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EFFECT OF DIFFERENT PLANT EXTRACTS AND ESSENTIAL OILS ON SUGAR BEET DAMPING-OFF AND ROOT ROT.

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ABSTRACT

The antimicrobial activities of 0f essential oils and plant extract were studied, it was revealed that Garlic extract, onion, clove and Artemisia extract showed complete inhibition of mycelium linear growth of *S.rolfsii* at 75% .Clove extract showed complete inhibition on *R.solaniat* 50% concentrate and at 75% concentrate on *F.oxysporum*. Garlic extract showed (85.66%) reduction of *F.oxysporum*. thyme oil was the best fungicidal to pathogenic fungi it gave (100%) inhibition to *s . rolfsii* at (2%), at (1%) to *R.Solani* and *F.oxysporum*. Anise oil shows a complete inhibition to three pathogens at (1%). Camphor oil at (2%) show (62.22%) inhibition on *R.Solani*, (41.11%) inhibition on *F.oxysporum* and a complete inhibition in mycelium linear growth of *S .irolfsii* at (1%). Other extract hadn't any effect on any pathogen. In greenhouse and Field experiment, data showed that three tested plant extract, thyme and anise oil generally effective in controlling pre-post emergence damping-off and significantly decreased the root rot incidence compared with the control. And increasing yield component, total soluble sugars, sucrose percent in root and sugar purity as compared with Rizolex fungicide

Keywords:sugarbeet,soilbornepathogens(S.rolfsii,R.solaniandF.oxysporum),essential oils and plant extract.

INTRODUCTION

Sugar beet (*Beta vulgaris* L) is a second important sugar crop after sugar cane in Egypt, due to the great consumption of sugar, It is covering about 40 % of the sugar requirements out of the total needs of the world. Also, it's considered as industrial crop to produce various products as alcohol, other many products as well as green forage for animal feed. It is wide adaptability to grown in poor, saline alkaline and calcareous soils. It is commercially cultivated in northern temperature zone i.e. between 30 – 60 latitudes north.

Under Egyptian Agricultural condition, it has been cultivated as a commercial crop science 1982 in Kafr El-Sheik Governorate with plantation area about 16,943 faddan in growing season 2006 the plantation area covered about 167.800 faddan that produced a total amount of 355-421 ton sugar (Egyptian sugar experts association, December 2006. Agriculture policy aims to enlarge the plantation area to cover 250,900 faddan to decrease the shortage between the sugar production and consumption by 90%. One of the most important factors affecting the productivity of sugar beet is the numerous root diseases at all stages of growth that affect directly on sucrose content (Fahim *et al.*, 1981; Elkholi, 1984; Abada, 1994;Mosa and Elkholi, 1996; El-Kazzaz *et al.*, 1999; Esh, 2000; Gouda, 2001; Buttner,

2004 This investigation was conducted to study: Screening the inhibitory effect of plant extracts and essential oils against the isolated pathogens. Evaluation of the recommended concentrations of all treatments on seedling blight, disease incidence, disease severity, and quality characters under greenhouse and field conditions.

MATERIAL AND METHODS

Pathogenic Fungi:
Fungal pathogens (S.rolfsii,F.oxysporum and R.solani) were isolated from diseased sugar beet roots.

Host plant
Seeds of kawmira sugar beet cultivar obtained from the North Delta sugar company, Egypt. These were surface sterilized in 5 %sodium hypochlorite for 3mintesthen rinsed for several in sterilized distilled water.

Laboratory experiment:

The inhibitory effect of essential oil and plant extract on linear growth of pathogenic fungi:

The inhibitory effect of 7commercial essential oil of Camphor, thyme, anise, lettuce, ground nut, rocket and caraway oil (at 0.5 ,1,2%concentration) .In addition, 8 extract of higher plant species belonging to 7 different plant families. These plants are *pimpinelle anism ,Giycyrrhiza glabara, Nigella sativa, Eruca. sativa, eugenia caryophyllus ,Artemisia Judaica, Allium cepa and Allium sativum* One ml of the different tested plant extracts were separated and mixed with 9 ml of PDA medium before solidification to give an adequate previously (25.50,75%concentration) than poured in sterilized Petri dish. Three replicates for each concentration were inoculated at the center with equal disc (5mm diameter) taken from 7 days old culture of each fungus (*R. solani, F. oxysporum and Sclerotium rolfsii*) individually, the plates were incubated at laboratory temperature. Linear growth of the tested pathogenic fungi was measured after the diameter of the growth in control treatment reached to 9 cm by taking two perpendicular diameters in cm and averaged it.

Greenhouse experiment:

III.5.3. Effect of seed dressing with different plant extracts and essential oils on disease incidence:

Different treatments, which showed high reduction on mycelal growth of pathogenic fungi in laboratory experiment, were used for greenhouse experiments. Healthy sugar beet kawmira cultivar seeds were soaked for 12 hours in recommended concentration of each treatment treated seeds were air-dried and ten seeds were sown in each pots containing tested fungi at the rate of 2 % of the soil weight. Five pots were used for each particular treatment. Seed soaked in sterilized water were sown in the same method as a control. Disease readings were taken i.e., pre-, post damping-off, root rots.

III.6. Field experiments:

Field experiments were conducted in randomized complete block design with 3 replicates under natural infected fields during 2006 and 2007

winter growing seasons to study the effect of, essential oils and plant extract, on damping-off (at 15,45 days of planting time) disease incidence and disease severity at harvest time (180 days of planting time). In addition, yield component i.e. total soluble solids (TSS), sucrose percent and sugar purity were also estimated. TSS was estimated in fresh roots using the hand refractometer according to McGinnis (1982). Sucrose percent was estimated according to A.O.A.C. (1990) by adding 173 ml 3 % lead acetate to 26 g from sample representing the interior of the roots. After filtration, sucrose percent was measured by the aid of saccarometer. Purity percent was calculated by dividing the sucrose percent by TSS.

RESULTS

II. Effect of plant extract on linear growth of pathogenic fungi:

Table (1): Effect of plant extract on linear growth of pathogenic fungi.

Extracts		R. Solani		F. oxysporum		S. rolfsii	
		L.G	RED%	L.G	RED%	L.G	RED%
Control		9.0	0.0	9.0	0.0	9.0	0.0
Nigella Sativa	25	7.26	22.94	7.03	21.84	9.0	0.0
	50	4.53	45.18	4.63	48.51	6.76	26.29
	75	3.93	56.29	4.46	50.36	3.33	62.96
Eruca Sativa	25	9.0	0.0	6.03	32.95	9.0	0.0
	50	5.9	38.14	5.3	41.11	9.0	0.0
	75	4.56	49.25	5.0	48.14	6.4	28.51
Engenea caryophylus	25	2.53	71.85	3.6	59.99	6.3	29.29
	50	0.0	100	2.9	67.77	0.0	100
	75	0.0	100	0.0	100	0.0	0.0
Artemisia Judaica	25	9.0	0.0	6.43	28.51	6.53	27.40
	50	4.83	44.07	5.3	37.40	2.5	72.22
	75	3.86	57.03	4.7	47.77	0.0	100
Elycyrrhira glabra	25	7.8	13.33	7.57	15.92	6.43	28.51
	50	5.5	38.88	6.86	23.7	5.53	38.51
	75	4.4	51.11	6.1	32.22	0.0	0.0
Allium Cepa	25	3.7	58.88	3.93	56.29	2.8	68.14
	50	2.7	69.99	2.67	70.36	0.0	100
	75	1.27	85.92	1.2	86.66	0.0	100
Pimpinella anism	25	8.1	9.99	7.7	14.44	9.0	0.0
	50	7.1	20.73	7.6	26.67	4.1	54.44
	75	6.0	39.99	5.7	37.03	0.6	93.70
Allium Sativum	25	7.1	20.36	6.3	29.62	2.3	74.44
	50	4.1	53.7	5.03	47.77	0.0	100
	75	2.76	69.25	3.1	65.55	0.0	100
L.S.D	5%	0.41	-	0.50	-	0.46	-
	1%	0.55	-	0.67	-	0.61	-

From the mentioned results indicated in table (1) the tested plant extracts differed in their reaction against pathogenic fungi. These. Garlic, Onion, Clove and Artemisia extract showed completely inhibited mycelial growth of *S.rolfsii* at 75% concentration. Clove showed complete inhibition on *R.solani* at 50% and at 75% on *F.oxysporum*. Garlic showed 85.92% inhibition on *R.Solani* and 86.66 on *F.oxysporum* onion extract showed

69.25% on *R.solani* and 65, 55 on *F.oxysporum* followed by Artemisia extract. Nigella, Anise, liquarice extract as well as Rocket seeds extracts had slight effect on mycelial growth inhibition. Garlic, onion and Artemisia extract were prepared for further studies.

III. Screening of the antagonistic effects of some commercial essential oils against pathogenic Fung:

Table (2): Antifungal activity of some commercial essential oil against pathogenic fungi.

		R. Solani		F. oxysporum		S. rolfsii	
		L.G	REDUCTION	L.G	RED	L.G	RED
Control		9.0	0.0	9.0	0.0	9.0	0.0
Camphor	0.5	9.0	0.0	9.0	0.0	5.9	33.69
	1.0	9.0	0.0	5.8	35.55	0.0	100
	2.0	3.4	62.22	4.7	41.11	0.0	100
Thyme	0.5	5.7	37.03	4.46	50.36	2.76	69.25
	1.0	0.0	100	1.4	84.07	1.2	86.66
	2.0	0.0	100	0.0	100	0.0	100
Anise	0.5	0.8	91.10	4.9		1.1	87.77
	1.0	0.0	100	0.0	100	0.0	100
	2.0	0.0	100	0.0	100	0.0	100
Lettuce	0.5 1.0 2.0	ND	-	ND	-	ND	-
Ground nut	0.5 1.0 2.0	ND	-	ND	-	ND	-
Rocket	0.5 1.0 2.0	ND	-	ND	-	ND	-
Caraway	0.5 1.0 2.0	ND	-	ND	-	ND	-
L.S.D	5%	0.42	-	0.49	-	0.57	-
	1%	0.56	-	0.65	-	0.77	-

ND=not detective Reduction=% inhibition in linear growth.

In table (2) show that the antagonistic effects of 7 commercial oils against *R.solani*, *F.oxysporum* and *S .rolfsii* at three concentration (05 -1-2%).The completely inhibition in linear growth obtained by three essential oils thyme, Anise and Comphor oil on S.rolfsii. R.solani and F.oxysporum mycelium linear growth were completely inhibited at 1% by both thyme and anise oil. On the contrast, four essential oils (lettuce, ground nut, rockets and caraway) did not cause any antagonistic effect against three pathogenic Fungi.

Effect of essential oil and plant extract as seed soaking on damping off and root rot diseases caused by *R. solani*.

Table (3): Effect of essential oil and plant extracts as seed soaking on damping off and root rot diseases caused by *R. solani*.

Treatments	Damping -off		Survival	Root rot	
	Pre-	post		D. incidence	D. Severity
control	44	28	28	60	31
Anise oil	12	14	74	10	4
Thyme oil	8	14	78	10	5
Garlic extract	14	16	62	20	7
Onion extract	22	20	58	20	8
Artemisia extract	24	28	48	30	11
Rhizalex.thirm	6	12	72	10	3
L.S.D 5%	10.15	10.39	16.24	31.92	7.55

Data in table (3) show that when seeds were treated as seed dressing and seed soaking with Rhizolex -thiram recommended dose before sowing, showed the highest percentage of survival plants and decreasing disease incidence (10%) obtained by followed by essential oils .Garlic cloves extract proved to be the most effective extract on damping off, root rot (20% disease incidence and 7% disease severity) followed by onion extract. Artemisia extract had the lowest effect on disease incidence 30%, Disease severity 11% and damping off 42%).

Effect of essential oil and plant extract as seed soaking on damping off and root rot of sugar beet caused by *F.oxysporum*.

Data presented in table (4) showed that seed soaking in essential oil and plant extract gave significant reduction on disease symptoms.

Table (4): Effect of essential oil and plant extract as seed soaking on damping off and root rot of sugar beet caused by *F.oxysporum*.

Treatments	Damping -off		Survival	Root rot	
	Pre-	post		D. incidence	D. Severity
Control	38	28	34	60	41
Anise oil	14	14	72	10	20
Thyme oil	18	16	66	10	20
Garlic extract	22	18	60	20	30
Onion extract	26	22	52	20	30
Artemisia extract	30	24	56	40	40
Rhizalex.thiram	8	12	80	10	5
L.S.D 5%	11.27	9.03	16.02	13.59	20.70

Fungicide and Anise oil gave the highest reduction damping off (20.28%) and root rot (10%) followed by thyme oil. Garlic clove extract and onion extract were moderate in their effect. Artemisia extract gave the lowest percentage of reduction.

Effect of essential oil and plant extract as seed soaking on *S .rolfsii* root rot of sugar beet:

Data in table (5) revealed that, seed soaking in Anise oil and Fungicide were the highest in surviving plants compared with control. All tested treatments decreased pre and post emergence damping off, increased percent of surviving plants and reduced root rot. Fungicide, Anise oil and thyme oil were equal in their effect on disease incidence%, but in disease severity gave (5, 7, 8%) respectively.

Table (5): Effect of essential oil and plant extract as seed soaking on damping off and root rot of sugar beet caused by *S. rolfsii*.

Treatments	Damping -off		Survival	Root rot	
	Pre-	post		D. incidence	D. Severity
Control	42	26	32	60	42
Anise oil	16	14	70	10	7
Thyme oil	18	16	66	20	8
Garlic extract	26	18	56	20	8
Onion extract	28	18	54	30	16
Artemisia extract	32	20	48	50	28
Rhizalex.thirm	16	10	74	10	5
L.S.D 5%	11.69	8.90	18.39	10.95	18.47

Garlic extract showed 56% on survival plants, 20% on disease incidence and 8% on disease severity as thyme oil followed by onion extract. Artemisia showed the less effect on damping-off and root rot.

Table (6): Effect of natural additions on seedling blight and root rot diseases of sugar beet plant under field condition

Treatment	Damping-off		Disease incidence		Disease severity	
	1	2nd	1st	2nd	1st	2nd
Garlic extract	6.67	4.50	3.66	3.33	2.4	2.5
Onion extract	8.89	6.67	4.33	4.66	3.23	3.83
Artemisia extract	11.11	8.89	5.66	6.33	3.83	4.33
Anise oil	4.44	4.44	2.66	2.0	1.5	1.33
Thyme oil	4.44	6.67	3.0	3.0	3.06	2.1
Rhizolex-thiram	4.44	2.22	0.66	1.33	0.26	0.53
Control	15.5	17.08	20.33	19.66	40.33	42.67
L.S.D 5%	5.37	6.06	1.50	2.02	1.29	1.53
1%	7.27	8.19	2.02	2.74	1.74	2.06

Effect of treatments on sucrose, T.s.s and purity Percentage of sugar beet.

Effect of different treatments on yield components juice quality parameters are total soluble solids percentage (T.S.S %) , sucrose percentage and purity percentage. These parameters are widely affected by internal and external factors.

The results obtained in table (7) showed that Tss% and sucrose % positively affected Anise oil showed, significant increasing onT,S.S and sucrose percent in the 1st and 2nd season as fungicide . Thyme oil and onion extract showed improving in increasing in yield components. The higher the

sucrose percentage n the higher the purity percentage the higher the sugar extraction.

Table (7) Effect of some plant extract and essential oils on sucrose, T.s.s and purity Percentage of sugar beet.

Treatment	Sucrose		T.s.s		Purity	
	1st	2nd	1st	2nd	1st	2nd
Garlic extract	18.98	18.42	22.15	22.53	85.98	84.73
Onion extract	19.23	19.65	21.73	21.82	88.49	90.14
Artemisia extract	17.32	17.53	21.76	22.59	79.54	77.62
Anise oil	20.18	19.99	23.05	23.05	89.07	90.67
Thyme oil	19.19	19.51	21.88	22.33	87.52	87.47
Rhizolex-thiram	20.08	19.98	21.99	21.99	92.24	92.26
Control	13.51	11.77	19.06	17.98	65.17	62.84
L.S.D 5%	1.88	2.09	2.007	2.88	7.85	211

DISCUSSION

Plant extracts and their constituents in some species are known to have antifungal properties among 8 plant extract tested *allium sativum* which provided to be the most effective growth inhibitors for all fungi tested, suppressing mycelium linear growth of all tested fungi by 65.5% to 100%. These results agree with many workers who reported the antifungal activity of garlic extract against these fungi (El-Shami *et al.,* 1995; Carcia and Lawas, 1990). The high antifungal activity of garlic extract possibly due to some sulfer containing compounds alliin [(+) –s- allyl –L- Cystine sulphoxide]. Alliin is hydrolyzed to sulfenate, pyruvate and ammonia by alliinase enzyme 2 mol of sulfenate gives allicin which identified and as antifungal by many researcher. Gorlic extract also contain antifungal ajoene [(E, Z)- 4, 5, 9-tri – thiadodeca- 196,11- triene- 9- oxide]. These reported by many researchers (Lawson *et al.,* 1991). A cepa gave complete inhibition of S.rolfsii at 50% and 85% inhibition on *F. oxysprum* and *R. solani* at 75%. We noticed that some plant extracts had slight or no effect on the myceilal growth on the tested fungi. Pimpinella anism extract caused moderate reduction in the linear growth of *R.solani* and F.oxysporum, but it strongly inhibited linear growth of s. rolfsii by 93% T 75%. The aqueous extract of Glycyrrhiza glabra highly reduced the linear growth of *s.rolfsii* by 100% at 75% only by 51, 32% on *R. solani* and *F. oxysporum* respectively. Artemisia judiaca gave complete inhibition of *s.rolfsii,* but showed moderate reduction in other fungi as well as other extracts. The above mentioned results indicated that the tested plant extracts differed in their reaction against fungi. The differences might be due to the concentration of active ingredient and the presence of antifungal like substance in plant material. These results agree with those reported by (Agha, (1992); Zedan (1993)). The efficiency of soaking seeds in garlic and onion and Artemisia plant extracts in controlling sugar beet root-rot disease caused by *R. solani, F. oxysporum* and *S. rolfsii* was studied under pot experiment. Garlic cloves extract proved to be the most effective antifungal substances when used as seed soaking before soaking, followed by onion

extract. In this respent, Artemisia extract had the lowest effect. These effects might be due to the absorption and translocation of Active substance into seeds or seedling tissue and the remain of active during the seedling stage. When most of the disease occurs. The mentioned results which presented in some plant extract have a great biological value which obtained in lab.

In field experiment, data showed that three tested plant extract were generally effective in controlling pre-post emergence damping-off and significantly decreased the root rot incidence compared with the control.

Garlic extract was a promising treatment against pre and post emergence damping-off and root rot diseases followed.

By onion extract. Artemisia showed less effect on disease readings in correlation of antifungal substances as alkoids, tennins, coffic acids and solubility in water (Qasem and Abou- blan, 1996)

the result of the work indicate that, from Tested essential oil, three essential oils (anise, thyme and camphor essential oils). The completely inhibition of the growth of test phytopathogens was studied at lab condition on plates 9cm diameter for these oils. There 4 essentials no antagonistic effect against the studied fungi at three concentration. Arise oil gave complete inhibition at 1.0% concentrate on three soil borne pathogens, moreover, thyme oil gave complete inhibition on R. solani at 1.0% and on *Fusarium. oxysporum* as well as *S.rolfsii* at 2%. Camphor oil gave 62% inhibition on *R.solani*, and 47.8 inhibition on *F. oxysporam* and complete inhibition at 1.0% on *S. rolfsii.*

These a highly fungi toxic show that there is relationship between chemical structure and ils antifungal effect which might be due to the presence of monoterpenes hydrocarbons, α - terpinene and P- cymene coffeic acids and tannins aliphatic aldehyde, phenolic – oH groub and it can easily from hydrogen bond, with active sites of enzymes. These findings in agreement with Zambonelli *et al.* (1996); who mentioned that thyme led to a complete inhibition of R. solani) investigated that eucalyptus oil was effective against F. oxysporum and *S. rolfsii.* In addition, the results concluded that the essential oils act as antimicrobial agents due to main characters, the first is their natural origin to be safety to environment, the second that it is difficult for the pathogens to develop resistance to such a mixture of oil components.

REFERENCES

Abada,K.A. (1994)Fungi causing damping-off and root rot on sugar beet and their biological control with *Trichodermm harzianum* .Agriculture, Ecosystem and Environment,51(3):333-337.

A.O.A.C., Association of official analytical chemisis (1990). Official methods analysis of the association of official analytical chemistis. Washinton, 25. D.C., USA.

Buttner,G.,B.Pfahler and B.Marlander (2004) . Greenhouse and field techniques for testing sugar beet for resistance to Rhizoctonia rot and crown rot. Plant breeding, 123(2)158-166.

Carcia, R.P., and Lawas, M.V. (1990): Potential plant extract of Azolla fungal pathogens .Philippine Agricultural 73: 343 – 348

Esh, A.M.H.E. 2000.studies on some sugar beet root diseases in Egypt. Fac. Agric. Zagazig .Univ., 287pp.

El-shamy, Mona A.; F.A..fadil .;K.A .tawfik. ;A.R .Sirry andM.M.El-zayat. (1985). Antifungal property of Garlic clove juice compared with fungicidal treatment against *Fusarium* wilt of watermelon .Egypt J .phytopathology,17(1)55-62.

EL-KHOLI, M.M.A. (1984). studies on fangal disease of sugar beet in A.R.E.ph.D thesis,fac.Agric Ain Shams univ.,183pp.

El-kazzaz ,M.K;M.A .Hassan;M.M.Badr and K.E.Ghoniem (1999). Studies on sugar beet root rot disease in northen Nile Delta .J.Agric.Res..,Tanta Univ.,25(2):122-131.

Gouda,M.I.M. (2001). Studies on some sugar beet root diseases .ph .D .thesis ,Fac .Agric .kafr Elshiekh univ.150pp.

Fahim,M.M;M.A.Kararah ,A.A.El-Gharabawi and K.A.M.Abada (1981). Studies on fungi causing root rot of sugar beet with special reference to *Sclerotium rolfsii* .Egypt.J.Phytopatholgy.,13:1-2.

Lawson,L.D.,G.wood and B.G.Hughus (1991). HPLC analysis of allicin and other thiosulfinates in garlic clove homogenates. Plant med.75:263-270.

MC Ginnis, R.A. (1982). Beet sugar technology. 3 rd edn. Beet sugar development foundation for Collins, 855 pp.

Mosa,A.A.;ABD-EL-sayed,w.m,;EL_KHolliM.M.A. (1996). Biological control of Rhizoctonia damping-off of sugar beet by *Pseudomonas fluorescence* .Arab universities journal of Agricultural sciences 5(2)433-447.

Qasem,j.R.andH.A.Abu-Blan. (1996). Fungicidal activity of some common weed extracts against different plant pathogenic fungi .J .phytopathology 144:157-161.

Singh, R.K., and Dwivedi. (1990). Fungicidal properties of neem and blue gum against *Sclerotium rolfsii* .a root rot pathogen of barley .Acta Botanica indica 18;260-262.

Zambonelli ,A.: Zechini,A. ,A .,Bianchi ,A.,and Albasini ,A., (1996). Effects of essential oils on phytopathogenic fungi in vitro. Journal of phytopathology 144:491-494.

Zedan.A.M. (1993). Antifungal properties of certain plant extracts with A special reference to the possibility of controlling onion white rot disease using Eucalyptus robusta leaves .Egypt .J.App.Sci.,8(12);574-589.

تـاثير بعض المستخلصات النباتيـه والزيـوت علـي مقاومـة مـوت البـادرات وعفـن الجذورالمتسببة عن بعض فطريات التربة في بنر السكر.

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****معهد بحوث امراض النبات - مركزالبحوث الزراعية.**

تم دراسة القدرة التثبيطية للمستخلصات النباتية على المسببات المرضية الفطرية وكانت النتائج:

أعطى ٧٥% من مستخلص الثوم ، البصل، القرنفل، والشيح تثبط كامل النمو الميسليومى للمسبب المرضى ***S.rolfsii***، واعطى لمستخلص القرنفل تثبط تام ***R.hizoctonnia solani*** عند تركيز ٥٠% وعند ٧٥% على الفطر ***F.oxysporum*** مستخلص النوم أعطى ٨٥,٩٢% تثبط للفطر ***Rhizoctonia solani*** ، ٨٦,٦٦% للفطر ***F.oxysporum*** أمـا بـاقى المستخلصات أظهرت قدرات اقل فى تثبيط المسببات المرضية

-تم إجراء اختبار القدرات التضادية لبعض الزيوت العطرية على المسببات المرضية وجاءت النتائج أعطى زيت الينسون تثبط تام ١٠٠% أعلى الفطريات الثلاثة عند تركيز ١% زيت الزعتر تثبيط تام للمسبب المرضى ***Rhizoctonia solani*** عند تركيز ١%، وثبط تام للفطر ***S.rolfsii***، ***F.oxysporum*** عند تركيز (٢%) .أدى زيت الكافور إلى التثبط الكامل للفطر ***S.rolfsii*** تحت تركيز (١%) وعند ٢% أعطى تثبيط ٦٢,٢٢% للفطر ***R.solani***، ٤١,١١ للفطر ***F.oxysporum*** أما زيت الخس والفول السودانى لم تبدى أى قدرة على تثبيط المسببات المرضية الثلاثة. في كل من الصوبة والحقل استخدام الزيوت العطرية بتركيز ٢% أعطى أعلى تأثير في مقاومة الفطريات الثلاثة بالمقارنة بالمستخلصات النباتية حيث أعطى زيت الزعتر- والينسون بتركيز ٢% المرتبة الثانية في تقليل معدل موت البادرات وتقليل نسبة الإصابة وشدة الإصابة أما المستخلصات احتلت المستوى الثاني وكان أفضلها مستخلص البصل والثوم عند تركيز ٧٥%.