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SUMMARY

Faba bean (*Vicia faba* L.) is one of the most important and nutritional legume crops in Egypt, as well as, in many countries of the world. Faba bean plants are subjected to several pathogens especially those attack the root regions and causing damping-off and root-rot. So the present work was undertaken to study the biological control of root – rot disease of faba bean through different bio- control agents.

The results of such investigation can be summarized as follows: -

- 1- A number of pathogenic fungi which causes root – rot disease of faba bean were identified as. *Fusarium solani* and *Rhizoctonia solani* have been isolated from 6 Egypt Governorates of. *Rhizoctonia solani* was the most frequently isolated pathogen followed by *Fusarium solani*.
- 2- Pathogenicity test showed that, *R.solani* was the highest percentage of pre and post-emergence damping – off and survival plants at 7% concentration while *F.solani* at 10% concentration.
- 3- The antagonistic ability of *Trichoderma* spp. on both *R. solani* and *F.solani* was studied, all *Trichoderma* spp. inhibited the linear growth of both pathogenic fungi followed by bacterial spp.
- 4- There were different antagonistic abilities among *Trichoderma* spp. It has been found that, *T.harzianum*



and *T.hamatum* were more effective bioagents in inhibiting the linear growth of *R.solani* and *F.solani*. Followed by *T. eureoviride* and *T. virens*.

- 5- All isolated bacteria associated with root rot disease of faba bean inhibited the linear growth of both *R.solani* and *F.solani*. *Bacillus subtilis* and *pseudomonas fluorescens* were more effective bioagents followed by *Bacillus megaterium* and *Stenotrophomonas maltophilia*.
- 6- Differentiation between the pathogenic fungi by RAPD-PCR was carried out. The results differ between *R.solani* by both location and aggressiveness but the difference between *F.solani* by location only.
- 7- Reaction of 18 faba bean entries to *R.solani* and *F.solani* separately or in combination with them indicated that, 8 entries were susceptible; 8 entries were moderate resistance and 2 entries were resistance to *R.solani*. Concerning *F.solani*, 5 entries were susceptible, while, 9 entries were moderate resistance and 2 entries were resistance, while by combination of both *R.solani* and *F.solani*, all isolates becomes susceptible.
- 8- All the biocontrol agents and BioZeid and Bioarc tested against pathogenic fungi causing root-rot disease reduced the damping-off and root-rot disease of faba bean. The results indicated that, BioZeid was more effective than *Trichoderma* spp. while Bioarc was more effective than bacterial sp. on controlling root – rot disease of faba bean.
- 9-Five experiments were conducted to increase the growth of biocontrol agents under different



- conditions of different media, temperature, hydrogen ion (pH) levels, carbon sources and nitrogen sources.
- 10-The suitable medium for growth of *Trichoderma* sp. was PDA medium followed by Waxman medium, Czapek's Dox, Richard's and Malt extract medium, respectively.
 - 11-For bacterial isolates, the suitable medium for growth was nutrient agar medium followed by King's medium, Sucrose peptone, Dox and yeast glucose medium, respectively.
 - 12-The effect of different temperature degrees on growth of *Trichoderma* isolates was studied. Five different temperature degrees ranged from 15⁰C to 35⁰C were tested. The results cleared that, the best incubation temperature for growth was 25⁰C for all *Trichoderma* isolates followed by 30⁰C and followed by pH 15⁰C.
 - 13- For bacterial isolates, the best incubation temperature for growth was 35⁰C followed by 30⁰C, 25⁰C, 20⁰C and 15⁰C, respectively.
 - 14- The effect of hydrogen ion (pH) level on growth of *Trichoderma* isolates was studied *in Vitro* by using best medium and best temperature ranged from 6 to 8. Results showed that, the optimum pH required for maximal growth was 6 for all *Trichoderma* isolates followed by 6.5, 7, 7.5 and 8, respectively.





- 15- For bacterial isolates the best hydrogen ion (pH) level for growth was 7 for all bacterial isolates except isolate no. (8) which prefer pH: 6.5 than 7. Followed by pH 6.5 and 7.5 while the isolates no (1) and (2) prefer 7.5 than 6.5 and finally pH 6 and 8 the last pH level for growth
- 16- The obtained data recorded that, sucrose was the most suitable carbon source for growth of all *Trichoderma* spp. followed by starch, glucose, glycerol and fructose, respectively.
- 17- By using different carbon sources glucose gave the maximum growth for all bacterial isolates followed by using glucose, sucrose, starch, maltose and glycerol.
- 18- The obtained data recorded that, the suitable nitrogen source for growth of *Trichoderma* isolates was peptone followed by ammonium sulphate, casein, sodium nitrate and potassium nitrate, respectively.
- 19- For different nitrogen sources, peptone is the most favorable nitrogen source for the growth of bacterial isolates followed by potassium nitrate, casein, ammonium sulphate and finally sodium nitrate. While isolate no (1) prefer sodium nitrate than ammonium sulphate and isolates no (1,6) prefer casein than potassium nitrate.
- 20- Identification of both bioagents by Biolog system was carried out *T. harzianum*, *T. hamatum* and *T. euroviride* and *T. virens* for fungi, and *Bacillus*



subtilis, *pseudomonas fluorescens*,
Stenotrophomonas maltophilia and *Bacillus megaterium* for bacterial isolates.

21- In conclusion, by using biocontrol agent we can control on root – rot disease of faba bean, and by using different parameters we can obtain the maximum production for biocontrol agents by. *Trichoderma* spp. and bacterial spp.

