El-Kazzaz *et al.*, 2003).

As regards for sclerotial germination, data in Table (4) indicate that all treatments have significantly inhibited sclerotial germination of *R. solani*. The fungicides and essential oils were the most effective treatments against sclerotia of the three pathogenic fungi; *M. phaseolina*, *R. solani* and *S. rolfsii*. On the other hand, all plant wastes treatments were, contrarily, the least efficient ones in this respect. Moreover, a positive relationship between the effect of essential oils tested as antisclerotial germination and their concentrations was realized. Clove oil at 3000 and 4000ppm was the best essential oil against all sclerotia recording 100% inhibition of germinated sclerotia. The present results concerning the efficacy of essential oils and plant wastes of sclerotial germination of *R. solani*, *M. phaseolina* and *S. rolfsii* are in harmony with those reported by Singh (1983); Dubey (1991) and Bauiomy (1997).

Table 4. Effect of natural plant products on percentages of sclerotial germination of guar pathogenic fungi

Treatment		Concentration (ppm)	Germinated sclerotia (%)		
			R. solani	*M. phaseolina*	*S. rolfsii*
Essential oil	Lemon grass	1000	56	100	100
		2000	23	100	78
		3000	0	79	23
		4000	0	44	0
	Clove	1000	79	67	90
		2000	37	0	14
		3000	0	0	0
		4000	0	0	0
Plant wastes	Bauhinia	3 g/l	64	100	88
	Damsis	3 g/l	83	78	35
	Lemon grass	3 g/l	57	44	87
	Marjoram	3 g/l	78	100	100
Fungicides	Topsin M	4000	0	0	0
	Vitavax/Thiram	4000	0	20	0
Check			100	100	100
L.S.D. at 5%			4.6	10.8	10.1

Effect of essential oils, plant wastes and fungicides on damping-off incidence of guar under greenhouse conditions:

Data in Table (5a) indicate that all tested treatments have significantly reduced percentages of pre- and post- emergence damping-off caused by all fungi compared with their check ones. Marjoram wastes resulted in non-significant reduction regarding post-emergence in soil infested with *M. phaseolina*. Fungicides followed by essential oils were the superior treatments against all tested fungi. In this respect, they completely decreased percentages of pre- and post- damped seedlings in soil

Table 5a. Effect of essential oils, plant wastes and fungicides on percentages of damping-off of guar under greenhouse conditions

Treatment		Damping-off (%)															
		Pre-emergence								Post-emergence							
		R. solani		*M. phaseolina*		*S. rolfsii*		*F. oxysporum*		*R. solani*		*M. phaseolina*		*S. rolfsii*		*F. oxysporum*	
		I*	R**	I	R	I	R	I	R	I	R	I	R	I	R	I	R
Essential Oils	Lemon grass	26.7	51.5	0.0	100	16.0	76.8	4.0	89.7	14.7	62.0	0.0	100	16.0	36.8	0.0	100
	Clove	16.0	71.1	0.0	100	4.0	94.3	0.0	100	6.7	82.7	0.0	100	9.3	63.2	0.0	100
Wastes	Bauhinia	44.0	19.7	17.3	50.5	38.7	45.3	14.7	62.7	20.0	48.3	14.7	37.7	22.7	10.4	0.0	100
	Damsis	40.0	27.0	26.7	20.3	34.7	51.0	12.0	69.0	29.3	24.3	16.0	33.8	20.0	21.0	0.0	100
	Lemon grass	45.3	17.2	21.3	38.5	38.7	45.3	28.0	27.7	25.3	34.6	18.7	27.0	22.7	10.4	9.3	68.3
	Marjoram	33.3	39.3	25.3	27.0	44.0	37.7	25.3	34.6	22.7	41.4	26.7	6.7	21.3	15.7	16.0	45.5
Fungicides	Topsin M	14.7	73.5	0.0	100	5..3	92.5	0.0	100	0.0	100	0.0	100	2.7	89.5	0.0	100
	Vitavax/ Thiram	12.0	78.5	0.0	100	2.6	96.2	2.7	93.1	0.0	100	0.0	100	12.0	52.6	0.0	100
Check		54.7	--	34.7	--	70.7	--	38.7	--	38.7	--	29.3	--	25.3	--	29.3	--
L.S.D. at 5%		5..3	--	3.7	--	4.0	--	3.7	--	7.1	--	3..3	--	3.6	--	5..3	--

* Incidence of pre- or post-emergence damping-off (%).

** Reduction in percentages of pre- or post-emergence relative to check treatment.

infested with *M. phaseolina*. Moreover, Topsin M and clove oil (*F. oxysporum*) as well as Topsin M and Vitavax/Thiram (*R. solani*) showed the same effect as for pre- and post- emergence, respectively. Bauhinia and damsis wastes recorded (62.7 % & 69.0 %) and 100 % reduction in pre- and post- emergence caused by *F. oxysporum*, respectively.

As regards healthy survival seedlings (Table 5b) all treatments increased percentages of survivals compared with those of check treatments. *Rhizoctonia solani*, however, was the most affected fungus using all treatments since percentages of healthy survivals increased by 3.4 folds (lemon grass) to 12.3 folds (Vitavax/Thiram) relative to its check. In this respect, clove oil was approximately as effective as the two fungicides tested as it increased healthy survivals by 10.7 folds. In contrast, *S. rolfsii* was the least affected one when plant wastes and

Table 5b. Effect of essential oils, plant wastes and fungicides on healthy survival seedlings of guar under greenhouse conditions

Treatment		Healthy survival seedlings							
		R. solani		*M. phaseolina*		*S. rolfsii*		*F. oxysporum*	
		Survival (%)	Increase* (%)	Survival (%)	Increase (%)	Survival (%)	Increase (%)	Survival (%)	Increase (%)
Essential oil	Lemon grass	58.7	789.4	100.0	275.9	68.0	160.0	96.0	200.3
	Clove	77.3	1071.2	100.0	275.9	86.7	206.8	100.0	212.8
Wastes	Bauhinia	36.0	445.5	68.0	155.6	38.7	86.8	85.3	166.9
	Damsis	30.7	365.2	57.3	115.4	45.3	103.5	88.0	175.3
	Lemon grass	29.3	3440.0	60.0	125.6	38.7	86.8	62.7	96.1
	Marjoram	44.0	566.7	48.0	80.5	34.7	76.8	58.7	83.6
Fungicides	Topsin M	85.3	1192.4	100.0	275.9	100.00	240.0	100.0	212.8
	Vitavax/Thiram	88.0	1233.3	100.0	275.9	100.00	240.0	97.3	204.4
Check		6.6	--	26.6	--	4.00	--	32.0	--

* Percentages of increase in survival seedlings relative to check treatments.

essential oils were used estimating 76.8-103.3 % increase in healthy survivals as well as *F. oxysporum* (204.4-212.8 %) using the two tested fungicides relative to their check treatments. Several investigators found similar results in respect to the effect of natural plant products as means of management against pre- and post-emergence damping-off disease (Singh, 1983; Kumar & Chauhan, 1991; Bauiomy, 1997 and El-Shazly, 2000).

Effect of natural plant products on damping-off disease incidence as well as vegetative growth and yield parameters of guar under field conditions:

Data in Table (6a) demonstrate that all treatments significantly reduced percentages of damping-off disease incidence under field conditions compared with check treatment during the two experimental seasons, 2003 and 2004. Fungicides followed by essential oils tested were the best treatments in this respect as they recorded reduction figured (83.8-91.9%) and (74.4-89.2%), respectively. Clove essential oil was significantly superior to that of lemon grass, whereas it was as effective as the two fungicides tested throughout the two seasons. Plant wastes were the least efficient treatments; however, bauhinia was significantly superior to the other wastes tested, whereas the marjoram waste was the least.

As regards vegetative growth parameters, data in Table (6a) indicate that all tested treatments significantly improved plant height and increased number of branches/plant in comparison with those of check treatment in the two experimental seasons. In this respect, fungicides followed by essential oils were the superior treatments, while plant wastes were the least effective ones. Moreover, using fungicides as seed dressers increased plant height (18.4-20.4%) and number of branches/plant (64.0-80.8%) in the first season (2003) relative to check treatment, whereas these increases were (22.2-26.4%) and (103.3-118.5%), respectively during the second season of experimentation. On the other hand, the tested essential oils increased these parameters by (9.9-15.0%) and (48.2-75.0%), respectively, in the two seasons.

Table 6a. Effect of formulated natural plant products and fungicides on disease incidence and some vegetative growth of gaur plants under field conditions during two successive seasons, 2003 & 2004

Treatment		2003 season						2004 season					
		Disease incidence		Vegetative parameters				Disease incidence		Vegetative parameters			
		Infection (%)	Reduction (%) *	Plant height (cm)	Increase (%) *	No. of branches/plant	Increase (%) *	Infection (%)	Reduction (%) *	Plant height (cm)	Increase (%) *	No. of branches/plant	Increase (%) *
Essential oil	Lemon grass	9.2	74.3	150.0	14.4	15.0	48.2	8.8	73.6	153.2	15.0	15.8	71.7
	Clove	5.6	84.4	149.0	9.9	15.0	48.2	3.6	89.2	153.0	14.9	16.1	75.0
Wastes	Bauhinia	21.8	39.3	140.3	3.5	13.6	33.9	19.4	41.7	143.1	7.4	12.8	39.1
	Damsis	23.6	34.3	140.0	3.2	15.0	48.2	21.3	36.0	141.0	5.9	16.0	73.9
	Lemon grass	25.2	29.8	144.0	6.2	12.2	19.8	22.7	31.8	143.0	7.4	13.0	41.3
	Marjoram	28.0	22.0	140.0	3.2	13.0	28.5	23.7	19.8	144.0	8.1	13.0	41.3
Fungicide	Topsin M	5.8	83.8	163.2	20.4	18.3	80.8	3.5	89.5	168.3	26.4	20.1	118.5
	Vitavax/ Thiram	4.9	86.4	160.6	18.4	16.6	64.0	2.7	91.9	162.7	22.1	18.7	103.3
Check		35.9	--	135.6	--	10.1	--	33.3	--	133.2	--	9.2	--
L.S.D. at 5%		1.6	--	5.2	--	0.8	--	1.1	--	5.5	--	1.3	--

* Reduction or increase relative to check treatment (%).

Data in Table (6b) reveal that all treatments resulted in significant increases with respect to all yield parameters, except for bauhinia and lemon grass wastes since their increases relative to those of check treatment were non-significant. Topsin M (fungicide) followed by lemon grass (essential oil) were the best treatments for all parameters during the two seasons. Vitavax/Thiram (2004 season) was superior to the aforementioned fungicide as for pods weight (g/plant) as it recorded 50.2 % increase relative to the check compared with 48.16% regarding Topsin M, however, the difference between each other was non-significant. In this respect, Topsin M recorded increases by (19.9-27.3%), (32.8-48.2%) and (114.2-121.6%) concerning number of pods, pods weight (g/plant) and gum yield (g/plant). Whereas, these increases measured (19.2-23.4%), (30.0-45.9%) and (63.9-76.5%) for the previous parameters, respectively, when lemon grass oil was applied .

Table 6b. Effect of formulated natural products and fungicides on some yield parameters of guar plants under field conditions during two successive seasons, 2003 & 2004

Treatment		2003 season						2004 season					
		No. of pods/plant	Increase (%) *	Pods weight/plant	Increase (%) *	Gum yield (g/plant)	Increase (%) *	No. of pods/plant	Increase (%) *	Pods weight/plant	Increase (%) *	Gum yield (g/plant)	Increase (%) *
Essential oil	Lemon grass	143.4	19.2	69.1	30.0	8.0	63.9	146.4	23.4	71.2	45.9	9.0	76.5
	Clove	141.0	17.2	66.5	25.0	8.0	63.3	142.0	19.7	68.3	40.0	9.0	76.5
Wastes	Bauhinia	125.0	3.9	67.5	27.0	6.0	22.6	122.0	2.9	62.6	28.3	7.2	41.2
	Damsis	131.0	8.9	63.1	18.8	6.0	22.5	126.0	6.3	57.8	18.4	6.8	33.33
	Lemon grass	122.6	1.9	63.1	18.7	6.0	22.5	120.3	1.4	57.0	16.8	6.0	17.65
	Marjoram	130.0	9.7	68.1	28.1	5.8	18.4	124.0	4.6	62.3	27.7	6.0	17.7
Fungicide	Topsin M	144.2	19.9	70.6	32.8	10.5	114.3	151.3	27.8	72.3	48.1	11.3	121.6
	Vitavax/ Thiram	136.2	13.2	70.1	31.9	8.3	70.0	140.1	18.8	73.3	50.2	8.7	70.6
Check		120.3	--	53.2	--	4.9	--	118.6	--	48.8	--	5.10	--
L.S.D. at 5%		5.2	--	2.5	--	0.2	--	4.4	--	3.1	--	0.40	--

* Increase in yield parameters relative to check treatment (%).

Fungicides and essential oils were superior in increasing all variables than check followed by waste treatments. Disease incidence through protective and/or curative treatments with natural plant products might be due to: (1) altering the physiology and biochemistry of plants through augmented phenolic levels, (2) disturbing the establishment of the pathogen and spread within the plant through effects on plant structures and through the functioning of the seeds or roots and (3) altering the physiology of the pathogen. These results are consistent with those obtained by other investigators who found an antifungal activity of some natural plant products against plant pathogens (Vir & Grewl, 1972; Singh and Solanki, 1974; Kumar and Chauhan, 1991; Seddon and Schmitt, 1999; El-Shazly, 2000 and Aly *et al.*, 2003).

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فعالية بعض المركبات النباتية كوسيلة آمنه لمكافحة مرض موت البادرات على الجوار فى مصر

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تم عزل الفطريات *Fusarium oxysporum* ، *Macrophomina phaseolina* ، *Rhizoctonia solani* ، *Sclerotium rolfsii* من الجذور المصابه وقواعد سوق نباتات الجوار التى تم الحصول عليها من مناطق مختلفه بجمهورية مصر العربيه. ولقد أثبتت تجارب العـــــدوى الصناعية أن الفطريـــن *R. solani* ، *S. rolfsii* هما أكثر الفطريات المختبرة قدرة على إحداث الإصابة فى حين كان الفطر *M. phaseolina* هو أقلها فى هذا المجال.

تمكنت المبيدات الفطرية توبسين م، فيتافاكس/ثيرام وكذا الزيت الطيار لبراعم القرنفل عند استخدام أى منها بتركيز ٤٠٠٠جزء فى المليون من تثبيط النمو الميسليومى للفطريات الأربعة المختبرة تماما فى حين كانت مخلفات نباتات البوهينيا (خف الجمل)، الدمسيسه، حشيشة الليمون والبردقوش هى الأقل فاعلية فى هذا المجال عند استخدامها بمعدل ٣ جم/لتر بيئة. ولقد تفوقت المبيدات الفطرية المختبرة وكذا الزيوت الطيارة لحشيشة الليمون وبراعم القرنفل عند استخدامها بتركيز ٤٠٠٠ جزء فى المليون فى تثبيط إنبات الأجســام الحجريـــة للفطريات *M. phaseolina* ، *R. solani* ، *S. rolfsii* .

أدت المبيدات الفطرية والزيوت الطيارة عند استخدامها فى معاملة البذور قبل الزراعة فى تجارب الصوبة إلى حدوث خفض تام للنسبة المئوية لموت البادرات فى التربة الملوثة بالفطر *M. phaseolina* ، فى حين تفوق التوبسين م وزيت براعـــم القرنفـــل (*F. oxysporum*) وكـــذا التوبسيـــن م والفيتافاكـــس/ثيـــرام (*R. solani*) فى خفض النسبة المئوية لموت البادرات قبل وبعد ظهورها فوق سطح التربة على التوالى. ولقد حققت مخلفات نباتات البوهينيا (خف الجمل) والدمسيسه النسبة المئوية لموت البادرات قبل ظهورها فوق سطح التربة والمتسببة عن الفطر *F. oxysporum* بمقدار ٦٢,٦٧%، ٦٨,٩٩% فى حين حققا خفضًا تاما (١٠٠%) فى نسبة موت البادرات بعد ظهورها والمتسببة عن نفس الفطر. كما أدت كل المعاملات إلى زيادة النسبة المئوية للبادرات المتبقية حية وسليمة فى التربة الملوثة بأىٍّ من الفطريات المختبرة وذلك مقارنة بمعاملة الكنترول. ثبت أن الفطر *R. solani* كان أكثر الفطريات تأثرا بجميع المعاملات المختبرة فى حين كان الفطر *S. rolfsii* هو الأقل تأثرا عند استخدام المخلفات النباتية والزيوت الطيارة.

خفضت جميع المبيدات الفطرية والزيوت الطيارة والمخلفات النباتية المختبرة تحت ظروف العدوى الطبيعية فى الحقل- وبدرجة معنوية – النسبة المئوية لموت البادرات كما حسنت المعايير الخاصة بطول النباتات وأيضا أدت إلى زيادة عدد الأفرع/نبات. ولقد تفوقت المبيدات الفطرية والزيوت الطيارة فى هذا المجال فى حين كانت المخلفات النباتية هى الأقل فاعلية. ولقد تم الحصول على نفس التأثير بخصوص عدد القرون، وزن القرون بالجرام ومحصول الصمغ