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PATHOGENIC FUNGI AND NEMATODES AFFECTING ROOTS OF CUCUMBER PLANTS GROWN IN COMPACTED RICE STRAW BALES COMPARED WITH NATURAL SOILS.

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ABSTRACT

The cultivations of cucumber seedlings , Hesham cv ., on compacted rice straw bales were carried out in unheated plastic greenhouses in EL – Nuberia / Beheira Governorate and Abo – Khalifa / Ismailia Governorate during the winter season of 2007 . The occurrence of basal stem rot, root rot, wilt and root knot nematodes in cucumber plants grown in rice straw bales (mean of the two locations) reached 1.05, 0.62, 0.35 and 0.27 %, respectively. However, the corresponding figures for cucumber plants grown in natural infested soil under the same conditions were 12.37, 11.52, 23.3 and 16.62 %, respectively. *Fusarium oxysporum* and *Pythium ultimum* were the most common microorganisms invading cucumber roots as they recorded the highest rates during isolation reached about 48 and 36 %, respectively. *Rhizoctonia solani* and *Fusarium solani* occurred in less frequency recorded 24 and12 %, respectively of total count of fungal colonies developed from 25 tested samples. Pathogenicity test proved that all pathogens are pathogenic to cucumber causing pre and post emergence damping off, root rot and wilt of adult plants. Determination of pathogenic nematodes in natural soil and rice straw bales recorded the presence of 360 juvenile (J2) of *Meloidogyne* spp. and 70 juvenile (J2) of *Tylenchorhynchus* sp. per 250 g natural soil (average of two locations). However, the pathogenic nematodes were absent in rice straw . The temperature degrees around roots in rice straw bales increased by about 3 to 5 C^o compared to those cultivated in the natural soil during the winter season. This favored the plant growth, increasing fresh weight,plant height and the development of leaves. It influenced the number of fruits and finally the yield that was considerably higher in rice straw bales than that in natural soil. Due to the higher temperature in rice straw bales the phenomenon of fruit abortion was completely absent. Cucumber plants grown in rice straw bales recorded lower E.C. (ppm) value around the roots compared with natural soil during different stages of cucumber development. In the natural soil, EC value increased with increasing the plant age .Accumulation of excessive amounts of nutrients takes place in natural soil (3.63 EC equal to 2320 ppm) more than in rice straw bales (2.19 EC. equal to1400 ppm). The pH value around the roots of cucumber plants grown in straw bales ranged from 6.3 to 6.6 (slightly acidic substrate). However, the pH around the roots of cucumber plants grown in natural soil ranged from 7.4 to 8.4 (alkaline soil).
Keywords: Rice straw bales, basal stem rot, root rot, EC, pH, pthogenicity, nematode

INTRODUCTION

Chemicals are effective in controlling cucumber diseases but these chemicals are expensive and not environmental friendly. There are great efforts to reduce environmental pollution by reducing the dependence on agrochemicals to control pathogenic soil borne fungi and nematodes. Therefore, the investigators look for safe alternatives instead of pesticides for pest management and promote a healthy crop. The use of compacted rice straw bales, as an organic growing media in greenhouses is one of the

pesticides alternatives. Hassan (1988) referred to straw bale culture of wheat and barely for growing cucumber and tomato under greenhouses in some Europe and Arab countries. Choe *et al.* (1991) studied the effect of rice straw application on improvement of soil conditions for growing green pepper under greenhouses. Salama and Mohammedan (1996) studied the productivity of sweet pepper grown on agricultural wastes under protected cultivations. Jarvis (1997) reported that in the United Kingdom wheat straw bales have traditionally been used for cucumber and tomato production .The bales isolate the root system from soil infested with root disease fungi and nematodes and they warm up relatively quickly in the early part of the season.

Abdel – sattar (2004) published a new technique for the first time in Egypt for growing cucumber, tomato, pepper, melon and strawberry in greenhouses and open fields on compacted rice straw bales instead of naturally infested soil. The production of rice straw annually in Egypt reached about 5 million tons which causes serious pollution when disposed by burning every year. According to the literature the lignin, hemicellulose and cellulose contents of rice straw were about 12%, 28% and 60 %, respectively (Stahl and Ramadan 2007).These contents are not attractive or favorable for soil fungi and nematodes .In the same time, the raw material of rice straw is very cheaper, so it could represent a good substrate for sowing instead of natural soils. The present investigation deals with the possible use of rice straw bales as a soil less cultivation medium for cucumber plants under greenhouse conditions, thus escaping the problems inherent in the natural soils.

MATERIALS AND METHODS

Fermentation of compacted rice straw bales and transplanting:

Compacted rice straw bales (50 cm height x 70 cm width x 120 cm length) were first irrigated for six hours for washing soil particles, and then the dissolved fertilizers ammonium and potassium sulphate and phosphoric acid 85 % were injected daily through the drip irrigation system, 10-12 days before planting for rice straw fermentation. Cucumber Hesham cv. seedlings with two or three true leaves were transplanted in the fermented rice straw bales in two locations The distances between plants were 50 cm apart (plant density was 2.3 plant per square meter) and the plants were watered by the drip irrigation system until the end of season. Sowing cucumber seedlings in compacted rice straw bales under greenhouse conditions was carried out in the two locations; El-Nuberia –Beheira Governorate and Abo-Khalifa -Ismailia Governorate during the winter season 10-15 Nov.2006. However, sowing in naturally infested soil under greenhouse conditions was severed as a control in each location.

Fertilization:

The nutrition management in rice straw baled culture was similar as the sandy soil culture. The exception to the sandy soil culture was the higher use of nitrogen as soon as the rooting process started in rice straw bales (C: N ratio 98: 2, Salama and Mohammedan, 1996). The fertilization scheme with

N, P, K and Mg depended on the physiological status of cucumber plants during different stages of development. The daily doses of different dissolved fertilizers according to Nassar and Perry (1987) were injected into the drip irrigation water.

Occurrence of basal stem rot, root rot, wilt and root knot nematodes:

Incidences of basal stem rot, root rot, wilt and root knot nematodes on /in roots of cucumber plants at different stages of plant growth in compacted rice straw bales as compared with sowing in natural soil under greenhouse (9 x 60 m^2 including about 1250 plants)conditions were recorded in one greenhouse in each location

Isolation and identification of associated fungi and nematodes:

Wilted cucumber plants showing root rots and basal stem rots were collected from Nuberia /Beheira and Abo- Khalifa / Ismailia greenhouses. The infected plants grown in natural infested soil and rice bales were washed with tap water and their roots were cut into small pieces. Under aseptic conditions, the root pieces were surface sterilized in 3 % sodium hypochloride for 2 min. After washing in several changes of sterile distilled water, the root pieces were dried between folds of sterile filter papers. The pieces of roots were moved to PDA media and incubated at 27 ^oC for 7 days. A purified culture of each isolate was obtained by using single spore or hyphal tip techniques. Identification of isolated organisms was carried out according to keys of Waterhouse (1968), Van Der Plaats – Niterink (1981), Barnette and Hunter (1987), Moubasher (1993), Booth (1977) and was confirmed by Mycol .Res.and Dis. Survey Dept., Pl. Path. Res. Inst., ARC, Giza.In the same time identifications of associated nematodes were kindly confirmed by Nematode Dept,Pl.Path.Res.Inst., A.R.C,Giza..

Pathogenicity tests:

The isolated pathogen were tested for their pathogenic capabilities on Hesham hybrid cultivar of cucumber during winter 2007 season under greenhouse conditions. Sterilized pots 20 cm in diameter were potted with autoclaved light loam soil, and infested with inocula at the rate of 5%, except in the case of *Rhizoctonia solani* which was inoculated at the rate of 2 %. Inocula were prepared by growing the isolates on autoclaved barley grain medium and incubated at 28 ^oC for 3 weeks .Four pots for each treatment and five surface sterilized cucumber seeds were sown in each pot, one week after soil inoculation. Pots containing non-infested soil mixed with fungi free sterilized barley medium were used as control .The pots were irrigated when necessary and examined daily. The percentage of pre and post emergence damping off was recorded and re-isolation of the pathogenic fungal isolates from infected plants was carried out according to Koch postulates.

Vegetative growth characters:

Some important growth parameters of cucumber plants at different stages after sowing such as stem length (cm) , number of leaves /plant , fresh weight / plant (g) as well as fruit yield at 120 days as affected by sowing in rice straw bales under greenhouse conditions as compared with natural soil were continuously recorded .

Total soluble solids:

Few drops (2-3 drops) of the filtrated cucumber fruit juices through Whatman filter paper were placed on the plate of a hand refractometer. The percentage of total soluble solids was determined in both cucumber fruits grown on rice straw bales and natural sandy soil under greenhouse conditions.

Determinations of temperature degrees, electric conductivity (EC) and pH levels in rhizosphere of cucumber plants:

Temperature degrees in rhizosphere of cucumber plants, electric conductivity (EC) in nutrient solution and around root system beside pH levels were determined by thermometer , EC-meter and ph-meter, respectively in rice straw bales and compared with check plot cultivated on natural soil under greenhouse conditions in both the two locations.

Statistical analysis :

The collected data were statistically analyzed using two factorials of completely Randomized block Design . Treatments were compared at 0.05 and 0.01 level of probability LSD **(Steel and Torrie 1960)**

RESULTS AND DISCUSSION

1- Incidence of basal stem rot, root rot, wilt and root knot nematodes on / in roots of cucumber plants sowing in rice straw bales:

The percentage of naturally infected cucumber plants grown in rice straw bales varied than those grown in natural infested soil as well as in the two locations. Data presented in Table (1) indicate that the occurrence of basal stem rot , root rot , wilt and root knot nematodes in cucumber plants grown in rice straw bales reached (mean of the two locations) 1.05 , 0.62 , 0.35 and 0.27 % , respectively . However, the corresponding figures for cucumber plants grown in natural infested soil under the same conditions were 12.37, 11.52, 23.3 and 16.62 %, respectively (Fig. 1). The infection with basal stem rot and root rot of cucumber seedlings grown in rice straw bales might be attributed to contaminated rice straw with soil particles or through contaminated irrigation water or from latent infection in transplants . On the other hand, determination of pathogenic and free living nematodes (non – pathogenic) in rice straw bales and natural soil revealed the presence of 360 juvenile (J2) of *Meloidogyne* spp. and 70 juvenile (J2) of *Tylenchorhynchus* sp. per 250 g natural soil. Injuries caused by nematode infections facilitate and increases the susceptibility of the plant to invade with the pathogenic fungi which can enter the basal stem tissues through epidermal wounds and develop a localized rot. However, the pathogenic nematodes were absent in rice straw bales (Table1). In the same time, free living nematodes (non pathogenic) were recorded in both natural soil and rice straw bales.

Fig. (1): Symptoms of cucumber wilt at different stages (A1 *P.ultimum* A2,A3 *F. oxysporum*) , the disease started on lower leaves which became dried and then the hole plant wilted within 3-5 days (B) and typical symptoms of nematode infection appeared as yellowing on the lower leaves and extend to the upper leaves (C).

Table (1): Incidence of basal stem rot, root rots, wilt and root knot nematodes on /in roots of cucumber plants ,at different stages as affected by sowing in rice straw bales under greenhouse conditions .

Stages (days after transplanting)	Sowing in rice straw bales								Sowing in natural infested soil							
	Percentage of incidence								Percentage of incidence							
	Basal stem rot		Root rots		Wilt		Root knot		Basal stem rot		Root rots		Wilt		Root knot	
	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I
15	0.35	0.30	0.0	0.0	0.0	0.0	0.0	0.0	7.20	9.5	0.50	0.55	0.0	0.0	0.0	0.0
30	0.45	0.20	0.0	0.0	0.0	0.0	0.0	0.0	3.40	1.55	0.50	1.85	0.0	0.0	0.0	0.0
45	0.30	0.25	0.10	0.0	0.0	0.0	0.0	0.0	0.40	0.50	2.20	3.15	0.0	0.0	0.90	0.80
60	0.0	0.0	0.25	0.15	0.10	0.0	0.0	0.0	0.0	0.0	1.90	0.30	1.80	1.50	1.80	1.60
75	0.0	0.0	0.10	0.10	0.15	0.0	0.0	0.0	0.0	0.20	3.0	0.90	4.60	3.80	1.95	1.90
90	0.0	0.10	0.20	0.15	0.10	0.15	0.0	0.0	0.90	0.10	0.10	3.10	10.20	7.20	2.90	2.40
105	0.15	0.0	0.10	0.10	0.10	0.10	0.25	0.30	0.80	0.20	2.60	2.40	9.40	8.10	8.25	10.90
Total	1.25	0.85	0.75	0.50	0.45	0.25	0.25	0.30	12.7	12.05	10.8	12.25	26.0	20.6	15.8	17.50
Mean of the two location	1.05		0.75		0.35		0.275		12.375		11.525		23.3		16.65	
L.S.D. 5 %	L=0.02 S=0.04		L=0.03 S=0.06		L=0.02 S=0.04		L=0.01 S=0.03		L=0.24 S=0.48		L=0.08 S=0.17		L=0.08 S=0.16		L=0.04 S=0.08	
L : Locations N: Nubaeria I: Ismailia S: Stages																

2- Isolation and identification of the associated microorganisms:

Samples of cucumber roots showing different rot symptoms obtained from rice bales and from natural infested soil Fig. (2) were used for isolation of the associated pathogens . Plating internal pieces of rotted tissues on PDA yielded several fungal genera. Counts of fungal colonies of identified genera of pathogens were recorded on the segmented parts of 25 roots in order to determine their frequency of occurrence. Disease symptoms observed under greenhouse conditions were also described. Data illustrating frequency of occurrence of different pathogens are shown in Table (2). As shown in Table (2) *Fusarium oxysporum* and *Pythium ultimum* were the most common pathogens invading cucumber roots as they were recorded at the highest rates of about 48 , 36 % , respectively . *Rhizoctonia solani* and *Fusarium solani* occurred in less frequency recorded 24 and 12 %, respectively of total counts of fungal colonies developed from 25 tested samples.

Table .2 Symptoms of soil borne cucumber diseases and occurrence of pathogens isolated from disease cucumber roots (natural infection).

Isolated Pathogens	Symptoms of soil borne cucumber diseases	Occurrence (%)
Fusarium oxysporum	Pre and post emergence damping off of seedlings, wilting of older plants within 3-5 days. Vascular discoloration of the roots and stem is common.	48
Pythium ultimum	Damping off, basal stem rot and root rots of seedlings and mature plants.	36
Rhizoctonia solani	Damping off, root rots of seedlings and older plants.	24
Fusarium solani	Crown and foot rot.	12

3- Pathogenicity test with the isolated pathogens :

Pathogenicity tests of the isolates obtained during the present work were tested on cucumber seeds of Hesham cv under the greenhouse conditions at Faculty of Agriculture Farm; Suez Canal University revealed that *R. solani* recorded the higher percent of pre emergence damping off followed by *P. ultimum, F. oxysporum* and *F. solani* (Table3). However, *F. oxysporum* showed the higher percent of post emergence damping off followed by *R.solani, P. ultimum*, and *F. solani*. It's also clear that mortality of cucumber plant was higher with *R.solani* and *F.oxysporum* (55 % for each), followed by *P. ultimum* (45 %) and *F. solani* (30%).Generally , pathogenicity test proved that all microorganisms are pathogenic to cucumber causing pre and post emergence damping off, root rot and wilt of adult plants.

Fig. (2): Fusarium wilts of greenhouse grown cucumber plants caused by *Fusarium oxysporum* (A), basal stem rot caused by *P.ultimum* (B), root knot nematodes(C) and fruit abortion noticed only on natural soil (D) .

Table (3): Pathogenicity tests with the isolated pathogens *F. oxysporum* , *F. solani,* R*. solani* and *P. ultimum*, the causal pathogens of damping off, wilt and root rots on Hesham cucumber plants.

Inoculated pathogens	(Damping- off ,wilt and root rots)		Mortality %	Survivals %
	Pre - emergence	Post – emergence ,wilt and root rots of adult plants		
F.oxysporum	10	45	55	45
R. solani	20	35	55	45
P.ultimum	15	30	45	55
F. solani	10	25	30	70
Control	0.0	0.0	0.0	100

4- Vegetative characters of cucumber plants grown on compacted rice straw bales as compared with natural soil:

Better growth and an increase in stem length, No. of leaves /plant and fresh weight / plant were observed on cucumber plants grown in rice straw bales compared with those in the control plot under greenhouse conditions(Table.4). It was found that plants grown in rice straw bales recorded the higher values of plant fresh weight at 30, 45, 60 and 75 days after sowing as compared with the control in natural soil. The same trend was observed with plant height and No. of leaves /plant at the different stages of plant development .The better growth of cucumber plants may probably be due to the affect of the rice substrate on the chemical and physical properties. These results are in agreement with Gasperavicute (1977) who reported that the growth of cucumber plants were more vigorous when grown in loose or pressed straw than soil .

Table (4): Some vegetative growth characters of cucumber plants, at different stages, as affected by sowing in rice straw bales and natural soil under greenhouse conditions (mean of the two locations).

Treatment	Stages (Days after transplanting)											
	Fresh weight /plant (g)				Plant height (cm)				No. of leaves /Plant			
	30	45	60	75	30	45	60	75	30	45	60	75
Sowing in rice straw bales	64.5	151.3	228.1	280.2	36.2	76.4	111.2	145.2	7.9	17.1	19.7	27.8
Sowing in natural soil	45.2	108.2	171.5	238.0	28.5	57.3	85.0	114.5	6.1	12.2	15.9	24.5
L.S.D 5%	S=17.93		St =25.35		S=0.11		St = 0.15		S=023		St=0.33	

S=soil St = stages

5- Fruit yield ,percentage of fruit abortion / plant and total soluble solids content in cucumber fruits as affected by sowing in rice bales in the two locations, Nuberia / Beheira and Abo-khalifa / Ismailia Governorates:

It is evident from Table (5) and illustrated in Fig.(3) that cucumber plants grown in rice straw bales showed a significant increase in the total yield as a mean number of fruits /m^2 (123.3 and 142.8 fruits) and as a weight (13.6 and 15.7 kg /m^2) for the two locations, Nubaeria /Beheira and Abo-khalifa / Ismailia, respectively as compared with those grown in natural soil (78.1 and

101.5 fruits /m^2 and as a weight 8.5 and 11.2 kg /m^2, respectively). It is also clear that the total yield was higher in Nuberia /Beheira greenhouse compared with Abo- Khalifa / Ismailia in both rice straw bales and natural soil. These results were in agreement with those of Hartman and Waldhor (1973), Sady (1979) and Omel، Chenko *et al*. (1983) . They found that using artificial substrates increased the total yield of cucumber plants. Due to the higher temperature in rice straw bales the phenomenon of fruit abortion was completely absent on cucumber plants during winter season .However the fruit abortion reached 7 and 9 % /plant in plants grown in natural soil of Nuberia / Beheira and Abo-Khalifa / Ismailia, respectively (Fig.2.D).

On the other hand , there was an increase in the total soluble solids contents in cucumber fruits grown in rice straw bales of Abo – Khalifa and EL – Nuberia greenhouses (3.85 and 4.52, respectively) as compared with those of natural soil (3.50 and 4.43 , respectively). The increases of T.S.S may be play a role on improving the quality of cucumber fruits.

The total soluble solids may be affected by mineral fertilization as mentioned by Deswal and Patil (1984) and Muller *et. al*. (1986).

Fig. 3. Different stages of cucumber plants grown in compacted rice straw bales showing the normal vegetative growth and good fruit quality.

Table (5): Fruit yield ,percentage of fruit abortion /plant and total soluble solids (TSS)content in cucumber fruits as affected by sowing in rice straw bales under greenhouse conditions.

No. of fruits /m2 and weight kg /m2 , 120days after sowing					
Treatment	**Location**	**No.of fruits/ m^2**	**Weight kg/m^2**	**TSS**	**Percentage of fruit abortion /plant**
sowing in rice straw bales	Nuberia / Beheira	142.8	15.7	4.52	0.0
	Abo- Khalifa/ Ismalia	123.3	13.6	3.85	0.0
sowing in natural soil	Nuberia / Beheira	101.5	11.2	4.43	7.0
	Abo-Khalifa/ Ismalia	78.1	8.5	3.6	9.0
L.S.D 5%		**S= 0.12 L=0.12 S*L=0.14**	**S= 0.82 L=1.0 S*L=0.95**	**S= 0.079 L=0.86 S*L=0.09**	

S=Sowing methods – L=location , S*L=interaction between sowing and location

6- Temperature, electric conductivity (EC) and pH level around roots of cucumber plants as affected by sowing in rice straw bales under greenhouse conditions:

Temperature degrees in rhizosphere of cucumber plants, electric conductivity in nutrient solution and around roots as well as degrees of pH level around roots of cucumber plants as affected by sowing in rice straw bales were studied. It appears from Table (6) that the temperature degree around roots in rice straw bales increased by about 3 to 5 C^o compared to those cultivated in the natural soil during the winter season. This favored the plant growth, increasing root length and the development of leaves .It influenced the number of fruits and finally the yield that was considerably higher in rice straw bales than that in the natural soil under greenhouse conditions.

Table (6): Temperature , electric conductivity (EC)and pH around roots of cucumber plants as affected by sowing in rice straw bales compared with natural soil under greenhouse conditions (mean of the two locations).

Date of the test	**Tem(^oC) at 15-20 cm depth**		**pH around roots**		**E.C in nutrient solution (ppm)**	**E.C.* around the roots in straw bales (ppm)**	**E.C. the around roots in natural soil (ppm)**
	In straw bales	**In natural soil**	**In natural soil**	**In straw bales**			
10/12/2006	23.6	21.2	6.3	7.4	445	720	690
20/12/2006	25.2	21.6	6.4	7.5	530	730	750
30/12/2006	24.7	21.4	6.5	7.6	550	750	770
10/1/2007	23.6	20.2	6.3	7.7	640	1010	780
20/1/2007	20.1	17.8	6.2	7.8	660	1400	1240
30/1/2007	21.8	17.3	6.5	7.9	670	1430	1870
10/2/2007	19.5	15.1	6.6	8.1	780	1380	1910
20/2/2007	20.5	16.2	6.5	8.2	760	1400	1980
1/3/2007	21.5	15.8	6.5	8.3	760= 1.19 EC.	1400= 2.19 EC.	2320= 3.63 EC.
L.S.D.5%	**D=0.054 S=0.03 DxS=0.07**		**D=0.054 S=0.03 DxS=0.07**		**D=7.52 S=4.18 Dxs=5.42**		

D=Date – S = Sowing methods – DxS= intetraction between Date and sowing

*** One EC equal to 640 ppm.**

Due to the higher temperature in rice straw bales the phenomenon of fruit abortion was completely absent. The arising of higher temperature in rice straw bales might be due to fermented and degraded straw.

Data in Table (6) indicate also that plant grown in rice straw bales recorded lower E.C value (2.19 equal to 1400 ppm) around the roots compared with natural soil during different stages of cucumber development. In the natural soil, EC value increased with increasing the plant age.

The EC value reached 3.63 which equal to 2320 ppm around cucumber roots in natural soil, three months after sowing. Accumulation of excessive amounts of nutrients takes place in natural soil more than in rice straw bales. This confirmed that sowing cucumber plants in compacted rice straw bales avoid possible salinity that may develop in rhizosphere of plants in natural soil. These results agreed with Ruizernaars (1984) who reported that cucumber plant growth was enhanced by the lower EC. Value. The degree of pH around the root in straw bales ranged between 6.3 to 6.6 (slightly acidic substrate). However, the pH around the roots of cucumber plants in natural soil under greenhouse conditions ranged between 7.4 to 8.4 (alkaline soil). It is known that the acidity of the soil play a role in the growth and development of cultivated plants. The pH 6-6.5 is favorable for dissolving the insoluble salts (Gaspervicute,1977). So, sowing cucumber plants in rice straw bales (pH 6.3 -6.6) instead of natural soil (pH 7.4 – 8.4) can solve the conditions of alkalinity and salinity in rhizosphere of cucumber plants.

On the bases of the above results, it could, therefore be concluded that using compacted rice straw bales as a growing media instead of naturally infested soil, can improve the production of cucumber and minimize the incidence of soil borne diseases and nematodes infection under greenhouse conditions in Egypt .The technical advantages of growing cucumber plants in rice straw bales are listed as fallows:

*Good control of pathogenic soil borne fungi and nematodes without pesticides use.

*Avoid possible alkalinity and salinity that may develop in rhizosphere of cucumber plants in natural soil.

*The higher temperature arising from fermented and degraded straw favors vegetative growth, flowering, fruit setting and the phenomenon of fruit abortion is avoided or minimized.

*Avoiding the serious pollution every year in Egypt when disposed about 5 million tons rice straw by burning.

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الفطريات والنيماتودا الممرضة التي تؤثر علي جذور نباتات الخيار النامية علي بالات قش الأرز المضغوطة مقارنة بالتربة الطبيعية

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تم زراعة بادرات الخيار صنف هشام علي بالات قش الأرز المضغوطة بالصوبات البلاستيكية الغير مدفأة بالنوبارية محافظة البحيرة وأبو خليفة محافظة الاسماعلية أثناء الموسم الشتوي لعام ٢٠٠٧ . بلغت النسبة المئوية لمرض عفن قاعدة الساق واعفان الجذور والذبول ونيماتودا تعقد الجذور لنباتات الخيار النامية علي بالات قش الأرز ١,٠٥-١,٦٢-٠-٣٥.٠-٢٧.٠ % علي التوالي بينما الصورة المقابلة لهذه الأمراض في نباتات الخيار النامية بالتربة المصابة طبيعيا تحت نفس الظروف بلغت١٢,٣٧- ١١,٥٢ - ٢٣,٠٣ -١٦,٦٢ % علي التوالي . كان, *P.ultimum*, *F. oxysporum* من أكثر المسببات المرضية مصاحبة للجذور حيث حققت اعلي معدل في العزل علي البيئات الصناعية يصل الي ٤٨ % و٣٦ % علي التوالي بينما يليهم الفطريات *F.solani*, *R. solani* بمعدل اقل يتراوح ما بين ١٢-٢٤ % من مجاميع المزارع الفطرية التي تم عزلها من ٢٥ عينة جذور مصابة . تجارب العدوى الصناعية بالكائنات الدقيقة الأربعة المعزولة من جذور النباتات المصابة علي بذور الصنف هشام تحت ظروف الصوب بمزرعة كلية الزراعة جامعة قناة السويس برهنت علي ان هذه المسببات ممرضة لنباتات الخيار وتسبب موت البدرات تحت وفوق سطح التربة واعفان الجذور والذبول للنباتات البالغة كذلك أوضحت تجارب العدوى الصناعية أن معدل موت نباتات الخيار بلغ ٥٥% عند الإصابة بأي من الفطرين *R. solani* و *F. oxysporum* بينما حقق *P.ultimum*٤٥ % موت للنباتات يليه *F.solani* ٣٠ %.

كذلك اوضحت النتائج الخاصة بتقدير النيماتودا الممرضة بالتربة الطبيعية وكذلك ببالات قش الارز وجود٣٦٠ طور يرقي ثاني (طور معدي) للنيماتودا .*Meloidogyne* spp و٧٠ طور يرقي ثاني للنيماتودا .*Tylenchorhynchus* sp لكل ٢٥٠ جم تربة طبيعية بينما النيماتودا الممرضة كانت غير موجودة في بالات قش الأرز المضغوطة.

علي الجانب الأخر فان النباتات النامية علي بالات قش الأرز سجلت زيادة في المجموع الخضري وزيادة في كمية المحصول بجانب تحسين كمية ثمار الخيار الناتجة وتختفي ظاهرة الاجهاض للثمار بالنباتات النامية علي قش الأرز مقارنة بتلك النباتات النامية في التربة الملوثة طبيعيا .

درجات الحرارة حول جذور النباتات النامية علي بالات قش الأرز تزيد بنحو ٣ : ٥ درجات مئوية مقارنة بتلك النباتات النامية علي التربة الطبيعية أثناء موسم الشتاء .هذه الزيادة في درجات الحرارة ببالات قش الأرز تناسب نمو النباتات وتزيد من طول الجذور وتكشف الأوراق كما أنها توثر علي عدد الثمار وأخيرا كمية المحصول التي تزيد زيادة معنوية علي بالات قش الأرز مقارنة بالتربة الطبيعية . نباتات الخيار النامية علي بالات قش الأرز سجلت كذلك اقل قدرة علي التوصيل الكهربائي (جزء في المليون) حول الجذور مقارنة بالتربة الطبيعية في مراحل نمو الخيار في حين ان قيمة القدرة علي التوصيل في التربة الطبيعية تزداد بزيادة عمر النبات وان تجمع الكميات الزائدة من الأملاح تأخذ مكانها بالتربة الطبيعية (٢٣٢٠ جزء في المليون) وهي اعلي من تلك المسجلة علي بالات قش الأرز والتي بلغت ١٤٠٠ جزء في المليون وهذا يؤدي الي تجنب تراكم الملوحة التي قد تظهر بمنطقة الريزوسفير حول النباتات المنزرعة في التربة الطبيعية في نفس الوقت درجة الحموضة حول جذور النباتات النامية علي بالات قش الأرز تتراوح ما بين ٦,٣ الي ٦,٦ (وسط حامضي خفيف) بينما يتراوح ما بين ٧,٤- ٤.٨ (تربة قلوية) حول جذور نباتات الخيار النامية بالتربة الطبيعية وعليه فان زراعة نباتات الخيار علي بالات قش الأرز (٦- ٥.٦) يمكن أن تحل مشكلة القلوية والملوحة في منطقة الريزوسفير لنباتات الخيار .