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The Impact of Liquid Plants Extracts on Some Fungus Causing Root Rots on Chickpea

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ABSTRACT

This experiment has been conducted to test the effect of some liquid plant extracts for plants of Eucalyptus, Oleander, Basil and Garlic on the fungus of *Fusarium oxysporium, Rhizoctonia soloni, Macrophomina Phaseolina* and *Sclertium rolfsii* which cause root rot on the Chickpea plant. The results showed that the leaves extracts of Eucalyptus, Oleander, Basil and Garlic have reduced the growth of mycelium tested fungi and the Eucalyptus was most of these extracts effecting where it prohibited the germination of Sclerotium that produced by some of these fungus. While the field experiments clarified that the extracts of Oleander reduced the occurrence of root rot in addition to enhance the properties of the product as compared with the control. Also there were significant differences between the fungus and their effect on the root contains of the total dissolved sugars where it has registered the higher average of these sugars in the plants treatment by the liquid extract of the Eucalyptus and infected by *S. rolfsii* fungi while the significant differences increase was in the content of the roots for all of these treatments as compared with the control treatment. Generally, the extract of the Eucalyptus and the extract of Oleander plant have given high significant differences in the content of the total dissolved sugars and phenolic compounds of different treatments. Also, the results pointed to the existing of significant differences between the root contents of the lignin of different treatments.

INTRODUCTION

Featuring crop chickpea *Cicer arietinumL.*height of nutritional value because it's a rich source of protein that it helps to formation tissues of human body and it as one of the important crops in the world despite the limited area under cultivation (1).

Exposure chickpea plants to infection by root rot diseases which causes the death of roots and the decomposition (2).

Appears on plants suffering from disease root rot symptoms of drought and become weak and scalable to attack other pathogens. These diseases inhibit plant growth which result in large economic losses.*Rhizoctonia solani, Fusarium oxysporium, Sclerotiumrolfsii,Macroophomina phasealina*and *Sclerotinia sclerotium.*

Studies have shown that these fungi represent the highest percentage of fungi isolated from places injury by roots rot disease (3).

A lot of studies proved that the plant liquidextracts gives effective results in resistance to plant diseases that contains anti-materials bacteria and fungi (16, 28). Also, there are 18 plant species leaf extracts back to the 11 upscale family resistance to fungal pathogen in the soil, such as *Fusarium oxysporum, Pythium debaryanium, Sclerotiumrolfsii, Rhizoctniasolani*(12, 14), the materials were extracted from plants effective against fungus and leads to reduced diameters colonies dry weight and the numbers of sclerotium germination, also, observed decrease in dry weight of hyphae fungus *Sclerotiumrolfsii* when used to extract of bark pine tree, extract of leaf Eucalyptus, Daturam, extract of root Turmeric and Ginger (4, 25,26). There are also several of the fungus sensitive to garlic extract, including fungi *Pyrculariaoryzea* (3, 17). In other research, suggested to some plant extracts such as Basil, Oleander and Eucalyptus led to inhibition of some pathogen causes diseases to the rice such as Fungus *Rhizoctoniasolani* and *Sclerotiumoryzea* under Laboratory conditions (18). Some plants extracts have been used in the resist fungus *R. solani* Laboratory, found that 17 species of plants extracts. They had an anti-fungal effect that causes root rot chickpea. Among these plants showed Garlic, Eucalyptus and Ginger inhibition of 100% of the growth of pathogen (11, 23).

Evaluating the efficiency of plants extracts to resist rot disease that caused by fungus *M. phaseolina* on plant chickpea planted in pots field. Fund that plants that have been treated

seeds by extracts leaves after infected by pathogen, seeds showed resistance to root rot disease (10), also, proved that the use of an liquidextract of the plant Eucalyptus leaves concentration 5% against fungus: *F. sp, R. solani*&*M. phaseolina* on nomination papers was effective against the fungus *R. solani* and the use of crude plant parts mixed with the soil to record reduced injury by tested fungi with a high significant increase in the length and weight shoot and root to plant chickpeas (22). Also, the method of extraction a big role in getting active substances for each plant differentiated impact on the fungus *Penicilliumdigitatum* that was found Neem plant. *Azadirachtaindica* the high-efficiency, as well as, extracts plants of *A. indica, colotropis procera, terminalia chebule, curcuma longa. ocimum sanctum, cathamanthusroseus* and *Zingilberofficinale* (13). On the other hand, the liquidextracts of Neem leaves had been an effective antidote against fungus *Penicilliumexpansum* that by adding rate 50 mg/ml of extracts leaves to the medium, led to the effect of the growth of fungus and form of colonies compared of the control, (17), while liquidextraction of plants.*Ocimumbasilicum* leaves and garlic cloves*Allium sativum* under laboratory conditions at a rate of 3000 to 4000 ppm led to a significant decrease in germination fungus *Alternaria alternate,Fusarium sp* and *Penicilliumsp* at concentration 6% (v/v)in petri dishes. Many studies have shown that volatile compounds from the extracts of liquid draw garlic cloves at high concentration had dampened the growth of germs and mycelium fungus *F.oxgsporum.f.sp. lycoperisici* in the fungi medium (29).

MATERIALS AND METHODS

Preparation of fungus inoculation:

The inoculation was prepared from the fungus *Fusarium oxysporum,Rhizoctonisolani, Macrophominaphasealina*and*Sclerotiumrolfsii* in the medium of (PDA) and incubated on $25 \pm 2c^{\circ}$ for 7days.

The ability pathological tests of pathogenic fungi:

The ability pathological tests of pathogenic fungi done in accordance (27).

Using sterile soil distributed in agriculture sterile bags (diameter 17cm) impregnate it in the formalin solution 40% for 15 min, and left it to evaporate for 3 days, divided the soil to 5 groups and infected it by fungus tested separately and planted by chickpea seeds rate of 2 seed/pot. Also, planted seeds in infected soil to control.

Took the results after 30, 60, 90 days, then used the equation to calculate the pathogenicity of pathogenic fungi.

$$\text{The proportion of dead plants} = \frac{\text{number of dead plants}}{\text{number of plants in pot}} \times 100$$

Preparation of plant extracts:

Prepared liquidextracts from the leaves of plants Basil, Eucalyptus, Oleander and Garlic in the stage of floral or maturity used to 250 g of leaves of plant, crushed them in the blender for 5 min then filtrate by cloth gauze and filtrate one or more time by filter paper and put in airtight and dark bottles, cold sterilization in the refrigerator at temperature $-20c^{\circ}$ (6).

1. The impact of extracts plants on the mycelium of microorganism:

Fungus *F.oxysporum, R. solani, S.rolfsii, M. phaseolina* growth on (PDA) medium in petri dishes in incubation for 7 days on $25 \pm 2c°$, then taking 20 ml from (PDA) and poured in petri dishes. Before solidify of the medium in the dishes add to it amount 1.5 ml from one of liquid extracts former, after solidarity infection by the tested fungus that taking a circular disk by drills cork diameter 4 mmt from all culture and put it in the center of the dishes (11). In the control treatment infection the medium by sterile water instead ofliquid extracts that 3 dishes for every treatment and measured the mycelium growth of fungus and took the results after 3, 5, 7, 9 days.

2. The impact of extract plants on the occurrence and development of symptoms of root rot

Evaluation of impact of extract plant for tested plants on the resist to root rot disease applied of agricultural experiments on the plants in pots in the conditions open (in vivo) agriculture in the field that soaked the seeds of chickpeas plant in the former extracts plants (each group of seeds in one of extracts plants). For a period of not less than 8 o'clock in the dark place (31) and distributed in pots containing soil infected by tests fungi at rate of 2 seeds/pot by 4 replicates then extracted all the death plants at all stages of the experiment after 30, 60, 90 days after planting seeds as follows:

$$\text{percentage of survived plants} = \frac{\text{number of plants } survived}{\text{number of seeds in the potted}} \times 100$$

So, take some measurements of the yield such as:

$$\text{the proporation of the infection from the equation} = \frac{\text{number of the death plants}}{\text{number of seeds in the total plants}} \times 100$$

a number of root modules per plant, plant height (cm), dry root weight (gr) after 60, 90 days and weight of 100 seeds after 90 days.

3. The impact of extracts plants on the biochemical content to the roots of the plant chickpeas:

The total soluble sugars used the method mentioned by (19). That boil 0.5 gr from roots per treatment in 50 ml distilled water on the temperature 66 c° for 1 min, then completed the volume to 100 ml distilled water from the samples nomination then take 1 ml from the leaky with 1 ml phenol 5% and 3ml concentrated sulfuric acid samples were left to cool for 20 min at room temperature estimate the total soluble sugars by used the device (spectronic-spectrophotometer) on the wavelength490nmand expressed by Microgram/rewarding (EQ) glucose after multiply the absorption in the constant 0.91.

To total phenols saucepan the total phenols by the method elucidated (24) by crushed 1g roots of plants in 10 ml methanol 95% and leaved it even cool for 24 hour at room temperature, then the mixture was nominated and took 1 ml from the solution and added to it 23 ml from distilled water in a beaker the size of 100 ml added to it 1ml from detector (folin-Denis) with shake well for 3 min and added sodium carbonate 10% even up to volume 33 ml then shake well to 90 min until the occurrence of blue color, and recorded the absorption in the spectrophotometer device for each sample at the wavelength 660 nm and saucepan the quantity of phenolic compounds by used standard curve for Tannic acid and express about it by Mg/g of plant tissue.

The content of Lignin estimated the content of roots from lignin by take 5g from weight of roots crushed in 10 ml from phosphate cool organizer PH 7 then transfer the mixture to centrifuge on the rotation speed 3000 rpm for 20 min times by used solutions (phosphate cool organizer PH 7 then distilled water, then ethanol alcohol, then acetone at last washed the

residuum by dimethyl ether) added to residuum each treatment SML from sodium hydroxide 0.5 Mueller and by used centrifuge (3000 rpm) for 15 min for separating the residuum from solution added 2.5 ML sodium phosphate PH 70.05 Mueller and measured the absorbability on the wavelength 360 Nm and estimate the content of lignin by used the measurement curve mg/g of plant tissue (21).

RESULTS

Table (1) pointing to high capacity-fungal *F.oxysporum, R. solani*and *S.rolfsii*to events death to the plant growth and root rots compare with fungus *M. phaseolina* the proportion of dead plants reached to 66% after 90 days from the infection by fungus *F.* oxysporum while *M.phaseolina* did not exceed 33% after 3 months after planting.

Impact of extracts plants on mycelium fungus growth (in vitro):

the result of this study to the liquidextracts of plants Basil, Eucalyptus, Oleander and Garlic had impact on the extent of mycelium fungus growth, *F.Oxysporum,M.phaseolina, R. solani* and*S. rolfsii*, the table (2) shows that the liquidextracts of Oleander and Eucalyptus the most impact on the all fungus reached the extent of the fungus to (6.63 cm^2, 17.45 cm^2) after 9 days respectively. In general, all the treatment gave clear significant differences in the growth of mycelium to the tests fungus compare by control and the fungus *M.phaseolina* shown that the most impact in the first days and the liquidextract of Garlic a significant impact of the growth of mycelium more than 0.20 cm^2 after 3 days from the infection while arrived to 0.62 cm^2 when we treatment by Oleander extract after 5 days then the measurements between the treatments impact on the extent of mycelium growth more clear significant differences in the seventh day reached the extent of mycelium fungus growth of *F.* oxysporum more than 1.62 cm^2 in thepetri dishes that treatments by Oleander liquidextracts and arrived to 1.77 cm^2 when treated by Eucalyptus extracts comparative the control 63.50 cm^2 to the same fungus

Impact of plant liquidextracts on the fungus in (vivo):

Table (3) indicated that the fungus *F.* oxysporum the most impact on the germination arrived the percent of plants residual 33.3% after 90 days (in control).

The liquid plant extracts were impact of the fungus infection in the soil, table (3) found that the treatment by Eucalyptus encourages germination and arrived of the percent to 100%

during the first 30 days in the soil infection by *S. rolfsii*, then decrease the percent of plants after 30 days from planting and decrease the percent of the residual plants in the treatment by Garlic liquid extracts for all fungus after 30 days from planting.

Impact of used the liquidplant extract on the percent of infection number root nodules, a height of the plants and dry weight of the roots after 60 days from planting(Table no 4).

The results indicate the presence of height significant differences to impact of fungus (in control) and impact of liquidplant extracts on the percent of infection that arrived to 69.6% in the control compared with the treatments by extracts of Eucalyptus and Oleander (29.9%, 31.3%) respectively and the extracts impact on the fungus *M.phaseolina* so that was the percent of infection 38.5% and shown the extracts of Eucalyptus, Oleander and Garlic a clear impact in reducing the percent of infection. Also, liquid extracts of leaves of Eucalyptus plant reducing the percent of the infection to 20.25% in the soil infection by fungus *S. rolfsii* compared with the all other treatments.

When calculating of the nodules in the soil after 60 days, the results indicate the extracts led to significant increase in the number of nodules compared by control treatment that arrived to (11 nodules/plant) when treatment by Oleander extract in the soil infection by fungus *M. phaseolina* and observed that treatment by Eucalyptus, Oleander and Basil liquidextracts impact and significant differences with treatment by Garlic and control treatment and arrived the highest of the plant in this study to (24.5 cm) when treatment by Oleander in the soil infection by fungus *S. rolfsii*and shown also that plants treatment by Eucalyptus extract and followed by Oleander extract were the highest growth compared by plants in control (21 cm, 19 cm, 11.5 cm) respectively. While the fungus *R*. solani that the most fungus impact on the highest of plants in this study.

And when taking a dry weight of roots (table 4) observed the liquidextracts of plants gave high significance differences and increase in the dry weight of roots in the case of Eucalyptus extract (0.79 g) in the soil infection by fungus *M.phaseolina*.

Impact of using the liquidplant extracts on the percent of the infection number of root nodules height of the plants and dry weight of roots after 90 days from planting:

In table (5) shown the significance differences high between impact of extracts plant on the percentage of the infection the plants after 3 months after the treatments and infection by the fungus using the liquidextracts leaves of plants reduced the percentage of infection to 21.88% in the treatment by the liquidleaves of Eucalyptus in the soil contaminated by fungus*S. rolfsii*.Also, from table (5) shown the plants treatment by extract of Oleander gave high numbers of nodules (10 nodules/plant) and the record the presence of highly significant differences in the height of plants outcome impact of treatments, led to using the liquidextracts to increase of height plants in the treatment by liquidextracts leaves of Oleander (28.38 cm) in the soil infection by fungus *S. rolfsii*. Also, shown the results presence the high significance differences in the weight dry of roots impact to the fungus and treatments of seeds by liquidextracts of Eucalyptus in the soil infection by fungus *M. phaseolina* gave the driest weight of roots (1.01 g). While less dry weight of roots in the treatment by the extract of Garlic in the soil infection by fungus *S. rolfsii* (0.32 g). And shown in this study impact of the liquidextracts on the seeds observe exceed the liquidextracts of Oleander leaves on the other liquidextracts of plants leaves in increasing the weight of 100 seeds (123.25 g) in the soil infection by fungus *F. oxysporum*, then the liquid extract of Eucalyptus leaves compared by the control treatment.

Estimate biochemical content of chickpea rots which treated by liquidextracts and planted in the fungus indicated soil:

In table (6) shown the presence of significant differences between the fungus and control in impact on the content roots from the total soluble sugars content and recorded in the plants grew from seeds treated by liquidextracts of Eucalyptus and Oleander more content of roots from the total soluble sugars (0.81, 0.66) respectively, compared by control plants while found in the treated by liquidextract of Oleander leaves recorded (0.84 mg/equivalent of glucose) in the soil infection by fungus *R. solani*. Also, in the table found the content of roots from phenolic compounds in the all treatment shown high significant differences. So, the liquidextract of Eucalyptus leaves the most increase treatment that the content of roots from phenolic compounds amount to (0.96 mg/g tissue) in the soil infection by fungus *R. solani* and found this increase in all the treatment compare to the control treatment while recorded the content of plants from Lignin high significant differences whereas the liquidextracts of Garlic leaves reduced the content of roots Lignin to (0.25 mg/ g tissues) in the soil infection by fungus *S. rolfsii*.

DISCUSSION

In this study, in vitro tested impact of liquidextracts plants leave Eucalyptus, Oleander, Garlic and Basil against the fungus *F. oxysprum, M. phasealina, R. solani* and*S. rolfsii* and the results shown that extracts had impact and inhibited growth fungal mycelium and the extract of Eucalyptus gave the most inhibited (20). Also, this extracts inhibited the Sclerotium germination for the fungus *M. phaseolina, R. solani* and*S. rolfsii*and this extract produces materials inhibited some fungus as *Aspergillus fumigates, A. flavus, Penicilliumdigitatum, F. oxysporum*and *Thichophytonnentagrophytes* (7).

Generally, plant extracts characterized by ability to reduced incidences of plant diseases, whereas contain composite and effective materials had inhibited impact for plant pathogens and form the vegetate structures and reproductive structures for pathogens, where had natural phenolic materials that had been found that these compounds impact of the energy whenever increased these compounds in addition to plant contain materials had toxins (15) and the Garlic extract had impact on these fungus and shown the impact at high concentration of fungus *Aspergillusniger*and *A. flavus* (30).

Also, tested the effectiveness of these liquidextracts in vivo that soaked of chickpeas seeds in the liquidextracts and planted in soil infection by fungus and appeared by the results that all the treatments led to increase in the content of root from the total soluble sugars and content of phenolic compounds and the most effectiveness the liquidextract of Eucalyptus leaves that gave high capability to reduce the diseases percentage that due to the presence of phenolic compounds in these leaves in large quantities (9) and whereas compounds level depends on the number of nodules and nitrogen fixation and Lignin deposited in the cell walls which causes resistant of the pathogens (24). Therefore, the treatments in the soil and increase of the content plants from biochemical compounds and increase of the dry weight root to the plants planted.

Table (1): The percentage of the death of chickpea plants in the soil infection by fungi tested:

Tested Fungi	The proportion of dead plants %		
	After 30 days	After 60 days	After 90 days
F. oxysporum	12.5	58	66.7
M.phaseaolina	25	50	33.4
R .solani	12.5	42.9	50
S.rolfsii	25	33.4	50
Control uninfected	0.0	0.0	0.0

Table 2:Impact of extracts plants on mycelium fungus growth:

Lim Readings	Fungus	Distance of mycelium fungus growth (cm^2)						Value of L.S.D.o.5%
		Basil	Eucalyptus	Oleander	Garlic	Control	Averages	
The third day	*F. oxysporum*	1.8	0.7	0.7	1.1	1.9	1.2	Fungus: 0.29 Treatments:0.32 Fungus X treatments: 0.25
	M. phaseaolina	0.9	0.3	0.3	0.2	1.8	0.7	
	R. solani	1.8	2.1	2.1	0.8	6.7	2.4	
	S. rolfsii	1.5	1.5	1.5	3.1	2.2	2.0	
	Average	1.5	0.9	1.1	1.3	3.1		
The fifth day	*F. oxysporum*	4.2	1.2	1.3	3.1	4.2	2.8	Fungus: 0.49 Treatments:0.55 Fungus X treatments: 0.43
	M. phaseaolina	3.6	1.0	0.6	3.4	7.1	3.1	
	R. solani	6.5	2.4	4.0	4.0	29.4	9.3	
	S. rolfsii	5.7	12.6	1.7	8.2	28.3	11.3	
	Average	5.0	4.3	2.0	4.7	17.3		

The seventh day	*F. oxysporum*	8.7	1.7	1.6	4.9	19.0	7.2	Fungus: 1.36 Treatments:1.52 Fungus X treatments: 1.17
	M. phaseaolina	8.6	4.8	3.2	5.0	38.5	12.0	
	R. solani	7.9	3.4	4.8	10.5	50.2	15.3	
	S. rolfsii	13.0	11.8	2.1	18.4	63.9	21.8	
	Average	9.5	5.4	2.9	9.7	42.8		
The ninth day	*F. oxysporum*	12.6	1.8	3.1	6.2	63.6	17.5	Fungus: 2.43 Treatments:2.71 Fungus X treatments: 2.10
	M. phaseaolina	16	20.2	8.8	12.6	63.6	24.2	
	R. solani	27.2	16.2	11.3	25.4	63.6	28.8	
	S. rolfsii	49.4	31.4	3.3	44.3	63.6	38.4	
	Average	26.3	17.5	6.6	22.1	63.6		

Table (3): impact of plant liquid extracts on the fungus in vivo

Lim Readings	Fungus Tested	The remaining percentage of plants (%)				
		Basil	Eucalyptus	Oleander	Garlic	Control (only fungus)
After 30 days	*F. oxysporum*	87.5	57.1	75	66.6	42
	M. phaseaolina	87.5	87.5	57.1	66.6	50
	R. solani	87.5	87.5	71.4	66.6	57.1
	S. rolfsii	87.5	62.5	66.6	60	66.6
After 60 days	*F. oxysporum*	60	75	66.6	50	33.3
	M. phaseaolina	40	71.4	40	75	66.6
	R. solani	50	57.1	60	75	50
	S. rolfsii	66.6	40	75	40	50
After 90	*F. oxysporum*	60	75	66.6	50	33.3

	M. phaseaolina	40	71.4	40	75	66.6
	R. solani	50	57.1	60	75	50
	S. rolfsii	66.6	40	75	40	50
The ninth day	*F. oxysporum*	12.6	1.8	3.1	6.2	63.6
	M. phaseaolina	16	20.2	8.8	12.6	63.6
	R. solani	27.2	16.2	11.3	25.4	63.6
	S. rolfsii	49.4	31.4	3.3	44.3	63.6
	Average	26.3	17.5	6.6	22.1	63.6

Table (4): impact of used the liquid plants extracts on the some of crop plant chickpeas requirements after (60) days from planting in soil infection by fungi tested

Readings	Fungus	The liquid plants extracts						Value of L.S.D 5%
		Basil	Eucalyptus	Oleander	Garlic	Control	Averages	
Rotate of infection (%)	*F. oxysporum*	40.1	44.6	35.1	45	73.3	47.6	Fungus: 5.3 Treatments:5.9 Fungus X treatments: 5.3
	M. phaseaolina	44.6	25.3	27.2	30	65.4	38.5	
	R. solani	60.2	29.7	40.6	65	65	52.1	
	S. rolfsii	60.1	20.2	27.4	40.1	75	43.5	
	Average	51.2	29.9	31.3	45	69.6		
Number of root nodules/plant	*F. oxysporum*	6	5	9	4	3	5.4	Fungus: 1.2 Treatments:1.3 Fungus X treatments: 1.2
	M. phaseaolina	6	5	11	7	3	6.4	
	R. solani	9	7	6	8	4	6.8	
	S. rolfsii	6	6	6	6	4	5.6	
	Average	6.7	5.7	8	6.2	3.5		
Plant height (cm)	*F. oxysporum*	17.6	22.2	15.7	11.2	13.5	16	Fungus: 2.76 Treatments:3.08 Fungus X treatments: 2.76
	M. phaseaolina	13.5	21.5	21.2	13.5	12	16.3	
	R. solani	11.7	19.5	14.7	12	10	13.5	
	S. rolfsii	14.5	22.7	24.5	16	10.5	17.6	
	Average	14.3	21.5	19	13.1	11.5		
Dry weight of	*F. oxysporum*	0.36	0.42	0.33	0.59	0.08	0.35	

	M. phaseaolina	0.36	0.79	0.41	0.41	0.09	0.41	Fungus: 0.11 Treatments:0.12 Fungus X treatments: 0.11
	R. solani	0.29	0.26	0.24	0.27	0.1	0.23	
	S. rolfsii	0.23	0.48	0.31	0.23	0.04	0.27	
	Average	0.33	0.48	0.32	0.37	0.07		

Table (5): impact of used the liquid plants extracts on some of crop plant chickpeas requirements after (90) days from planting in soil infection by fungi tested

Readings	Fungi	The liquid plants extracts						Value of L.S.D 5%
		Basil	Eucalyptus	Oleander	Garlic	Control	Averages	
Rotate of infection (%)	*F. oxysporum*	44.4	45	35.7	46.4	73.1	48.9	Fungus: 5 Treatments:5.6 Fungus X treatments: 5
	M. phaseaolina	46	25.5	28.9	32	70.2	40.5	
	R. solani	62.4	30.6	42	68.9	70.1	54.8	
	S. rolfsii	63.6	21.9	24.9	41.8	77.8	46	
	Average	54	30	32	47	72		
Number of root nodules/plant	*F. oxysporum*	6.75	6.75	10	5.5	3.5	6.5	Fungus: 1.1 Treatments:1.3 Fungus X treatments: 1.1
	M. phaseaolina	6.75	6.5	12.5	6.75	3.75	7.25	
	R. solani	11	10.5	8.75	9.75	4.75	8.95	
	S. rolfsii	7	9.25	9	7.75	5	7.6	
	Average	7.8	8.5	10	7.4	1.7		
Plant height (cm)	*F. oxysporum*	1.9.1	23.3	16.8	12.6	14	17.2	Fungus: 2.7 Treatments:3
	M. phaseaolina	15.5	21	23	14	12.2	17.6	
	R. solani	13.5	21.9	17	11.7	10.7	14.9	

	S. rolfsii	18.5	26.4	28.3	20.6	12.3	21.2	Fungus X treatments: 2.7
	Average	16.6	23.8	21.3	14.7	12.3		
Dry weight of the roots (gr)	*F. oxysporum*	0.51	0.49	0.70	0.67	0.09	0.49	Fungus: 0.12 Treatments:0.14 Fungus X treatments: 0.12
	M. phaseaolina	0.40	0.01	0.48	0.5	0.12	0.5	
	R. solani	0.36	0.33	0.32	0.34	0.16	0.3	
	S. rolfsii	0.38	0.63	0.39	0.32	0.12	0.36	
	Average	0.4	0.6	0.4	0.4	0.1		
Weight of (100) seeds (gr)	*F. oxysporum*	80.3	84.5	123	53	23.3	72.8	Fungus: 10.8 Treatments:12.1 Fungus X treatments: 10.8
	M. phaseaolina	42.3	102.3	111	55.8	25	67.5	
	R. solani	40.8	102	99.8	40	15.5	59.6	
	S. rolfsii	30.5	77.5	64.8	47.5	13	46.6	
	Average	48.4	91.6	99.8	49	19.1		

Table (6): Impact of used the liquid plants extracts on the content of biochemical to the roots of chickpea

Readings	Fungi	A number of biochemical compounds in the roots of chickpeas						Value of L.S.D 5%
		Basil	Eucalyptus	Oleander	Garlic	Control	Averages	
The total soluble	*F. oxysporum*	0.48	0.67	0.53	0.38	0.04	0.42	Fungus: 0.06 Treatments:0.07
	M. phaseaolina	0.44	0.59	0.67	0.36	0.03	0.41	
	R. solani	0.36	0.72	0.84	0.55	0.02	0.49	

	S. rolfsii	0.57	0.81	0.66	0.27	0.05	0.47	Fungus X treatments: 0.05
	Average	0.46	0.69	0.67	0.39	0.04		
Phenolic compounds	*F. oxysporum*	0.71	0.87	0.67	0.54	0.06	0.57	Fungus: 0.06 Treatments:0.06 Fungus X treatments: 0.05
	M. phaseaolina	0.66	0.95	0.83	0.69	0.06	0.64	
	R. solani	0.59	0.96	0.79	0.47	0.08	0.57	
	S. rolfsii	0.68	0.84	0.82	0.65	0.07	0.61	
	Average	0.66	0.91	0.77	0.58	0.07		
Lignin (mg/g tissue)	*F. oxysporum*	0.35	0.53	0.61	0.33	0.67	0.49	Fungus: 0.07 Treatments:0.08 Fungus X treatments: 0.06
	M. phaseaolina	0.42	0.69	0.63	0.47	0.56	0.55	
	R. solani	0.34	0.56	0.44	0.37	0.66	0.47	
	S. rolfsii	0.27	0.33	0.31	0.25	0.47	0.32	
	Average	0.34	0.52	0.49	0.35	0.59		

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