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INFLUENCE OF BIO, ORGANIC AND NATURAL ADDITIONS ON PLANT GROWTH, CHEMICAL COMPOSITION AND CHOCOLATE SPOT IN FABA BEAN

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ABSTRACT

Laboratory and field experiments were conducted in 2006-2007 to study the effect of bio, organic and natural additions on faba bean growth, chemical composition and chocolate spot disease. The laboratory results reveald that biozeid and bioaric completely inhibited the linear growth, fungal dry weight and sporulation as well as mycelial dry weight of *botrytis fabae*, but, plant oils "cumin, cornation, garlic and rocket oils" completely inhibited sporulation of *Botrytis fabae*.

The field experiment results show that the highest increase in fresh weight was recorded with bioaric, while in dry weight the highest increase recorded with rocket oil. Plant height, number of branches, pods/plant and seeds/pod all of these parameters were increased significantly with Acadian C. plant. Concerning to the weight of 100 grains gave the highest increase with aminogreen. It is clear from those results that there is highest increase in nitrogen and Mn with garlic oil, while rocket oil is most effect addition on concentration of P, K, Zn and Fe.

The results of this experiment show that bioaric led to maximum reduction of chocolate spot disease severity this followed by biozeid, while there is no significant difference between Acadian C. plant and aminogreen. In conclusion, bio, organic and natural additions were most effective addition in increasing growth, chemical composition and yield parameters of faba bean, and decrease the disease severity of chocolate spot in faba bean.

INTRODUCTION

Faba bean (*Vicia faba*) is one of the main pulse crops grown for seed in Egypt. Due to its high nutritive value in both energy and protein contents, it is a primary source of protein in the diet of masses (Nassib et al., 1991). This strategic crop is suffering from many destructive diseases. It is attacked by more than 100 pathogens in the mediterreanean region (Hebblethwait, 1983). Chocolate spot cause mainly by *Botrytis faba* sard, and to some extract by *B. cinerea* pers. Ex. Fr is an important disease of broad bean world wide occurring almost in all regions where faba bean are grown (Rahman et al., 2002).

The disease appears as lesions on flowers, leaves and stems may be oblong elliptical of reddish to brown color. With darker margins that are fairly defined, and often a concentric circular pattern. As lesions increase in number, generally on the adaxial leaf side, they may remain small expand or merge (Harrison, 1988).

The production of faba bean in Egypt is still limited and fails to face the increasing local consumption of the crop. Therefore, increasing the crop production is one of the major targets of the agricultural policy and can be

realized by increasing the cultivated area with faba bean through introduction the crop.

Essential oil extracts have been considered as natural preservatives or food additives, and can be used as additional methods of controlling pathogens (Naidu, 2000). A variety of essential oils (EOs), the natural mixtures of volatile metabolites extracted from plants, show their biocidal effects on bacteria, fungi, viruses, protozoa, insects and plants (Kalemba and Kunicka 2003).

The problem of adequately protecting plant against the fungus by using fungicides has been complicated by the development of fungicidal resistance and/or adverse effect on growth and productivity of the host plant as well as on the accompanying microflora (Khaled et al., 1995).

Because of hazards of fungicide on public health and environmental balance, this research aimed to study the effect of bio, organic and natural additions on some morphological, physiological traits and yield & yield components of faba bean plants. We hypothesized that these additions might reduce or nullify the negative effects of chocolate spot on the growth, photosynthesis pigments, mineral constituents and yield & yield components of faba bean plant.

MATERIAL AND METHODS

Laboratory experiment:

This experiment aimed to study the effect of bio, organic and natural addition on *Botrytis fabae* linear growth, fungal dry weight and sporulation which causes chocolate spot on faba bean plants. Biozeid, bioaric, Acadian C. plant, aminogreen, novaful, cumin oil, cornation oil, rocket oil and garlic oil at the concentration of 2.5 mg/L (250 g/100L) were separately mixed with PDA medium before solidification, then poured in a sterile Petri dishes. Four plates for each concentration were inoculated with fungal disc which had been cut from the periphery of 7 days old culture of *B. fabae*. The plates were incubated at 20±1°C, linear growth (cm) of the tested pathogenic fungus (*B. fabae*) measured when particular control filled of Petri dishes by fungal mycelial growth and also a concentration used as a check.

The influence of bio, organic and natural addition on dry weight and sporulaiton of *B fabae* were tested on Czapk's broth medium in conical flask containing 20 ml broth medium amended individually with all tested concentration of each addition at 2.5 g/L. A set of similar flasks containing chemical free medium served as check. Four flasks for each concentration were inoculated with fungal disc (0.6 mm diameter) of *B. fabae* taken from 7 days old culture for each flask. After 10 days of inoculation at 27±1°C, flasks were shacked (100 rpm) for 1 hour, then 1 ml from each flask was take to determine the number of spores using haemocytometer. The rest of the flask was filtered through pre weighted whatman No. 1 filter paper, washed with distilled water and dried at 70±2°C in a vacuum oven to constant weights.

Field experiment:

A field experiment was carried out at Tag El-Ezz Research Station, Dakahlia Governorate, Egypt during winter season of 2006-2007. The experiment soil was clay loam. All Agriculture process were done. A complete

block design with three replicates. The experimental plot contains 5 ridges occupying an area of 10.5 m^2 (3.5 x 3 m). data in Table 1 showed physical and chemical properties of studied soil.
Seeds of faba bean c.v. (Giza 716) were sown in 20th November 2006. all chemical fertilizers were added as a recommended dose of ministry of agriculture, Egypt.

Table (1): Physical and chemical analysis of the soil

Physical characteristics								
Soil texture	Coarse sand (%)	Fine sand (%)	Silt (%)	Clay (%)	$CaCO_3$ (%)	EC dSm^{-1}	Field capacity (%)	Real density (g/cm^3)
Clay loam	6.2	32.6	24.7	35.5	2.4	0.32	34.3	2.66

Chemical characteristics								
pH soil paste	Organic matter (%)	CEC meq/100 g	Available nutrients (ppm)					
			N	P	K	Zn	Mn	Fe
7.6	1.42	35.2	32.3	14.4	215	1.6	7.3	12.2

Bio-additions:
As shown in Table 2 two kinds of microorganisms were used, the first "Biozed" which contain the fungus of *Trichoderma album*, and the second "Bioaric" which contain the bacteria of *Bacillus megaterium*.
Organic additions:
three types of organic addition were used, the first "Acadian C Plant" it's a kind of "marine algae extract" , and the second kind "Amino green" it's a kind of amino acids and the third kind was "Novaful" its also kind of amino acids the Acadian C. plant, aminogreen, and Novaful contents were showed in Table 2
Natural additions:
Four types of plant oils were used in this studies as a natural addition "cumin, carnation, garlic and rocket oils" extractions of essential oils was carried out using water distillation method (Baiuomy, 1997).
All bio, organic and natural additions were added at two equal doses, the first treatment after 50 days of planting, and the second additions after 70 days of planting. Each of them used by rate 250 ml/100 L water, these equal 2.5 cm^3/L, then were sprayed over the plant. The plants were sprayed till dripping using small pressure pump with the concentration of treatments above. Wetting agent was used.
Morphological characters and yield components:
Samples were taken at 90 days from planting to estimate growth parameters as: plant height, number of branches/plant, fresh and dry weight of plant shoot. At harvest, number of pods/plant, seed/pod and weight of 100 seeds were recorded.
Soil analysis:
Particle size distribution was determined using the international pipette method as described by piper (1950) – Electrical conductivity in 1:2.5

soil: water extract, pH values, O.M., Avaialble NPK, microelements Fe, Zn, and Mn, $CaCO_3$ and Real density were determined according to Jackson (1967), Hesse (1970), Dewis and Freitas (1970) and A.O.A.C. (1990).

Table (2): The bio, organic and natural addition contents

Treatments	Contents	Types
Biozeid	***Trichoderma album***	Bio addition
Bioaric	***Bacillus megaterium***	
Acadian-C plant (marine algae extract)	N 0.33% - P_2O_5 0.3% - K_2O 4% Zn 15 ppm - Fe 44 ppm - Mn 2 ppm Mg 0.1% - Cu 9 ppm - Ca 0.05% B 30 ppm - S 0.3% - Na 1% Its contains also cytocynin, auxin and gibrlin	Organic addition
Amino green (amino acid)	Contents (w/v) Total organic acid + Amino acid 20% Fe 2.9% - Zn 1.4% - Mn 0.7%	
Novaful (Amino acid)	Amino acids 29.7% N 4.30% - K_2O 5.17% - P_2O_5 618 ppm	
Cumin oil *Cuminum cyminum*	Cumin seeds (Nutritional value per 100 g) Energy 370 kcal 1570 kJ - Carbohydrates 44.24 g - Fat 22.27 g - Protein 17.81 g Water 8.06 g – Vit. A 64 µg - Vit. B1 0.628 mg - Vit. B2 0.327 mg - Vit. B3 4.579 mg - Vit. B6 0.435 mg - Vit. B9 10 µg - Vit. C 7.7 mg - Vit. E 3.33 mg - Vit. K 5.4 µg - Ca 931 mg - Fe 66.36 mg - Mg 366 mg - P 499 mg - K 1788 mg - Na 168 mg - Zn 4.8 mg	Natural addition
Carnation oil *Dianthus caryophyllus* L.	**Nutrient levels in the leaves of carnations :** Nitrogen (3.33-4.19 % N) - Sulphur (0.27-0.35 % S) - Phosphorus (026-0.40 % P) - Magnesium (0.29-0.39 % Mg) - Calcium (1.13-1.64 % Ca) - Sodium (0.10-0.50 % Na) - Potassium (2.79-4.00 % K) - Manganese (50-250 ppm Mn) - Zinc (20-60ppm Zn) - Copper (6-10 ppm Cu) - Boron (30-100 ppm B) - Molybdenum (0.10-2.10 ppm Mo) - Iron (51-120 ppm Fe)	
Garlic oil *Allium sativum* L	**Physical & Chemical Analysis** Appearance: Bright yellow oil – Odour: Strong odor of garlic - AV 1.08 - Ajoene 0.65 mg/g - Vinyl Dithiins 4.5mg/g - Allyl Sulfides 40mg/g - Specific gravity 0.9-0.94 - Purity 99% - Ash% 2.0% Max - Arsenic <2 ppm - Heavy metals (Pb) <1 ppm - Foreign materials None - Pesticide residues None. **Microbiological analysis** APC <100 /g - Yeast & Mold <100 /g - E. Coli Negative -Salmonella Negative	
Rocket oil *Eruca sativa* Mill	Nutritional value per 100 g - Energy 20 kcal 70 kJ - Carbohydrates 3.40 g - Fat 0.10 g - Protein 0.68 g - Vit. B1 0.012 mg - Vit. B2 0.039 mg - Vit. B3 0.254 mg – Vit. B5 0.165 mg – Vit. B6 0.071 mg 5% - Vit. B9 25 µg – Vit. C 14.8 mg - Ca 25 mg – Fe 0.34 mg – Mg 10 mg – P 20 mg - K 233 mg - Zn 0.28 mg	

Plant analysis:

The plant parts were dried to fine powder and 0.2 gm was wet digested with a mixture of sulphuric and perchloric acids according to Jackson (1967). N, P, and micronutrients Fe, Mn, and Zn were determined according to Chapman and Pratt (1961), Hesse (1971).

Determination of photosynthetic pigments:

The blade of the 3rd leaf from plant tip (terminal leaflet) was taken to determine photosynthetic pigments using methanol 90% for 24 h at room temperature after adding traces of sodium carbonate. Then photosynthetic pigments were determined spectrophotometrically by the equations of (Mackinney, 1941).

Disease assessment:

The disease severity of chocolate spot disease was estimated at 80 day from sowing by using the scale of Bernier et al., 1993, as follow:

1= No diseasse symptoms or very small specks (highly resistance).
3= Few small disease lesions (resistant).
5= Some coalesced lesions, with some defoliation (moderately resistant).
7= Larrge coalesced sporulating lesions, 50% defoliation and some dead plants (Susceptible).
9= Extensive, heavy sporulation, stem girdling, blackening and death of more than 80% of plants (highly susceptible).

Percentage of chocolate spot severity was calculated using the formula adopted by (Hanounik, 1986).

$$\text{Disease severity \%} = \frac{\Sigma (\text{NPC} \times \text{CR})}{\text{NIP} \times \text{MSC}} \times 100$$ Where:

NPC = No of plants in each class rate.
CR = Class rate.
NIP = No of infected plants.
MSC = Maximum severity class rate.

Statistical analysis:

All data were subjected to the proper statistical analysis of variance (ANOVA) of randomized complete block design by Gomez and Gomez (1984). Mean values of treatments were differenced by using LSD according to procedure outlined by (Steel and Torrie, 1980).

RESULTS

LABORATORY EXPERIMENTS:

Effect of bio, organic and natural addition on linear growth, fungal dry weight and sporulation

Data in Table 3 show great variation in the linear growth and mycelial dry weight as well as sporulaiton of the pathogen, biozeid and bioaric completely inhibited the linear growth, fungal dry weight and sporulation compared with check.

There is no significant difference in linear growth with Acadian C plant compared to control, garlic oil also has a best effect on inhibited the linear growth more than other treatments. In general plant oils completely inhibited sporulation of *B. fabae*.

FIELD EXPERIMENTS:

Effect of bio, organic and natural addition on faba bean morphological characteristics:

1- Fresh and dry weight:

Data in Table 4 recorded that at two types of bacteria strains (Biozed and Bioaric) showed highly significant increase in fresh and dry weight. Bioaric appeared excellent superiority in all treatments (bio, organic and natural additions) on fresh weight 113.56 g while in dry weight the highest significant increase was reduced with rocket oil 55.29 g.

On the other hand, Table 4 showed that there is no significant difference between two kinds of amino acids "amino green" 62.37 g and "novafull" 62.38 g in fresh weight, and also no significant difference between garlic oil 74.17g and rocket oil 72.40 g in fresh weight, but in dry weight there is no significant difference between cornation oil and garlic oil. The best treatment in plant oils was cornation oil in fresh and dry weight 93.81 and 47.09 g respectively.

Table 3: Effect of bio, organic and natural additions on linear growth, fungal dry weight, and sporulation of *B. fabae*

Treatment	linear growth (cm)	Fungal dry weight (mg)	Sporulation
Control	9.00	249.67	44.00
Biozeid	0.00	0.00	0.00
Bioaric	0.00	0.00	0.00
Acadian-C plant	9.00	284.67	48.00
Aminogreen	4.33	122.67	15.33
Novaful	5.00	185.00	14.00
Cumin oil	6.33	193.33	0.00
Cornation oil	3.83	99.67	0.00
Garlic oil	2.17	64.67	0.00
Rocket oil	2.83	83.00	0.00
LSD 5%	**0.33**	**7.68**	**2.58**

Table 4: Effect of bio, organic and natural additions on growth parameter of faba bean

Treatment	Fresh weight (g)	Dry weight (g)	Plant height (cm)	Number of branches /plant
Control	59.12	32.85	74.67	4.33
Biozeid	80.82	47.25	86.00	7.67
Bioaric	113.56	50.54	83.33	7.33
Acadian-C plant	94.42	44.90	104.33	9.67
Aminogreen	62.37	39.66	88.67	9.67
Novaful	62.38	35.19	84.33	5.33
Cumin oil	93.81	47.09	83.67	4.33
Cornation oil	61.56	40.01	88.67	5.67
Garlic oil	74.17	41.21	99.00	7.67
Rocket oil	72.40	55.29	76.00	6.00
LSD 5%	**4.79**	**3.92**	**2.68**	**1.12**

2- Plant height:

As mentioned in Table 4 there is highly significant increase in plant height as affected by bio, organic and natural additions. The highest increase was recorded with Acadian C plant. This followed by garlic oil. While with bacterial strains biozeid is better than bioaric. Moreover with amino acids the plant height with amino green is more effective than novaful. On the other hand with plant oils the best treatment in plant height was recorded with garlic oil.

3- Number of branches/plant:

Number of branches/plant as a morphological character was affected by different additions. The superiority of all additions referred to Acadian C plant. In bacterial strains biozeid has a better effect than bioaric in all treatments but, about amino acid "amino green" has significant effect more than novafull on number of branches/plant. On the other hand the highly significant increase in number of branches/plant as affected by plant oils was occurred with garlic oil. These results were mentioned in Table 4.

Effect of bio, organic and natural additions on yield parameters of faba bean

1- Weight of 100 seeds:

Data in Table 5 show the values of 100 seeds weight as affected by different bio, organic and natural additions, there is highly significant increase in all treatments as compared to control, the highest increase of all treatments was recroded with aminogreen followed by biozeid. There is no significant difference between cumin oil and cornation oil and also between garlic oil and rocket oil.

2- Number of pods/plant and number of seeds/pod:

Concerning to the effect of bio, organic and natural additions on number of pods/plant and number of seeds/pods. Bacterial inoculation biozeid is more effective than bioaric on number of pods/plant. Aminogreen has highly significant increase than novaful. The same trend was mentioned with number of seeds/pods. Moreover, about the effect of plant oils, the best effect was occurred with garlic oil, there is no significant difference between cumin oil and rocket oil. These data presented in Table 5.

Table 5: Effect of bio, organic and natural additions on yield parameters of faba bean:

Treatment	Weight of 100 seeds (gm)	No. of Pods/Plant	No. of Seeds/Pod
Control	60.83	32.33	3.00
Biozeid	81.83	44.67	3.33
Bioaric	73.54	38.67	3.00
Acadian-C plant	81.76	64.67	4.00
Aminogreen	91.17	51.67	2.67
Novaful	67.19	37.33	3.00
Cumin oil	72.36	39.67	2.67
Cornation oil	70.54	50.00	3.00
Garlic oil	64.19	56.67	3.67
Rocket oil	63.72	46.67	2.67
LSD 5%	8.52	2.37	0.72

Macro and micronutrients contents as affected by bio, organic and natural addition treatments in faba bean:

1- Macronutrients contents:

Data in Table 6 mentioned that there is highly significant increase in NPK percentage in seeds of faba bean as affected by bio, organic and natural addition. About nitrogen the garlic oil is most effective addition compared to other treatments.

The bacterial addition showed that biozed is better than bioaric, amino acids also have significant increase, but aminogreen is more effective than novaful, garlic oil is best effective one among other plant oils.

The same effect of amino acids on nitrogen concentration was recorded with phosphorus concentration, while the plant oils, the best effect occurred with rocket oil and in bio addition bioaric is more effective, and the same with potassium %, the highest value in all treatment on K% was recorded with rocket oil, novaful is more significant than amino green.

Table: 6: Effect of bio, organic and natural additions on macro and micro nutrients in faba bean:

Treatment	N%	P%	K%	Zn ppm	Fe ppm	Mn ppm
Control	2.47	0.28	1.44	16.67	41.00	20.00
Biozeid	2.87	0.31	1.53	18.33	45.33	23.33
Bioaric	2.73	0.33	1.59	20.67	49.00	26.00
Acadian-C plant	3.13	0.29	1.49	24.33	46.67	30.67
Aminogreen	3.20	0.35	1.60	20.00	52.33	28.00
Novaful	3.07	0.32	1.83	26.00	51.00	29.33
Cumin oil	2.67	0.31	1.77	24.67	49.00	31.33
Cornation oil	3.30	0.32	1.94	28.33	61.67	30.33
Garlic oil	3.67	0.34	1.84	27.33	60.00	33.33
Rocket oil	3.47	0.36	1.99	29.67	63.33	29.33
LSD 5%	0.12	0.01	0.05	1.55	1.58	1.21

2- Micronutrients contents:

Application of different treatments used on micronutrients was recorded in Table 6 which appeared that there is highly significant increase in all treatments. The highest concentration of Zn and Fe were observed with rocket oil, while in Mn the highest significant increase with garlic oil.

In bio addition bioaric is more effective than biozeid in Zn, Fe, and Mn. While in organic addition amino green was better than novaful on Fe concentration, while novaful is more effective than aminogreen with Zn and Mn. Moreover there is highly significant increase in Zn, Fe and Mn with plant oils with Zn and Fe and rocket oil was the best one, while in Mn the garlic oil is the best effective one.

Photosynthetic pigments content:

It is well known that chlorophyll is a good parameter reflecting the health condition of any plant. In this investigation the photosynthetic pigments content in fresh plants were determined as chlorophyll a, b and caroteinoid as

shown in Table 7. with bacterial addition biozeid is more effective more than bioaric on chl. A, and B while bioaric is better thanf biozeid on caroteinoid. Rocket oil has the highest significant increase on chl. A, while Chl. B has the highest significant increase with Acadian C. plant. Carnation oil is concerning to the amino acids and their effect on Chl. A, and B, novaful is more effective than amino green. On the other hand amino green is more effective than novaful on their effect on caroteinoid.

Table 7: Effect of bio, organic and natural additions on chlorophyll A, B, and carotenoid in faba bean

Treatment	Chl. A	Chl. B	Carotenoid
Control	1.13	0.35	0.29
Biozeid	1.78	1.07	0.21
Bioaric	1.64	0.93	0.22
Acadian-C plant	1.76	1.50	0.07
Amino green	1.56	0.59	0.28
Novaful	1.78	1.15	0.23
Cumin oil	1.64	0.58	0.37
Cornation oil	1.58	0.62	0.39
Garlic oil	1.75	0.75	0.33
Rocket oil	1.79	1.19	0.21
LSD 5%	0.03	0.01	0.02

Disease assessment:

Data on disease severity of chocolate spot disease of faba bean was recode in Fig. 1 the maximum reduction of disease severity of chocolate spot was recoded by bioaric followed by biozeid, and garlic oil. Slight increase in disease severity was mentioned by cumin oil and novaful, while, there is no significant difference in disease severity of chocolate spot between Acadian C palnt, aminogreen and novaful.

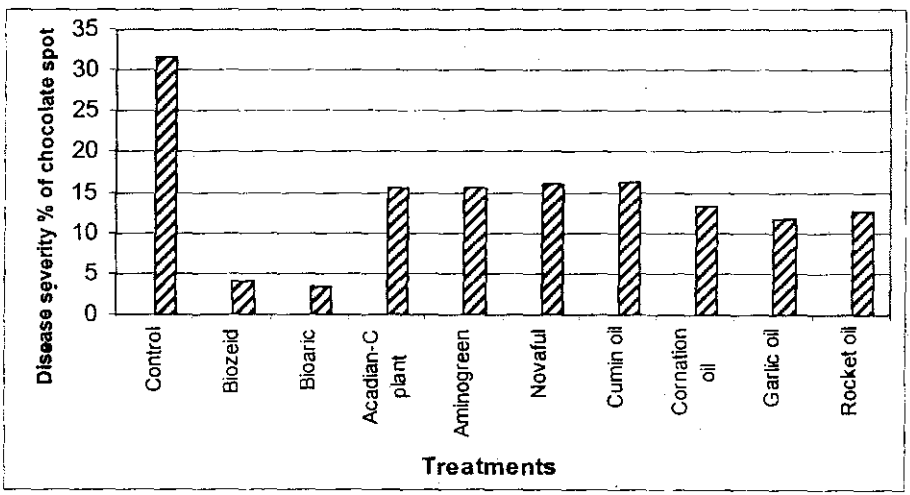

Fig. 1: Effect of bio, organic and natural additions on disease severity % of chocolate spot in faba bean

Photosynthetic pigments:

The data show that all of used treatments increased chl. a, and chl. b contents in the leaves of faba bean plant. The Biozeid, Noval and Roket oil were the most effective in this respect.

Carotenoids which known as a major endogenous plant antioxidant were increased due to cumin oil, carnation oil, and garlic oil treatments.

DISCUSSION

Concerning to the effect of bio, organic and natural additions on faba bean growth and reducing chocolate spot disease in faba bean. The results of this study showed that all growth parameters were increase highly significant increase with Acadian C plant, while the weight of 100 seeds gave the highest increase with amino green, on the other hand bioaric and garlic oil are most effective in reducing the disease severity of chocolate spot in faba bean plant.

The role of bio additions in reduce the negative effects of *B. fabae* on growth and yield of faba bean might be discussed as follow:

It has been known for many years that *Trichoderma spp* inhibit the fungal growth by three mechanisms: competition (for spaco and nutrients), parasitism (deriving nutrients from the host) and antibiosis (production of an inhibitory metabolite or antibiotic (Harman, 2006).

Trichoderma pers was considered as biocontrol agent phytopathogenic fungi, but the mechanism of this effect is not clearly understood. Proposed mechanisms of biocontrol are antibiosis (Ghisalberti et al., 1990).

Mycoparasitism and competition and/or fungicidal action because of capacity of Trichoderma to produce antibiotics or hydrolytic enzymes (Lorito et al., 1994). Certain strains of Bacillus appear to most effective as a biological control agent, by inhibiting the mycelial growth of palnt pathogenic fungi (Mahmoud 2004) and dry weight of the fungus as well as sporulation (Table 3).

Bacillus subtilis can induce resistance in plant to disease by stimulation of phytoalexins production and increasing the activity of lytic enzymes (Sailaja and Podile, 1998).

The positive effect of Acadian C plant on plant height may be due to its contain Gibberellin, cytokinin and auxin. Gibberellin causes increase in cell division and cell enlargement (Bruce, 1990 and Deotale et al., 1998), number of internodes/plant and length of the internodes (Castro and Vello, 1983).

The increase in photosynthetic pigments led to increase carbohydrates, hence biozeid, Acadian C plant and cornation oil will increase carbohydrate contents in faba bean plants. Carbohydrates are the main repository of photosynthetic energy, they comprise structural polysaccharides of plant cell walls, prinicipally cellulose, hemicellulose and pectin, also associated with the structural polysaccharides are phenolic compounds. Which play an important role in plant defense such phenols are essential for biosynthesis of lignin, which is considered an important structural component of plant cell walls (Hahlbrock and Scheel, 1989).

Acadian C. plant and amino acids which contain some nutrients such as NPK, Zn, Mn, B and also contain cytokinin, auxin, and gibberellin, each of these contents has an essential role in plant growth and its vital functions as followed.

Treated plants with growth regulators showed an increase in total phenol, calcium content and increase of the activity of chatechol oxidase, these materials protect plants against pathogen stress (Chowdhury, 2003).

Manganese activates a number of enzymes, through its specific involvement in any enzyme is not thoroughly understood. It is know to induce a cycle of reaction within the plant. The role of Mn in photosynthesis is clearly identified through is absolute necessary for water photolysis during photosynthesis. Also, iron plays a key role in several enzyme system in which haemin functions as the prosthetic group. These heam enzyme systems comprise the catalases. Peroxidases and several cytochromese (El-Naggar et al., 1994).

Manganese plays a role in regulating the levels of auxin in plant tissues by activating the auxin oxidase system (Marchner, 1986).

Phosphorus is probably the most limiting nutrient for production of leguminous crop, possibly by its influence on the activity of rhizobium bacteria and nodule formation (Mengel and Kirkby, 1982).

Zn, Mn and Fe are Co-factors of SOD (super oxide dismutase "enzymatic antioxidant") then they promote the nedgenous enzymatic antioxidant SOD which alleviate the harmful effect of ROS (Reactive Oxygen Species "free radicals") caused by botrytis pathogens stress.

The role of zinc in enhancement the vegetative growth which followed by stimulation superioxidase dismutase activity. Marked effect auxin synthesis (Ohki, 1978). Which in turn encourage the meristemic activity of the plant which resulted in more cell division and cell enlargement (Devlin and Withan, 1983).

Boron play essential role for translocation of carbohydrate in plant. Its deficiency may cause a breakdown of proteins, serious injuries to cell of the apical meristems of stems and roots (Mengel and Kirkby, 1982).

The essential oils decreased the harmful effects of B. fabae. This is agreement with Radwan (1980) stated that garlic juice inhibited growth of *Fusarium manilifarm, Helminthosporium oryzae, Alternaria citri, Scleratium bataticola, Aspergillus niger,* and *Penicillium italicum,* also clove juice supperessed the formation of Macrophomin phoseolina sclerotia around the paper disk.

Tansey (1975) mentioned that agueous extract of garlic inhibited the fungal growth of *Asbolus lineolatus, Coniphora suffocate, Favolus sp.*, and *Phycomyces blakesleanus.*

Fahmy (1994) tested oils of curaway, cumin, coriander, and fennel for their antifungal activity, he found that mycelial growth of *Rhizoctonia solani, Fussarium oxysporum* and *Sclerotium rolficii* were completely inhibited with all the tested oils, except coriander oil.

Farag, et al., (1989) found that essential oils of thyme, cumin, clove, and rosemary caused complete inhibition of *Asperigillus parasiticus* mycelial growth and aflatoxin production.

It could by concluded that the promotive effect of Acadian, amino green, cumin oil, carnation oil, garlic oil and roket oil may be due to the antioxidant material which found as a major content of these compounds. Such antioxidants (scavengers of ROS) alleviate and mitigate the harmful effect of botrytis pathogen stress.

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تأثير الإضافات الحيوية والعضوية والطبيعية على النمو والتركيب الكيميائي و التبقع الشيكولاتي لنبات الفول

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تم إجراء هذه الدراسة بمحطة البحوث الزراعية بتاج العز – محافظة الدقهلية خلال الموسم الزراعي ٢٠٠٦ – ٢٠٠٧ وذلك لدراسة تأثير بعض الإضافات الحيوية والعضوية والطبيعية على محصول الفول البلدي وصفاته ومرض التبقع الشيكولاتي في الفول البلدي.

ويمكن تلخيص النتائج في الآتي:

- أفضل زيادة في الوزن الطازج للفول البلدي كانت مع الإضافة الحيوية من البيوأريك بينما الوزن الجاف سجل أعلى زيادة مع إضافة زيت الجرجير.
- صفات النمو المختلفة مثل طول النبات، عدد الأشطاء/النبات، عدد القرون/النبات، كذلك عدد الحبوب/القرن سجلت أعلى زيادة مع إضافة مستخلص الطحالب البحرية.
- وزن الـ ١٠٠ حبه كانت أفضل زيادة مع إضافة الحمض الأميني الأمينوجرين.
- كما أوضحت النتائج أن أفضل تأثير للإضافات محل الدراسة على عنصر النيتروجين والمنجنيز كانت مع إضافة زيت الثوم. أما مع عناصر الفوسفور ، البوتاسيوم، الزنك وكذلك الحديد كانت مع إضافة زيت الجرجير.
- كما أوضحت النتائج أن المعاملة الحيوية بالبيوأريك أو البيوزايد أدت إلى انخفاض كبير في شدة المرض "التبقع الشيكولاتي للفول البلدي" يلي ذلك المعاملة بزيت الثوم بينما لم توجد أي فروق معنوية بين المعاملة بمستخلص الطحالب البحرية والمعاملة بالحمض الأميني الأمينوجرين.

لذلك توصى هذه الدراسة باستخدام الإضافات العضوية والحيوية والطبيعية لما لها من تأثير على صفات النمو والمحصول والتركيب الكيميائي في الفول البلدي وتأثيراتهم على مقاومة التبقع الشيكولاتي وتقليل شدة المرض في نبات الفول البلدي.