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ACTIVITY OF CERTAIN MICROORGANISMS ON ALLEVIATING THE BLIGHT DISEASE (*Stemphylium vesicarium*) OF ONION PLANT

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ABSTRACT: *Onion (Alluim cepa L.) is a principal component of the Egyptian table. Stemphylium vesicarium causes tip necrosis and large purple blotch on leaves of onion (Blight disease) which reduce the yield quality. Biologists oriented their efforts to control the disease biologically to limit the manipulation of chemical pesticides. This investigation uses some microorganisms such as the mixtures of Serratia + Bacillus and Serratia + Pseudomonas, as well as the metabolites of Anabaena oryzae + Nostoc muscorum , Azolla pinnata , and Pleurotus columbinus. The most effective biological treatments were the combination between Serratia and Bacillus followed by Pleurotus filtrate which diminished the disease severity to an extent comparable to the chemical pesticide. High content of phenolic compounds was found in Pleurotus filtrate. Cyanobacteria followed by Pleurotus filtrates were the auspicious treatments in respect to the total yield, marketable yield and bulbs weights of onion plants being 16.56 ton/fed., 14.18 ton/ fed. and 104 g for cyanobacterial filtrate treatment and 16.43 ton/fed., 13.95 ton/fed. and 100.33 g for Pleurotus filtrate treatment compared to the control (14.7, 12.86 and 96.0 in the second season , respectively).*

Key words: *Allium cepa L. , biocontrol , Stemphylium vesicarium, Bacillus, Serratia, Pseudomonas, Anabaena, Nostoc, azolla, Pleurotus.*

INTRODUCTION

In Egypt, onion (*Allium cepa* L.) is the main important and oldest vegetable crop. The Egyptian onion is famous allover the world because of its early appearance and superior quality. Onion is cultivated mainly for food, but also for traditional medicine. It is attacked by many diseases, which vary according to region, season and variety. Diseases can affect the production, harvesting, processing and marketing, which reduce the quality and yield, and thereby increase the cost of production, and the export potential. Tomaz and Lima (1988) reported that purple blotch and *Stemphylium* blight are the most important diseases in Northern India, which causes considerable losses in seed crops as well as bulb crops. It can cause severe damage, especially to the onion seed crop and losses of about 80 to 85% of the crop by affecting leaves and seed stalk. Hussein *et al*. (2007) stated that onion plants (*Allium cepa*) cv. Giza 6 grown in several commercial fields in Upper Egypt (Assiut Governorate) exhibited symptoms of blight on the leaves and seed-stalks. Initial symptoms on leaves consisted of tip necrosis followed by small white and/or large purple spots. Such observed symptoms resembled *Stemphylium* blight symptoms on onion leaves, which are caused by *S. vesicarium* (Wallr.) Simmons. The disease is wide spread in Asia and Europe and has been recorded previously on onion plants in South Africa and in New York. Many attempts were carried out for controlling *Stemphylium* blight on onion using cultural practices and chemical control (Aveling and Snyman, 1993). Certain chemicals, such as salicylic acid (SA) and 2,6-dichloroisonicotinic acid (INA), potassium salts, amino butyric acid (BABA) and Bion were reported to induce systemic acquired resistance (SAR) in plants (Oostendorp *et al*., 2001). Biologists found that microorganisms play an effective role in controlling and reducing the disease impact. Nalisha *et al*. (2006) and Okay *et al*. (2013) noticed that *Bacillus subtilis* produces antifungal substances which have inhibitory effects on a wide range of fungi and *Serratia* has chitinase which degrade the chitin composing the cell wall of fungi. Beside nitrogen fixation , cyanobacteria such as *Anabaena* and *Nostoc* isolated from various aquatic and terrestrial habitats showed antimicrobial activity (Yadav *et al*., 2012). Wang and Ng (2004) reported that some antifungal peptides were produced from fruiting bodies of the edible mushroom like *Pleurotus eryngii*. Some microorganisms were used by Hussein *et al*. (2007) as bioagents to inhibit the growth of *Stemphylium vesicarium* mycelia, those were *Bacillus subtilis*, *Pseudomonas fluorescens*, *Trichoderma harzianum*, *Gliocladium* sp. and *Saccharomyces cerevisiae*.

The present work aims to throw the light on the biological control of *Stemphylium* blight on onion by some cyanobacterial filtrates besides some other bacterial strains compared to chemical pesticide.

MATERIALS AND METHODS

Two field experiments were conducted on onion crop (*Allium cepa* cv, Giza 20) at Nubaria Agricultural Research Station Farm, during 2009/2010 and 2010/2011 winter seasons. Soil samples, from the experimental site, were determined for pertinent characters (Page *et al*., 1982). Results of the analyses are presented in Table (1).

Table (1) : Mechanical and chemical properties of the experimental soil

Soil Characters		Value
Mechanical analysis	Sand %	58.57
	Silt %	24.84
	Clay %	16.59
	Soil textural class	Sandy loam
Organic matter (%)		0.19
CaCO3 (meq/l)		22.43
Soil pH (1:2.5 soil/water susp.)		8.3
EC (dS/m) (1:2.5 soil/ water extr.)		2.17
Soluble cations (meq/l)	Ca^{+2}	6.69
	Mg^{+2}	1.73
	K^{+}	4.29
	Na^{+}	10.37
Soluble anions (meq/l)	CO^{-2}	-
	HCO_3^{-}	5.71
	Cl^{-}	11.72
	SO_4^{-2}	5.57
Soluble micronutrient (meq/l)	Zn	1.14
	Fe	1.37
	Mn	1.09
	Cu	0.67

Onion seedlings were transplanted on December 23th, 2009 and December 21st,2010. The experimental plot area was 7 m^2(1/600 fed.), each plot consisted of four ridges, 50 cm wide and 3.5 m long. Seedlings were planted on both sides of the ridges and spaced at 10 cm. The recommended doses of phosphorus fertilizer 45 kg P_2O_5/fed. as superphosphate and 100 kg K_2SO_4/fed. as potassium fertilizer were applied during soil preparation for all plots. Nitrogen fertilizer (90 kg N/fed.) as ammonium nitrate was added in case of control, monthly in three equal doses after transplanting. All other cultural practices including irrigation and control of weed, pathogen diseases and pests of onion production in the calcareous soils at Nubaria region were applied.

1. Chemical pesticide:

Traditional (commercial) name: Mitor Cu 50% WP.

2. Cyanobacteria and growth conditions:

Cyanobacterial species, namely strains of *Anabaena oryzae*, *Nostoc muscorum*, and *Azolla pinnata* were obtained from the Microbiology Department, Soils, Water and Environ. Res. Inst., (ARC), Giza. The strains were maintained in BG11 medium (Rippka *et al*., 1979). Cultures were incubated in a growth chamber under continuous illumination (2000 lux) and temperature of 25 °C ± 2 °C. *Azolla pinnata* was grown on modified Yoshida medium (Yoshida *et al*., 1976).

3. Preparation of algal culture and *Azolla pinnata* aqueous filtrates:

After 30 days of incubation, each algal biomass, in its medium, was put in an electric mixer , then the mixture of biomass with its medium was filtered and the extracted free cells were kept at 4°C till field application. *Azolla pinnata* was harvested from the culture medium and mixed well with distilled water and diluted by 1:1 (w/v) using an electric mixer, then filtered to obtain the extracted free cells and kept at 4 °C till field applications.

4. Bioagent sources and growth conditions:

Bacillus subitlis, *Pseudomonas fluorescence* and *Serratia* sp. were obtained from the Microbiology Department, Soils Water and Environ. Res. Inst., ARC, Giza. The bacterial strains were grown on King Medium (King *et al*., 1954), gently shaked on a rotary shaker incubator at 30 +/- 2 °C up to reach the log phase (ca. 10^7cfu ml^{-1}).

5. *Pleurotus columbinus* source and growth condition:

The white rot fungus (*Pleurotus columbinus*) was obtained from the Unit of Mushroom Production , Faculty of Agriculture , Ain Shams University .*Pleurotus columbinus* was grown on potato dextrose medium, in a rotary shaker at 200 rpm for 7 days (Martin, 1950) . After propagation , the growth and its medium was put in an electric mixer , then filtered and kept at 4 °C till field application.

A randomized complete block design (RCBD) with four replicates was used as an experimental layout. The allocated treatments were as follows:

T1: Control (without chemical or biological treatment).
T2: Chemical pesticide.
T3: Mixture of *Anabaena oryzae* and *Nostoc muscorum* filtrate.
T4: *Azolla pinnata* filtrate.
T5: Mixture of Serratia sp and *Bacillus subtilis* .
T6: Mixture of *Serratia* sp and *Psceudomonas fluorescens*.
T7: *Pleurotus colombinus* filtrate.

Along both seasons , the following parameters were recorded :

1- Disease severity :

The first reading of infection density was taken after 75 days of transplanting , the second reading was after 119 days of transplanting then the third reading was after 140 days of transplanting. The infection density was estimated microscopically. Ten plants were taken from each plot to calculate disease severity according to Tarabulsi *et al* (1998), applying the following equation:

% Ds = Σ(n × r)×100/5N where:
n= number of plants in each category.
r= numerical number of each category.
N= total number of examined plants.

Plants were rated for disease severity (Ds), as follows:
0 = no infection; 1= very weak infection; 2 = weak infection (tiny necrotic lesion; 3 = moderate infection (medium size lesions with corky tissue); 4 = severe infection (well developed large necrotic lesions and 5 = very severe infection (complete death of the leaf plant).

2-Vegetative growth characters:

After 120 days from transplanting, 15 plants were selected from each experimental plot for measuring plant height and number of tubular leaves per plant.

3- Days of maturity:

Number of days from transplanting to maturity was recorded. Maturity was determined by both neck softening and 50 % top down.

4- Yield and its components:

At harvest, all plants in plot were uprooted and determined for:
a- Total yield (t/fed.).
b- Marketable yield (t/fed.): represents the weight of single bulbs.
c- Average bulb weight (g).

5- Bulb quality traits encompassing :

a- Percentage of single , double bulbs and bolters : It was estimated by dividing number of single , double bulbs and blotters by the total number of bulbs per plot x 100.
b- Percentage of total soluble solids (TSS %) (that include mainly soluble sugars , amino acids and soluble minerals): It was determined using the hand refractometer .

Nitrogen, phosphorus and potassium were determined according to Jakson (1976). Total phenols were determined spectrophotometrically as described by Swain and Hillis (1959). Total carbohydrates were determined by the method of Dubois *et al.*(1956).

Soil biological activity: CO_2 evolution was determined according to Gaur *et al.* (1971). Total bacterial counts were estimated on nutrient agar using the spread plate method (Allen,1956).

Statistical analysis:

A combined analysis for the two seasons was calculated by MSTAT program. Combined average values from the four replicates of each treatment were interpreted using the analysis of variance (ANOVA).

RESULTS AND DISSCUSION

Fig. (1) reveals the effect of different biological treatments, compared to chemical pesticide, on disease severity of onion plant that infested by Stemphylium *vesicarium* throughout two agricultural seasons. The chemical pesticide was the best treatment in lowering the disease severity for the three readings in both seasons. All biological treatments had positive effects on disease severity, compared to the control but, at lower extent, compared to the chemical pesticide. The treatments of *Serratia* plus *Bacillus* followed by *Pleurotus* filtrate were the best in diminishing the disease severity comparable to the chemical pesticide in the second season among the biological treatments. Badalyan (2008) found that some species of *Pleurotus* had antagonistic effect and excrete antifungal substances against phytopathogens like *Fusarium* and *Trichoderma*. Ghasemi *et al* (2010) confirmed that chitinase isolated from *Bacillus pumilus* had antifungal activity and inhibited all tested fungi like *Rhizoctonia solani*, *Verticillium* sp., *Nigrospora* sp., *Stemphyllium botryosum* and *Bipolaris* sp. Belal *et al* . (2013) found that *Bacillus subtilis* produced antimicrobial metabolites against two fungal and one bacterial strains; *Pseudoperonospora cubensis*, *Sphaerotheca fuliginae* and *Staphylococcus aureus* that infect cucumber. Those antimicrobial metabolites mostly included fatty acids and made collapse in sporangiophor and sporangia of *P. cubensis* and conidiophore and conidia of *S. fuliginae* and also had antagonistic activity against *Staphylococcus aureus* . Nandakumar *et al.* (2002) reported that some strains of *Pseudomonas fluorescens* exudated some substances like 2,4-diacetyl phloroglucinol, iron chelating siderophore, hydrogen cyanide, lytic enzymes, such as chitinase and β-1,3-glucanase in cultures acting as antibiotics against the rice sheath blight pathogen *Rhizoctonia solani*.

Fig. (2) Shows slight differences in total bacterial counts in rhizosphere regions of the infected onion plants by *Stemphylium vesicarium* between the two seasons, in the second season counts were higher than the first. The chemical pesticide recorded the lowest bacterial numbers, compared to the biological treatments which were higher than both of the control and pesticide treatments. *Serratia* plus *Bacillus* treatment was the superior among the biological treatments, followed by *Anabaena* plus *Nostoc* filtrate treatment, while *Serratia* plus *Pseudomonas* and *Pleurotus* filtrate treatments were the lowest.

Fig. (3) Exhibits variations among all treatments in respect to the rate of CO_2 evolution in the rhizosphere of onion plants infected by *Stemphylium vesicarium*. The chemical pesticide treatment was the lowest among all treatments , due to its mortal action on soil microflora.

Cyanobacterial filtrate followed by *Pleurotus* filtrate were the uppermost treatments for CO_2 evolution among biological treatments. This might be attributed to excreting some regulating substances having the ability to control the fungal disease and promote the biological activity in the soil. Unexpectedly, the control treatment recorded high value of CO_2 rate, due to the biological activity of microflora in the plant rhizosphere. The importance of the evolved CO_2 estimation was ascertained to the soil respiration as a result to decomposition of green manures and increase the numbers of bacteria followed the carbon dioxide evolution (Haney *et al*., 2008). Trognitz *et al*. (2012) reported that the beneficial soil microorganisms stimulate the plant to resist stresses during developmental stages and could occupy niches inside the plant, which were in concurrence with pathogens, whereas deleterious microorganisms might be used for the biocontrol of weeds. Plant-associated microbial communities are essential for growth parameters like plant nutrition, resistance to biotic and abiotic stresses, plant survival and distribution.

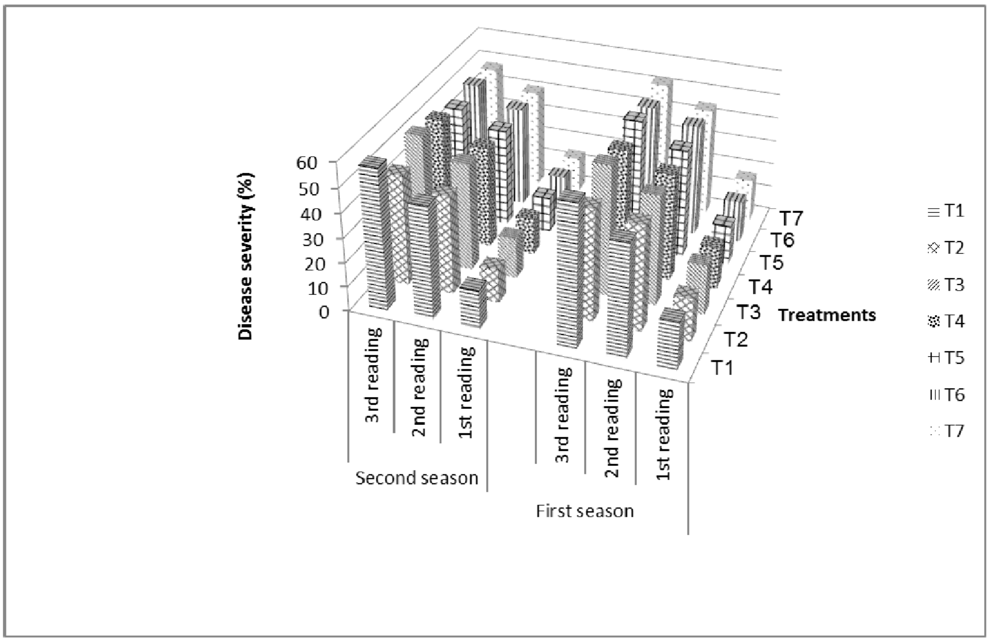

Fig. (1): Disease severity percentage of *Stemphylium vesicarium* during cultivation of onion crop due to the different treatments in the two seasons.

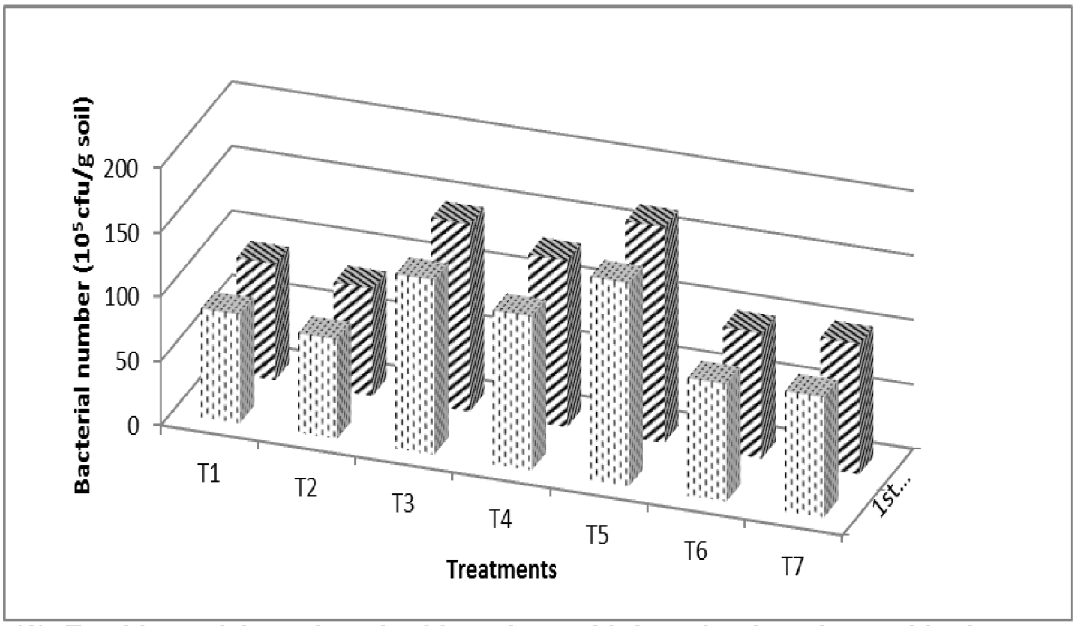

Fig (2): Total bacterial numbers in rhizosphere of infected onion plants of both seasons due to the different treatments.

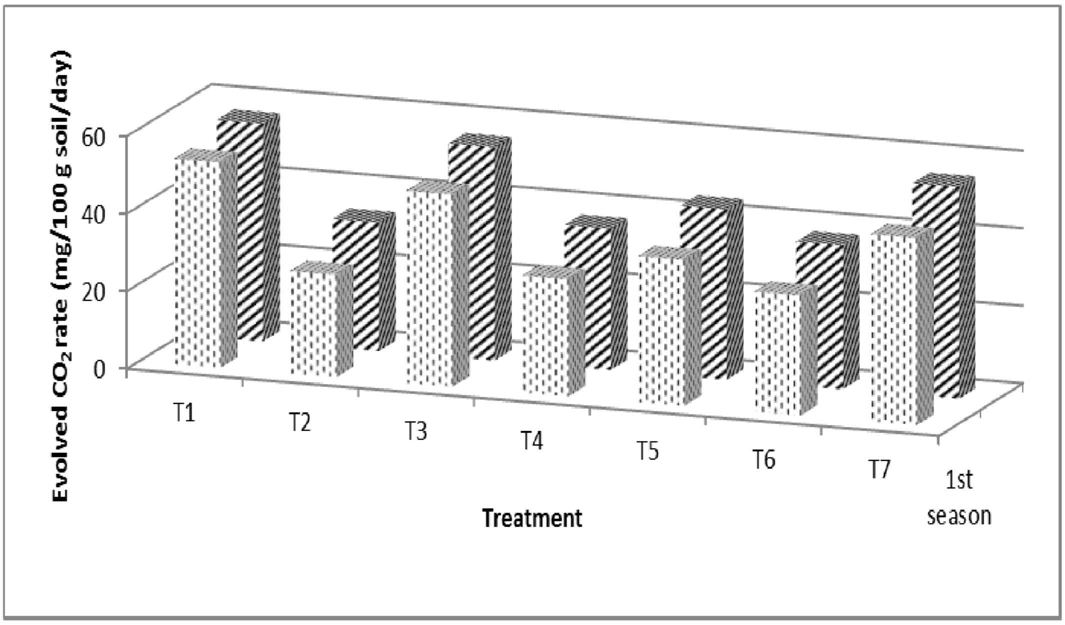

Fig. (3): CO_2 evolution in the rhizosphere of onion plant infected by *Stemphylium vesicarium* in both seasons as affected by the different treatments.

Fig. (4 a, b and c) brightens up the effect of the applied treatments on nitrogen, phosphorus and potassium contents in plants. Generally, the second season was better than the first one. The cyanobacterial filtrate followed by azolla and *Pleurotus* filtrates boosted the nitrogen absorption by the plant. In case of phosphorus, all the biological treatments were lower contents than chemical pesticide treatment. The pesticide and the control treatments were not affected by the infection by *Stemphylium vesicarium*. *Per contra* in the case of phosphorus, all the biological treatments were better in absorption of potassium than the chemical pesticide and control treatments, where cyanobacteria and azolla filtrates were the eclecticism.

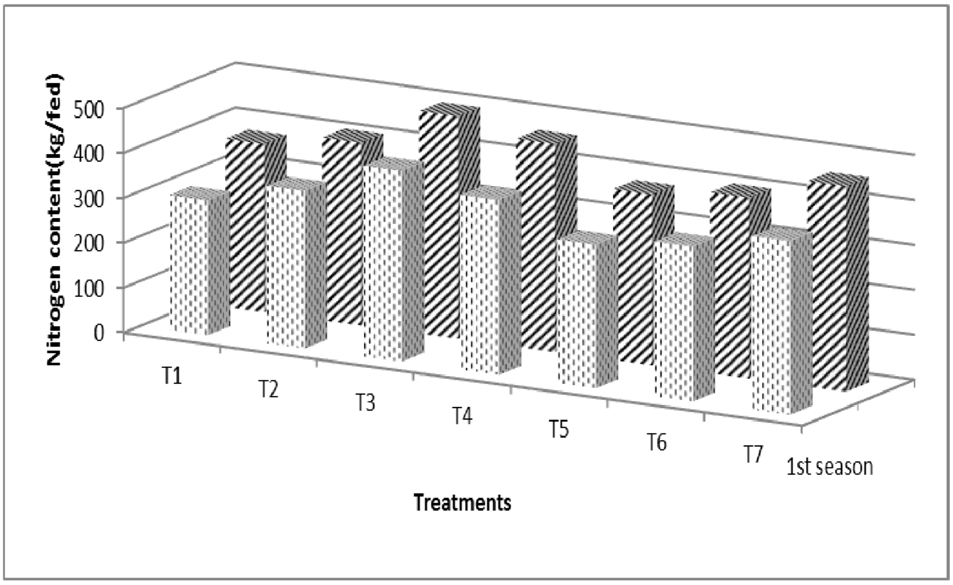

Fig. (4a): Nitrogen contents in onion plants treated by chemical pesticide and biological agents in the presence of *Stemphylium vesicarium* during the two seasons.

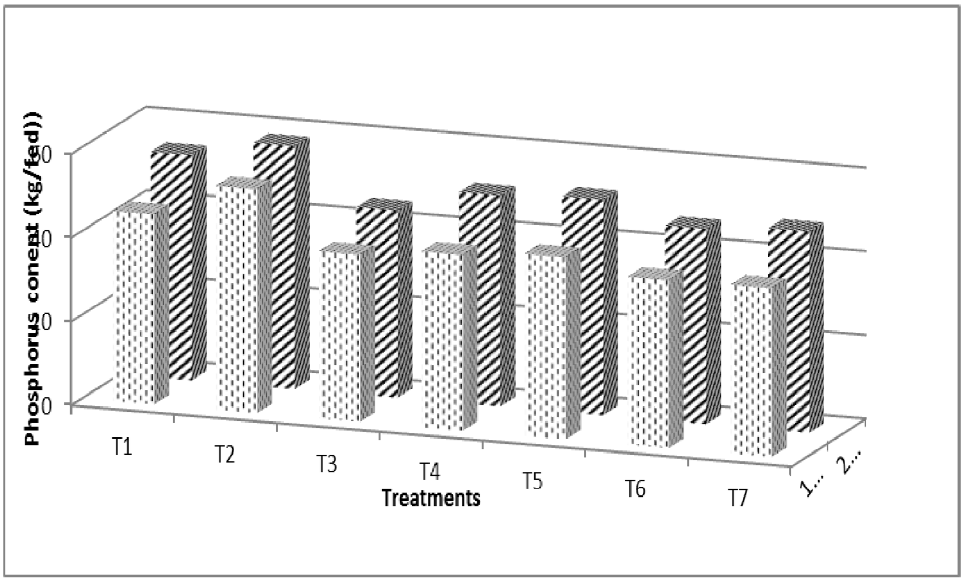

Fig. (4b): Phosphorus contents in onion plants treated by chemical pesticide and biological agents in the presence of *Stemphylium vesicarium* during the two seasons.

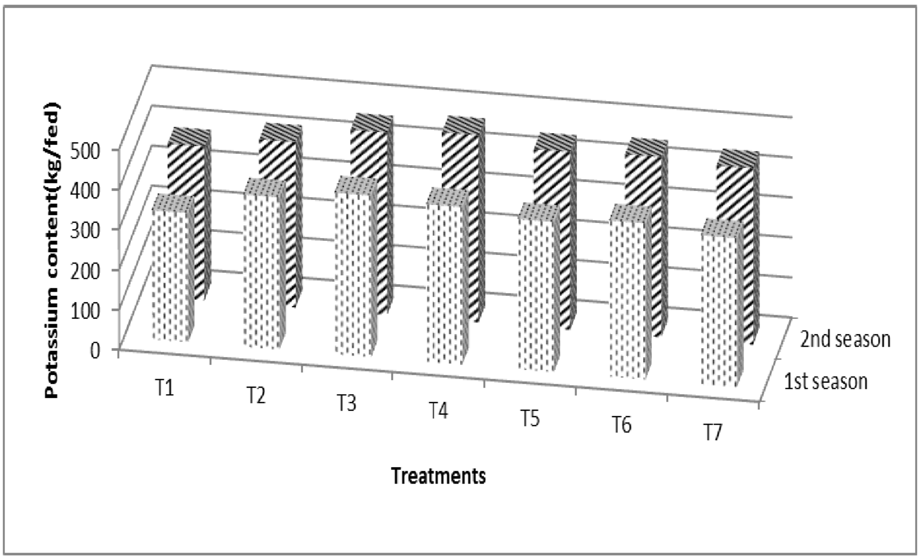

Fig. (4c): Potassium contents in onion plants treated by chemical pesticide and biological agents in presence of *Stemphylium vesicarium* during two cultivation seasons.

Fig. (5) clarifies the influence of chemical pesticide and some different biological agents on onion plants in the presence of *Stemphylium vesicarium* during the two cultivation seasons. High content of phenol was observed in the *Pleurotus* filtrate treatment, while chemical and other biological treatments showed lower values. Total phenols were not affected by by *Stemphylium vesicarium* infection and recorded highest value in the control treatment comparable the *Pleurotus* filtrate treatment. Cheng *et al.*(2013) studied the relationship between the phenolic and flavonoid contents and antioxidant, and the correlation among them. The increasing of antioxidants is due to elevating the contents of the total phenol and flavonoids that have scavenging activity of free radicals.

Fig. (6) Illustrates the effect of some bioagents on total carbohydrates in onion plants infected by *Stemphylium vesicarium* during the two seasons. All the biological treatments had positive effects on total carbohydrates. The promising treatments were cyanobacterial , azolla and *Pleurotus* filtrate treatments. The low values of total carbohydrates appeared in the control and chemical pesticide treatments. Ashraf *et al.* (2013) reported that exoploysaccharides released from some microorganisms played a role in fertility and enhancing the formation of soil micro-aggregates and contribute to building up soil physical structure, regulated nutrients and water flow from rhizosphere soil to the plant, promoted the vegetative growth, and protect the root against pathogens.

Table (2) presents some quantitative and qualitative characteristics of onion plants infected by *Stemphylium vesicarium* and treated with chemical and biological treatments, during the two seasons. The cyanobacteria followed by *Pleurotus* filtrates were the auspicious treatments in regard to the total yield, marketable yield and average of bulb weight of the onion plants in the respective seasons, where records were 16.56 ton/fed., 14.18 ton/ fed. and 104 g for the cyanobacterial filtrate treatment and 16.43 ton/fed., 13.95 ton/fed. and 100.33 g for the *Pleurotus* filtrate treatments. Time of maturity decreased as a result of the chemical pesticide reaching 161.7 days and the mixture of *Serattia* and *Pseudomonas* reached 161 days followed by the cyanobacterial and *Pleurotus* filtrates reached to 162 days for both last treatments in the first season while in the second season, the time of maturity diminished significantly by the chemical pesticide (153.3 days). The chemical pesticide and azolla filtrate increased the percentage of single bulb reaching 91 and 90.67 % respectively, followed by the cyanobacterial filtrate, mixture of *Serratia* and *Bacillus* and *Pleurotus* filtrate, which reached 89.67, 90 and 90 % in the second season, respectively.

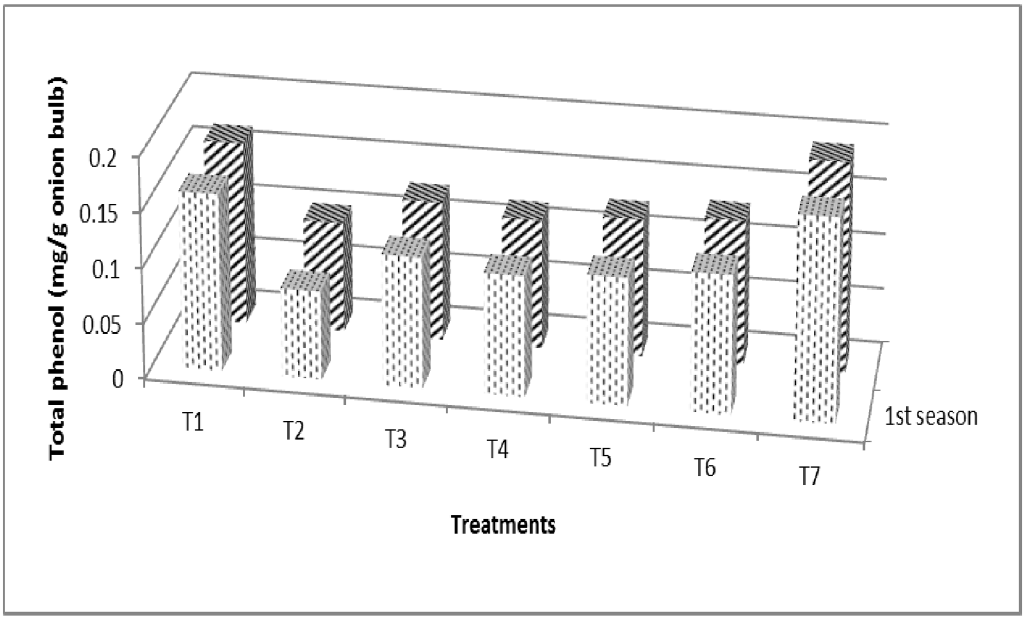

Fig. (5): Total phenols in onion plants infected by *Stemphylium vesicarium* and treated by chemical pesticide and different bioagents during the two seasons.

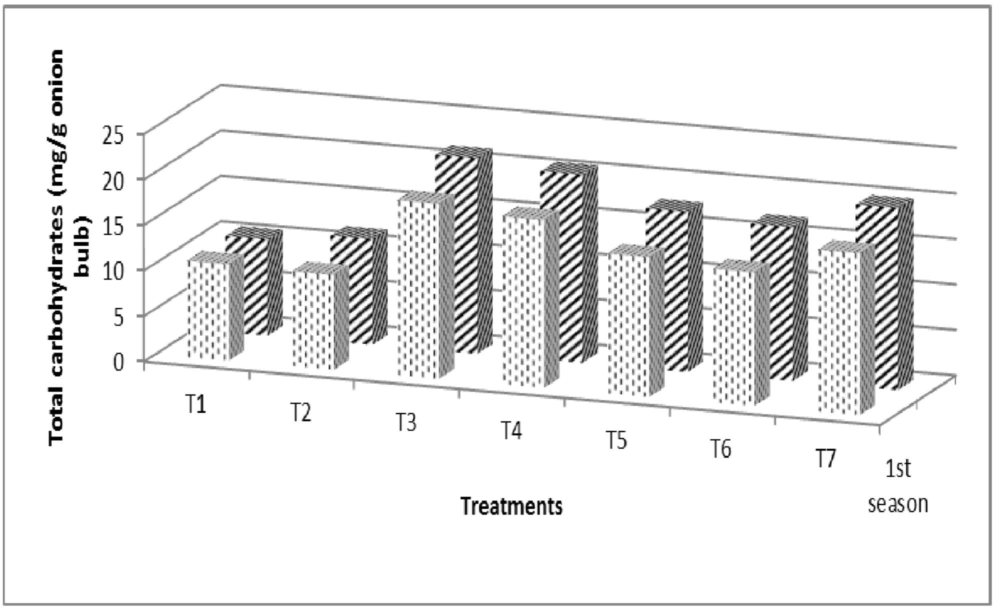

Fig (6): Total carbohydrate contents in onion plants infected by *Stemphylium vesicarium* and treated with chemical pesticide and different bioagents during the two cultivation seasons.

Table (2): Some quantitative and qualitative characteristics of infected onion plant by *Stemphylium vesicarium* that treated with some chemical and biological treatments through two seasons.

Treatment	Total yield (ton/fed)	Marketable yield (ton/fed)	Average of weight bulb (g)	Time of maturity (days)	% of single bulb	% of double bulb	% of bolters	No. of leaves/plant	Plant height (cm)
2010-2011 season									
T1	12.76 G	11.60 D	75.00 G	164.7 A	91.0 A	9.667 DE	3.333 A	6.667 EF	62.33 ABC
T2	14.97 CDE	13.89 AB	93.33 C	161.7 ABCD	88.33 ABC	12.67 BC	1.0 C	6.767 EF	62.33 ABC
T3	15.11 CDE	13.84 AB	94.33 A	162.0 ABC	83.0 D	15.67 A	1.333 BC	7.167 CDE	61.33 BC
T4	13.75 FG	12.70 ABCD	86.25 D	164.0 AB	85.33 CD	14.0 AB	1.333 BC	7.233 BCDE	63.67 ABC
T5	13.14 G	12.03 CD	84.33 G	162.7 ABC	87.67 ABC	9.667 DE	2.667 AB	6.533 F	63.0 ABC
T6	13.72 FG	12.07 CD	85.66 D	161.0 ABCD	87.67 ABC	12.33 AB	1.333 BC	7.033 DEF	60.33 C
T7	14.28 EF	12.68BCD	88.66 D	162.0ABC	86.33BCD	13.33AB	1.333BC	7.1DEF	61.67BC
2010-2011 season									
T1	14.70 DEF	12.86 ABCD	96.0 EF	155.7 BCD	89.0 ABC	9.333 DE	3.333 A	7.1 DEF	64.0 ABC
T2	15.89 ABC	13.97 AB	95.67 F	153.3 D	91.0 A	7.333 E	2.333 ABC	7.8 AB	64.33 AB
T3	16.56 A	14.18 A	104.0 E	158.0 ABCD	89.67 AB	10.33 CD	1.667 BC	7.833 A	63.67 BC
T4	15.90 ABC	13.06 ABCD	97.33 EF	154.7 CD	90.67 A	8.333 DE	2.333 ABC	7.567 ABCD	65.67 A
T5	15.26 CED	13.07 ABCD	94.33 B	156.0 BCD	90.0 AB	8.333 DE	2.333 ABC	7.167 CDE	64.33 A
T6	15.52 BCD	13.46 ABC	92.33 FG	157.0 ABCD	89.0 ABC	8.333 DE	2.333 ABC	7.6 ABCD	63.0 ABC
T7	16.43 AB	13.95 AB	100.33 EF	155.7 BCD	90.0 AB	8.333 DE	2.333 ABC	7.7 ABC	64.0 ABC
LCD at 0.05	1.032	1.493	8.133	8.474	3.932	2.559	1.634	0.5739	3.696
Main effect of years									
Mean	13.96 B	12.69 A	149.0 A	162.6 A	87.05 B	12.48 A	1.762 A	6.929 B	62.10 AB
Mean	15.75 A	13.51 A	138.7 B	155.8 B	89.9 A	8.667 B	1.524 A	7.533 A	64.14 A
LCD at 0.05	1.462	1.085	8.818	4.767	1.525	3.718	0.7932	0.2918	1.879
Main effect of treatments									
T1	13.73 D	12.23 D	85.5 E	160.2 A	90.0 A	9.5 BC	3.333 A	6.883 BC	63.17 AB
T2	15.43 AB	13.93 AB	235.5 B	157.5 A	89.67 A	10.0 BC	1.667 B	7.283 AB	63.33 AB
T3	15.84 A	14.01 A	375.8 A	160.0 A	86.33 B	13.0 A	1.5 B	7.5 A	62.5 AB
T4	14.82 BC	12.88 BCD	225.3 C	159.3 A	88.0 AB	11.17 B	1.833 B	7.4 A	64.67 A
T5	14.20 CD	12.55 CD	234.8 B	159.3 A	88.83 AB	9.0 C	3.0 A	6.850 C	63.67 AB
T6	14.62 C	12.77 CD	219.5 D	159.0 A	88.33 AB	10.5 BC	1.833 B	7.317 A	61.67 B
T7	15.35 AB	13.32 ABC	225.2 CD	158.8 A	88.17 AB	10.83 B	1.833 B	7.400 A	62.83 AB
LCD at 0.05	0.7297	1.056	5.751	5.992	2.780	1.809	1.155	0.4058	2.613

The percentage of double bulb was low in the chemical pesticide reaching 7.33 %, while all the biological treatments scord 8.33 % except the cyanobacterial filtrate gave 10.33 % in the second season. The percentage of bolters decreased by the chemical pesticide to reach 1.0 %, while all the biological treatments reached 1.33 %, except the mixture of Serratia and Bacillus which reached 2.67 % in the first, season while in the second season, the algal extract gave 1.67 %, while all the chemical and biological treatments acheived 2.33 %. The biological treatments were the best concerning the number of onion leaves. Their values were arranged, in the second season, as follows: algal extract (7.83), chemical pesticide (7.8), Pleurotus filtrate (7.7), mixture of Serratia and Pseudomonas (7.6), azolla extract (7.57), mixture of Serratia and Bacillus (7.17) and the last was control (7.1), in a descending order. Metabolite exudates excreted by microorganisms like cyanobacteria and yeasts can improve the quality and quantity of onion yield throughout the excrtion of vitamins , amino acids and plant hormones (Abdel-Raouf et al., 2012 and Shehata et al. , 2012). Vitamins like glutathione and amino acids like sulpher amino acids could significantly promote the growth and quality of green onion criteria such as shoot length, white part length, bulb diameter, leaf photosynthetic pigment, number of leaves, fresh and dry weight of onion plant (El-Awadi and Abd El Wahed, 2012). Bioactive compounds, such as auxins, gibberellins and cytokinins were produced by cyanobacteria and act as bioregulators for plant growth. These regulators can improve the total carbohydrates, proteins and chlorophyll in the plant and also increase soil organic conditions, improve soil structure, water holding capacity and improve buffering capacity against fluctuation in pH levels of the soil (Subramaniyan and Malliga, 2011).

Conclusion:

This investigation aims at controling the blight disease on the leaves and stalks of onion plant caused by *Stemphylium vesicarium*. The biological treatments had a distinctive position in enhancing the quality and quantity properties of infested plants. The second season was often better than the first one as a result of cultivation at the same location, due to the residual effect of the applied treatments. The cyanobacterial and *Pleurotus* filtrates had an obvious role in overcoming the disease and in raising the rate of CO_2 evolution in soil, content of nitrogen in leaves, crop yield , marketing yield and weight of bulbs of the onion plant, while *Pleurotus* filtrate was the best in increasing the phenol content in the leaves of onion plant. In general, biological treatments were supposed to replace the chemical pesticide, as to control the blight disease and improve the crop yield of onion quantitatively and qualitatively.

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النشاط الحيوى لبعض الكائنات الحيه الدقيقه لمكافحة مرض اللفحه (ستيميفيليوم فيسيكاريوم) لنبات البصل

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الملخص العربى

يعتبر البصل عنصرا اساسيا على المائدة المصريه ، و نظرا لما يسببه فطر ستيميفيليوم فيسيكاريوم تليفا و بقعا زرقاء على اوراق البصل التى تقلل من المحصول و تسبب صفاتا غير مرغوب فيها . و لذا وجه علماء البيولوجيا جهودهم لمكافحة المرض بيولوجيا للحد من استخدام المبيدات الكيميائيهز وقد استخدم فى هذا البحث مجموعات من الكائنات الحيه الدقيقه مثل خليط من بكتريا السيراتيا مع الباسيلس ، خليط من السيراتيا مع السيدوموناس ، و راشح خليط من سلالتي السيانوبكتريا انابينا اوريزا مع نوستوك ماسكورم ، راشح الازولا بيناتا ، و راشح فطر البلوروتس كولومبينوس لمكافحة المرض.

و اظهرت النتايج ان اكثر المعاملات البيولوجيه تأثيرا كان من خلال استخدام خليط من السيراتيا مع الباسيلس يتبعها استخدام راشح فطر البلوروتس حيث كان تأثيرهما على شدة الاصابه يقترب من المبيد الكيميائى . كما وجد ارتفاع ملحوظ فى محتوى الفينولات عند المعامله براشح فطر البلوروتس . و احتلت المعامله براشح السيانوبكتريا و يتبعها راشح الفطر مكانه مميزه فى تأثيرهما على المحصول و المحصول التسويقى و متوسط وزن البصله التى كانت نتائجها كالتالى : ١٦.٥٦ طن للفدان ، ١٤.١٨ طن للفدان ، ١٠٤ جم على التوالى بالنسبه لاستخدام راشح السيانوبكتريا ، ١٦.٤٣ طن للفدان ، ١٣.٩٥ طن للفدان ، ١٠٠.٣٣ جم على التوالى بالنسبه لراشح فطر البلوروتس بالمقارنه بالكنترول الذى كانت نتائجه ١٤.٧ طن للفدان ، ١٢.٨٦ طن للفدان ، ٩٦ جم على التوالى و ذلك من خلال الموسم الثانى.