CONTROL OF ROOT ROTS OF PEANUT (*ARACHIS HYPOGAEA* L.) WITH SAPONIN OF DIFFERENT SOURCES IN COMPARISON WITH A FUNGICIDE

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ABSTRACT

Synthetic lucernes saponin, when mixed PDA medium before sterilization (1 g/L), resulted in (47.8, 41.1, 34.4 and 16.7%) reductions in mycelial growth of Macrophomina phaseolina, Rhizoctonia solani, Sclerotium rolfsii and Fusarium solani, respectively, in vitro compared with the control treatments.

Root-rot diseases incidence significantly decreased when peanut seeds were treated by the synthetic lucernes saponin (3 g/Kg seed) before sowing in potted soils infested with Macrophomina phaseolina or Rhizoctonia solani compared with the control. Whereas, other sources of saponin showed different variation in the diseases incidence. On the other hand, dressing peanut seeds with different sources of saponin or Rizolex-T, increased apparently healthy survived plants at harvest under field conditions of Behara Governorate during 2000 and 2001 seasons, since they decreased disease infection percentages. The highest reductions of pre-emergence damping-off diseases were observed when seeds were dressed with Rizolex-T, followed by the synthetic saponin. Also, the same results were recorded with root-rot diseases incidence.

As saponin and Rizolex-T treatments were not effective in decreasing percentages of R. solani colonies in roots of peanut at harvest, the opposite reaction was recorded with Fusarium spp. and M. phaseolina in most cases. However, Rizolex-T followed by the synthetic saponin were generally the superior treatments against colonies of Fusarium spp.

Key words: Root rots, damping-off, *F. solani, M. phaseolina, R. solani, S. rolfsii*, control, saponin, Rizolex-T and pod yield.

INTRODUCTION

Damping-off, root and pod rot diseases are considered ones of the most destructive diseases, which cause tremendous losses of peanut (*Arachis hypogaea* L.). These diseases are caused by several soilborne fungi such as *Rhizoctonia solani*, *Sclerotium rolfsii*, *Fusarium solani*, *F. oxysporum* and *Macrophomina phaseolina* (Beattie *et al.*,1954; Reddy and Rage, 1980 and El-Deeb *et al.*, 1985).

In the light of the present days, constraints on pplant disease control practices, attempts were made to produce resistance cultivars (Seoud *et al.*, 1982; El-Wakil *et al.*, 1984; El-Ahmar *et al.*, 1989 and El-Deeb *et al.*,1998). Also several chemical control measurements have applied by (El-Wakil *et al.*, 1984; Hilal *et al.*, 1990 and Mahrous *et al.*, 1993). The use of agricultural practice is well established by (El-Ahmar *et al.*, 1989; Hilal *et al.*, 1994 and El-Korashy *et al.*, 1997). Biological control as well was also recorded by (Abdel-Moiety *et al.*, 1991).

On the other hand, plant extract (garlic extract) was effective in controlling root and pod-rot disease (Osman, Nagwa *et al.*, 1996). Also, antimicrobial substances naturally exists in many forage legume plants especially alfalfa (Oleszek *et al.*, 1990), and prowed its efficacy against soilborne fungi (Omar and Abdel-Halim, 1992 and Ismail, 1995).

This study was undertaken to evaluate the inhibitory effects of saponin from different sources and the fungicide Rizolex-T against damping-off and root-rot diseases of peanut.

MATERIALS AND METHODS

1. Preparation of different sources of saponin:

Saponin from seeds of oldman salt bush (*Atriplex mumalaria*) coded (AT), seeds of Leucaena glauco benth (*Leucaena leucocephala*) coded (AC), fruit of loofa (*Luffa aegyptiaca*) coded (LG) and roots of alfalfa (*Medicago sativa*) coded (ALF_1) collected from the north-western coast of Egypt and synthetic Lucerne saponin was provided by ICN company, USA. The plant samples containing saponin were dried at 70°C using a forced air-drying oven. The dried samples were

ground in Thompson Wielly mill. The saponin contents in different samples were determined by the modified method of Shany *et al.* (1970) and Khamis (1989). Saponin contents were 2% in AT, 2.3% in LG, 2.1% in AC and 2% in roots of alfalfa.

Peanut plants showing symptoms of root-rot disease were collected from south Tahrir (Behara district). *F. solani*, *M. phaseolina*, *R. solani* and *S. rolfsii* have been isolated from infected roots and were purified using the hyphal-tip and single spore techniques and pathogenicity tests also were done.

3. Effect of saponin on the linear growth and sclerotial formation of the fungi tested:

Synthetic lucerne saponin at 1% concentration was added to potato dextrose agar (PDA) medium and autoclaved. A saponin free PDA was also autoclaved to be used as a control treatment. The sterilized PDA media, with or without saponin, were poured into 9-cm sterilized Petri dishes.

Disk (5 mm in diameter) from activite growing culture of *F. solani*, *M. phaseolina*, *R. solani* and *S. rolfsii* were placed in the culture of the plates. Four plates were used for each treatment. The inoculated plates were then incubated at 28 °C. Mycelial growth was measured daily and sclerotia number was counted 10 days after incubation at 28°C.

Effect of different sources of saponin or fungicide on root and pod-rot diseases:

Peanut seeds (Giza 4) were dressed with different sources of saponin or fungicide (3 g/Kg seed). The treated seeds were then planted in (25 cm- diam.) pots previously infested with *M. phaseolina*, *R. solani* or *F. solani* (grown on sand barley medium for 15 days at 27 °C). Each fungal growth was then added to the formalin- sterilized soil at the rate of 2% of soil weight (w./w.). The sterilized soil or the non-treated seeds were served as control. Five seeds were sown per each pot and four pots were used for each treatment.

Field experiments:

Peanut seeds (Giza 4) were dressed with saponin of different sources, i.e. saponin from seeds of *Atriplex numalaria* and *Leucaena Leucocephala*, as well as roots saponin of alfalfa and *Luffa aegyptiaca* and synthetic saponin (3 and 5 g/kg seed). Rizolex-T (Tolclofos methyl thiram 50%) (3 g/kg seed) was used for comparison. Treated seeds were planted in soil naturally infested with root-rot fungi at Behara governorate during 2000 and 2001 seasons.

Experiment was carried out in a complete randomized block design with plots (3 x 3.5 meter). Three plots were left without treatment and served as control.

Data of pre-emergence damping-off were recorded after 30 days from sowing. While, percentages of root-rot diseases were recorded 120 days after sowing. All results were statistically analyzed using "F" test and L.S.D. to compare significance between treatments (Snedecor and Cochran, 1981).

Effect of different sources of saponin on percentage of colonies of fungi associated with roots of peanut plants:

Peanut plant roots from all treatments were collected at the end of the growing season. Very small pieces of sterilized roots were put on the surfaces of PDA plates (9-cm-diam.). Four replicates were, however, used for every treatment and incubated at 27 °C. Number of colonies of *F. solani*, *R. solani* and *M. phaseolina* were recorded after four days of incubation.

RESULTS

1. Effect of saponin on the linear growth and sclerotial formation of the fungi tested:

In vitro studies, reduction of linear growth by saponin (1g/L) was observed in all investigated fungi. Saponin was more effective against *M. phaseolina* than other tested fungi. Significant reduction of sclerotial number was obtained with *S. rolfsii* when grown on PDA plates treated with saponin (Table, 1).

II-Effect of seed dressing with saponin of different sources on disease severity:

The effect of each saponin sources or the fungicide Rizolex-T on percentages of infection by *F. solani*, *M. phaseolina* and *R. solani* was studied in greenhouse.

Data presented in Table (2) show that percentages of diseases incidence varied according to saponin plant-sources, kind of saponin (natural or synthetic source) and kind of the fungus tested. Significant reductions in incidence percentages of root rots caused by *M. phaseolina*, *R. solani* and *F. solani* were achieved on plants developed from seeds treated with saponin of different sources (3g/kg seed) and Rizolex-T (3g/kg seed). The best reductions in root rot diseases incidence were noted when peanut seeds were treated with the synthetic leucerne saponin in case of *M. phaseolina* (20.10%) and *R. solani* (17.70%), followed by saponin of alfalfa if compared with the control treatments

(47.53% & 43.67%). Other sources of saponin showed different variation in diseases incidence.

As for pod rots, all the treatments tested significantly decreased percentages of infection. However, infection percentages were ranged between (15.33% - 51.33%), while values of the control treatments were (37.33 – 57.00%). The synthetic saponin was significantly the best treatment in decreasing infection of pod rots. On the other hand, effects of the synthetic saponin on root and pod rots incidence were as effective as the fungicide Rizolex-T, except in case of root rot caused by *R. solani*, whereas these of the other treatments were superior than or comparable to that of the fungicide in most cases.

Field experiments:

All treatments (except LG at 3g/kg seed in only 2000 season) significantly decreased percentages of pre-emergence damping-off than the control (Table, 3) in both experimental seasons (2000 & 2001). Rizolex-T at the rates of 3 and 5 g/kg seed gave the least percentages of infection followed by the synthetic lucernes saponin in most cases.

Data presented in Table (4) show that all treatments of different sources of saponin as well as Rizolex-T significantly reduced root-rot diseases incidence than the control. The fungicide Rizolex-T gave significantly the least percentages of infection, followed by the synthetic lucernes saponin in most cases. Other sources of the natural saponin showed variation in diseases incidence.

Table (1): Effect of the synthetic lucernes saponin (1g/L. PDA) on linear growth and sclerotia number of the four fungi tested, 10 days after incubation at 28 °C.

Fungi	Linear growth (cm)	Reduction * (%)	Number of sclerotia/plate	Reduction * (%)
Fusarium solani	7.5	16.7	-	-
Macrophomina phaseolina	4.7	47.8	198.3	+ 52.8
Rhizoctonia solani	5.3	41.1	0.0	100.0
Sclerotium rolfsii	5.9	34.4	3.0	- 66.7
Control (Without treatment)	9.0 [A]	-	129.8	-
	9.0 [B]	-	0.0	-
	9.0 [C]	-	9.0	-
L.S.D. at 5%	0.7	-	4.1	-

* % Reduction relative to the control.

A = Values of M. phaseolina. B = Values of R. solani. C = Values of S. rolfsii.

Table (2): Effect of seed dressing with saponin of different sources and the fungicide Rizolex-T on percentages of root and pod-rots on peanut plants, grown in artificially infested soil under greenhouse conditions.

Treatments	*Macrophomina phaseolina*		*Rhizoctonia solani*		*Fusarium solani*	
	% Root rot	% Pod rot	% Root rot	% Pod rot	% Root rot	% Pod rot
Saponin of: Leucaena *Leucocephala*(AC)	39.80	19.33	31.47	27.50	24.27	23.40
Saponin of: *Atriplex Numalaria* (AT)	39.50	19.00	31.47	28.50	35.63	23.75
Saponin of: Alfalfa (ground roots) ALF	24.27	29.33	27.87	30.75	31.47	51.33
Saponin of: *Luffa aegyptiaca*	39.80	20.67	27.30	34.50	39.80	29.00
Synthetic lucernes saponin	20.10	15.33	17.70	23.00	39.50	23.33
The fungicide Rizolex-T	39.80	22.00	35.63	30.50	43.67	31.67
Control (Without treatment)	47.53	55.00	43.67	37.33	47.53	57.00
L.S.D. at 5%	3.37	1.96	2.74	2.08	2.69	3.18

Table (3): Effect of saponin of different sources and the fungicide Rizolex-T on pre-emergence damping-off disease in peanut seedlings under field conditions of Behera governorate, 2000 and 2001 seasons.

Treatments \ Conc. of the natural saponin	% of pre-emergence dampng-off at:			
	2000 season		2001 season	
	3g/kg seed	5g/kg seed	3g/kg seed	5g/kg seed
Saponin of: *Leucaena Leucocephala* (AC)	12.67	13.33	9.87	12.20
Saponin of: Atriplex *Numalaria* (AT)	15.67	10.00	12.77	11.73
Saponin of: Alfalfa (ground roots) ALF	16.67	11.33	16.97	14.30
Saponin of: Luffa aegyptiaca	21.00	13.67	15.67	20.87
Synthetic lucernes saponin	17.00 *	10.67 **	10.77 ***	5.20 **
The fungicide Rizolex-T	7.67 ***	7.67 ***	7.10 ***	3.30 ***
Control (Without treatment)	23.67	23.67	29.33	28.67
L.S.D. at 5%	5.32	4.91	5.51	4.75

* The first dose of the synthetic saponin (= 1 g/kg seed).
** The second dose of the synthetic saponin (= 3 g/kg seed).
*** The sole dose tested for the fungicide (= 3 g/kg seed).

Table (4): Effect of saponin of different sources and the fungicide Rizolex-T on root-rot diseases in peanut plants under field conditions of Bahera governorate, 2000 and 2001 seasons.

Treatments \ Conc. of the natural saponin	% infected plants at:			
	2000 season		2001 season	
	3g/kg seed	5g/kg seed	3g/kg seed	5g/kg seed
Saponin of: *Leucaena Leucocephala* (AC)	22.33	22.33	28.30	28.30
Saponin of: Atriplex *Numalaria* (AT)	26.00	15.67	28.87	28.30
Saponin of: Alfalfa (ground roots) ALF	22.67	19.00	26.10	26.10
Saponin of: Luffa aegyptiaca	26.67	24.67	30.87	30.87
Synthetic lucernes saponin	29.00 *	17.00 **	15.33 *	15.43 **
The fungicide Rizolex-T	8.67 ***	8.67 ***	11.07 ***	11.00 ***
Control (Without treatment)	35.00	34.00	46.33	53.67
L.S.D. at 5%	5.78	5.75	9.59	7.13

* The first dose of the synthetic saponin (= 1 g/kg seed).
** The second dose of the synthetic saponin (= 3 g/kg seed).
*** The sole dose tested for the fungicide (= 3 g/kg seed).

Regarding yield of peanut, all treatments gave significantly the higher yields than these from the non-treated seeds (Table 5). The highest yields were recorded with Rizolex-T at both rates (3 & 5 g/kg seeds) and seasons (2000 & 2001), except in case of AT treatment in only 2000 season. However, differences between values of the fungicide treatment and the other ones were significant. The synthetic saponin (5 g/kg seed) gave pod yields higher than the other saponin of different natural sources in most cases .

Table (5): Effect of saponin of different sources and the fungicide Rizolex-T on peanut pod yield (kg/feddan) under field conditions of Bahera governorate, 2000 and 2001 seasons.

Conc. of the natural saponin / Treatments	Pod yield (kg/feddan) at:			
	2000 season		2001 season	
	3g/kg seed	5g/kg seed	3g/kg seed	5g/kg seed
Saponin of: *Leucaena Leucocephala* (AC)	1155.0	1380.0	1455.8	1512.0
Saponin of: Atriplex *Numalaria* (AT)	1185.0	1447.5	1344.0	1287.8
Saponin of: Alfalfa (ground roots) ALF	1185.0	1335.0	1316.3	1371.8
Saponin of: Luffa aegyptiaca	1147.5	1335.0	1371.8	1455.0
Synthetic lucernes saponin	1185.0 *	1372.5 **	1260.0 *	1399.5 **
The fungicide Rizolex-T	1372.5 ***	1402.5 ***	1890.0 ***	1987.5 ***
Control (Without treatment)	990.0	990.0	1057.5	979.5
L.S.D. at 5%	0.6	0.6	1.1	1.0

* The first dose of the synthetic saponin (= 1 g/kg seed).
** The second dose of the synthetic saponin (= 3 g/kg seed).
*** The sole dose tested for the fungicide (= 3 g/kg seed).

All treatments (Table, 6), except ALF and LG with *Fusarium* spp., and Rizolex-T with *M. phaseolina* gave significant reductions in percentages of *Fusarium* spp. and *M. phaseolina* colonies than the control. Whereas, the treatments tested were not effective against *R. solani*. The fungicide Rizolex-T, followed by the synthetic saponin were generally the superior treatments in reducing colonies of *Fusarium* spp.

Table (6): Effect of saponin of different sources and the fungicide Rizolex-T on the percentages of fungi colonies associated with roots of peanut plants grown under field conditions of Bahera governorate.

Treatments (3g/kg seed)	% *Fusarium* spp.	% *Rhizoctonia solani*	% *Macrophomina phaseolina*
Saponin of: *Leucaena Leucocephala* (AC)	66.67	13.33	20.00
Saponin of: Atriplex *Numalaria* (AT)	60.00	13.33	20.00
Saponin of: Alfalfa (ground roots) ALF	73.33	6.67	13.33
Saponin of: Luffa aegyptiaca	86.67	6.67	13.33
Synthetic lucernes saponin	46.67	6.67	13.33
The fungicide Rizolex-T	33.33	13.33	73.33
Control (Without treatment)	86.67	13.33	80.00

L.S.D. at 5% for:
Fungi (F) = 7.43
Treatment (T) = 11.35
F x T = 19.65

DISCUSSION

It is well known that pre-emergence damping-off and root-rot diseases of peanut are serious and destructive diseases (Abdel-Al, 1973; Abdel-Ghany *et al.*, 1973 and Ali *et al.*, 1979). Saponin proved inhibitory to the mycelia growth of *F. solani, M. phaseolina, R. solani* and *S. rolfsii,* the causal pathogens of peanut pre-emergence damping-off and root-rot diseases and reduced percentages of infection when peanut plants were grown from seeds pre-treated with different sources of saponin.In this respect, Zentmyer and Thompson (1967), Omar *et al.* (1996) and Omar and Aly (1996) stated that several plant pathogenic fungi (especially soilborne fungi) were sensitive to saponin *in vitro* and *in vivo* application.

The inhibitory effects of saponin revealed the presence of some antifungal materials which caused this significant effects on mycelial growth of the fungi tested, i.e. *F. solani, M. phaseolina* and *R. solani* either in Petri-dishes or when treated seeds were planted in potted soil. In this respect, Osbum (1996)and Hostettmann and Marston (1995) stated that the antifungal effect of saponin can be attributed to its membraneolytic action where saponin combines with the membrane sterols causing the formation of pores and hence the loss of membrance integrity. On the other hand, saponin has been reported to enhance plant growth of peanut plants over the control. This may be due to the direct effect of saponin on plants growth or indirect by its inhibitory effect on growth and development of fungi affecting peanut plants (Omar *et al.*, 1996 and Abdel-Momen *et al.*, 2000).

Reduction in root-rot disease by the synthetic saponin application was somewhat similar to that induced by the experimented fungicide, Rizolex-T. However, saponin may be superior as being natural plant material, which is safe to the plants, animals and human beings, and do not cause pollution to environment.

REFERENCES

Abdel-Al, H.R. 1973. Studies on seedling and pod-rot diseases of peanut in A.R.E. and its control. Ph.D. Thesis, Fac. Agric., Al-Azhar Univ., Cairo, Egypt.

Abdel-Ghany, A.K., K.A. El-Alfy and M.A. Abdel-Gawad, 1973. Peg and pod-rot disease of peanut and its control. Agric. Res. Rev. (Cairo), 51: 129-138.

Abdel-Moiety, T.H., A.A. El-Deeb and I.A. Radwan, 1991. Biological control of seedling diseases and pod-rot of peanut under greenhouse and field conditions. Egypt. J. Appl. Sci., 6 (1): 103-111.

Abdel-Momen, S.M., S.A. Omar, Awaref A. Hanafi and T.M. Abdel-Rahman, 2000. different sources of saponin affecting white rot disease in onion (*Allium cepae* L.). Bull. Fac. Agric., Cairo Univ., 51: 365-378.

Ali, A.A., A.H. Yehia and A.A. El-Deeb, 1979. Survey of some pathogenic soil fungi causing damping-off and root-rot diseases of peanut with special references in varietal resistance in A.R.E. Agric. Res. Rev., 57: 57-62.

Beattie, J.H., F.W. Poos and B.B. Higginis, 1954. Growing peanut. Fmr' s Bull., M.S. Dept. Agric., 2063 (c.f. Rev. Appl. Mycol., 35: 375-54, 1956).

El-Ahmar, B.A., M.E. El-Mandouh, A.A. El-Deeb and I.A. El-Ghareeb, 1989. Reaction to root and pod-rot diseases of peanut (*Arachis hypogaea* L.). Ann. Agric. Sci. Moshtohor, 27 (3): 1577-1591.

El-Deeb, A.A, H.A. Mohamed and A.A. Hilal 1985. Studies on charcoal rot disease of sunflower in Egypt. The 1st Nat. Conf.of Pest , Dis.of Veg. and Field Crops. Egypt, Ismaillia, Oct., pp. 999-1012

El-Deeb, A.A., S.T. El-Serogy, M.A.I. Khalifa and M.A. El-Korashy, 1998. Effect of some ecological factors on the incidence of damping-off, charcoal rot and wilt diseases on sesame and their control. Egypt. J. Appl. Sci., 13 (5): 64-87.

El-Korashy, M., A.A. El-Deeb, M.A. Khalil and N.M. Abdel-Gawad, 1997. effect of fertilization on soilborne diseases incidence and yield of peanut plants. Egypt. J. Appl. Sci., 12 (5): 274-284.

El-Wakil, A.A., A.A. El-Deeb, H.S. Shalaby and A.A. Hilal, 1984. Pod-rot of peanut (*Arachis hypogaea* L.) and its control. Agric. Res. Rev., 62 (2): 201-209.

Hilal, A.A., M.I. Alian, A.H. Metwally, A.A. El-Deeb, 1990. Peanut diseases in Egypt. II. Factors affecting healthy survival plants. Ann. Agric. Sci., Moshtohor, 28 (3): 1557-1568.

Hilal, A.A., A.H. Metwally, S.A. Khaled and A.A. El-Deeb, 1994. Evaluation of peanut cultivar, date of sowing and NPK as integrated control measures against soilborne diseases. Zagazig J. Agric. Res., 21 (4): 1151-1162.

Hostettmann, K.A. and A. Marston, 1995. Saponin in: Chemistry and Pharmacology of

Natural Products. Cambridge Univ. Press, Cambridge, USA.

Ismail, A. I., 1995. Pathological and physiological studies on some diseases of alfalfa (*Medicago sativa* L.) in Egypt and their control. Ph.D. Thesis, Fac. Agric., Al-Azhar Univ.

Khamis, Mefat A.M., 1989. Biochemical studies on the allelochemical of forage crops. M.Sc. Thesis, Fac. Agric., Cairo Univ.

Mahrous, M.E., M.M. El-Morshedy, A.A. El-Deeb and M.A. Khalil, 1993. Effect of certain pesticides in controlling soilborne fungi and root-rot knot nematodes infecting peanut, *Arachis hypogaea*, under greenhouse and field conditions. Zagazig J. Agric. Res., 20 (2A): 709-719.

Oleszek, W., K.R. Price, I.J. Calquhhoum, M. Jurzysta, M. Ploszyrki and G.R. Fenwick, 1990. Isolation and identification of alfalfa (*Medicago sativa* L.) root saponin. Their activity in relation to fungal bioassay. J. Agric. Food Chem., 38: 1810-1817.

Omar, S.A. and A.Z. Abdel-Halim, 1992. Fungal growth response to alfalfa (*Medicago sativa* L.) saponin extract. Egypt. J. Appl. Sci., 7 (4): 24-32.

Omar, S.A. and A.A. Aly, 1996. Antifungal activity of saponin against soil-borne fungi associated with cotton damping-off. Menofiya J. Agric. Res., 2: 267-279.

Omar, S.A., Nagwa A.I. Osman and Awaref A. Hanafi. 1996. Controlling white rot disease in onion using alfalfa saponin. Bull. Fac. Agric., Cairo Univ., 47: 319-339.

Osbum, A. 1996. Saponin and plant defense: A soapstory. Trends in Plant Sci. 1: 4-8.

Osman, Nagwa A.I., Awaref A. Hanafi, A.A. El-Deeb and M.S. Abdel-Megid, 1996. Effect of garlic extract and volatiles on root-rot and pod-rot diseases of peanut (*Arachis hypogaea* L.). Egypt. J. Appl. Sci., 11(10): 162-175.

Reddy, M.N. and A.S. Rag, 1980. Damping-off of groundnut caused by two species of *Fusarium* (*F. solani* and *F. oxysporum*). Indian J. Mycol. and Plant Pathol., 10 (1): 65-66.

Seoud, M.B., K.K. El-Alfy, A.T. Thoma and A.A. El-Deeb, 1982. Further studies on the control of peg and pod-rot of peanut in Egypt. Agric. Res. Rev. (Cairo), 60: 127-139.

Shany, S., B. Yehuotith, B. Giestentnen and A. Bondi, 1970. Preparation, characterization and some properties of saponin from lucerne tops and roots. J. Sci. Food Agric., 21: 1313-1315.

Snedecor, G.W. and W.G. Cochran, 1981. Statistical Methods. 7th ed., Iowa State Univ. Press, Ames, Iowa, USA.

Zentmyer, G.A. and C.R. Thompson, 1967. The effect of saponin from alfalfa on *Phytophthora cinnamomi* in relation to control of root-rot of avocado. Phytopathology, 57: 1278-1279.

مقاومة أمراض أعفان الجذور على محصول الفول السوداني باستخدام مصادر مختلفة للسابونين بالمقارنة بمبيد فطرى

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تناول البحث دراسة تأثير بعض مصادر السابونين وفاعليتها في مقاومة أمراض أعفان الجذور على الفول السوداني تحت ظروف المعمل ، الصوبة والحقل بالمقارنة بمبيد فطرى.

أوضحت نتائج تجارب المعمل أن بيئة البطاطس دكستروز آجار والمحتوية على (١ جرام/لتر) سابونين سببت نقصاً في قطر مزارع الفطريات: *Macrophomina phaseolina, Rhizoctonia solani, Sclerotium rolfsii* and *Fusarium solani* عن معاملة المقارنة بلغ (٤٧,٨، ٤١,١، ٣٤,١ و١٦,٧%).

أدت معاملة بذور الفول السوداني في الصوبة بمسحوق السابونين ثم زراعتها في تربة أصص ملوثة بأي من الفطرين *M. phaseolina* or *R. solani* إلى الخفض المعنوي لنسبة الإصابة بأمراض أعفان الجذور عن معاملة المقارنة. ومن جهة أخرى أظهرت مصادر السابونين الأخرى تباين في درجات خفض الإصابة.

أجريت تجارب في الحقل في منطقة البحيرة تحت ظروف العدوى الطبيعية خلال موسمي ٢٠٠٠ و ٢٠٠١ وذلك لدراسة تأثير معاملة بذور الفول السوداني بمسحوق السابونين لكل مصدر على حده بمعدل (٣، ٥ جرام/كجم بذرة). وعموما أوضحت النتائج المتحصل عليها أن معاملة البذور بالمبيد متبوعا بالسابونين المخلق لهما التأثير الأقوى في تقليل موت البادرات وأعفان الجذور خلال موسمي ٢٠٠٠ و ٢٠٠١م.

رغم أن السابونين ومبيد الريزولكس-تى لم يكونا فعالين في خفض نسب مستعمرات الفطر *R. solani* على جذور الفول السوداني عند الحصاد، إلا أنهما كانا فعالين تجاه كل من الفطرين *Fusarium* spp. & *M. phaseolina* في معظم الحالات. وعموما، فإن مبيد الريزولكس-تى و السابونين المخلق كانتا أفضل المعاملات المستخدمة في مقاومة الفطر *Fusarium* spp.