An advanced studies on effesct of mycrrohiza inoculation with some root fungi that attack some leguminous plants

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Rhizoctonia solani, Fusarium solani and· Macrophominaphaseolina are considered the most common destructive pathogensthat cause root- rot and damping- off disease of beans.Objectives:The research aims at(a) Studying the effect of inoculation with mycorrhizal fungi whichsymbiosis with bean root.(b) Estimating the effectiveness of some systemic and non-systemicfungicides on mycorrhizal fungi.(c) Studying the effect of biological control from both pathogenicand mycorrhizal fungi.The obtained results could be summarized as follows:1- R. solani, F. solani and 11,1. phaseolina were isolated fromdiseased bean, faba bean, peas, chick pea and lupines plants rootscollected from the fann of the Faculty of Agric.at Moshtohor,Zagazig Univ., A.R.E.2- M ph aseo lina was the most destructive fungus causing thehiglrest percentage of pre- or post- emergence damping- off insterilized and unsterilized soils. On the other hand, R. solanicaused the highest percentage ofroo - rot severity in both soils.- The compound infection of the three pathogens caused asignificant increase in the percentage of pre-emergence dampingoff and root-rot. It also caused a significant decrease in the height,number of leaves for each plant and a decrease in both dry andfresh weights of roots and shoots in both soil types .. 4- The Glomus mosseae was isolated from the studied soil samples.By examined of mycorrhizae symbiosis root, it was found that VAmycorrhizalfungi have an extensive hypha! net work that extendsfrom the root. External hyphae are thick walled, variable andirregular in shape. Vesicles and arbuscles are produced in the soil.The shape of spores generally in Egyptian soils are gloubose,ellipsoid their longest dimension ranging form 30- 40 urn.s. For ilil;~e under the local environment, the study succeeded indeveloping the mycorrhizal fungi, after Murashing and Skoog(1962) medium was modified to urge the spores to germinate after2 - 3 weeks incubation period at 40 ± l°e, VAM- fungi begun togrow on the modified medium of Murashing and skoog (1962)after 2 - 3 weeks at 40 ± l''C. At the beginning a few hyphaewere formed after one week more, spores were fanned with ugeamount, these spores gernrinated after one week and formed more- hyphae. After 3 months a large net work of hyphae were formedin the plates with a few n bers of spores.6- Addition of VA-mycorrhiza to the soil in the presence of the threepathogens caused a decrease in the percentage of pre- emergence~130-damping- off. This trend was found ill both unsterilizedandsterilized soils.7- Addition of VA-mycorrhiza increased plant height, root length,number of leaves number of pods, fresh matter of shoots and rootsand the dry matter of shoots and root in both soils compared withthe control. Also, addition of VA- mycorrhiza in the presence ofany of M phaseolina, R. so/ani and F. so/ani improved thepreviously mentioned growth characters compared with eachpathogen alone.8- VA- mycorrhiza colonized the roots of bean plants in sterilizedand unsterilized soils. All treatments of the pathogenic fungi withG1 or G2 showed root colonization with VAM. Root colonizationwith VAM was higher in the sterilized soil than in the unsterilizedsoil.9- Addition of VAM- fungi to Gland G2 in sterilized or unsterilizedsoils decreased the percentage of root- rot and increased allgrowth characters under study.10- Addition of VAM- fungi to GI and G2 in the s erilized andnatural soils increased root colonization with VAM compared withthe control.11- Seed dressing with the ftmgicide Benlate combined with soilinoculated with G1 + G2 was effective in reducing the percentageof the

per-emergence damping- off. Soil inoculated with G1 + G2successfully prevented from infection with the root- rot of beanplants. Almost all combinations of systemic fungicides andVAM increased plant height, root length, shoot fresh and drymatter and root fresh and dry matter.12- Addition of any of Gland G2 and their combinations to sterilizedand unsterilized soils showed high colonization of bean roots withVAM- fungi. Seed dressing with any of the two systemicfungicides inhibited root colonization.13- Seed dressing with the non- systemic fungicide Dithane-M 45combined with soil inoculated with G2 was effective in reducingthe percentage of the per-emergence damping- off. Seed dressedwith Mancoper showed the lowest percentage of root- rot.Almost all combinations of the non- systemic fungicides andVAM increased the number of leaves, plant height, fresh and drymatter of shoots and the fresh matter of the roots.14- Addition of any of G1, G2 and their combinations to sterilized andunsterilized soils showed high colonization of bean roots withVAM-fungi. Seed dress' g with the two non- systemic fungicidesinhibited root colonization.15- Addition of any of G. macrocarpum, T. harizianum, B. subtilisand their combinations to the sterilized soil in presence of Rsolani, F. so/ani and M. phaseolina separatel increased thepercentage of the per - emergence- damping- off. All treatmentsincluded M phaseolina showed higher percentage of damping-off than other treatments. On the contrary, addition of mycorrhizaand the two antagonists to the soil decreased the percentage ofroot- rot.16- Plant height was increased with the addition of any of G.macrocarpum, T harizianum, B. subtilis and their combinations tothe soil in most treatments. Root length was decreased with theaddition of the pathogenic and the antagonistic fungi separately orin combinations. All treatments included the mycorrhiza and theantagonistic fungi separately or in combination increased numberof leaves. Treatments included G. macrocarpum, the autagnisticfungi or their combinations increased shoot fresh matter in somecases and decreased in the others. Shoot dry matter, root fresh anddry matter were increased in treatments included G.macrocarpum, the antagonistic fungi and their combinations.17- Bean plants grown in sterilized and unsterilized soils inoculatedwith mycorrhiza, T. harizianurn, B. subtilis and their combinationsshowed high percentages of root colonization. On the other hand,addition of the pathogenic fungi to soil inoculated with themycorrhiza decreased the percentage of root colonization.Generally, the percentage of root colonization was higher in theunsterilized soil than the sterilized one.18- Bean plants grown in sterilized soil inoculated with G.macrocarpum had high contents of chlorophyll A and B in theirleaves compared with the control. The combinations ofmycorrhiza + R. solani or F. solani showed higher contents ofchlorophyll A and B than each pathogen separately which were,however, less than the control. The same trend was also foundwith the caroteinoids. All combinations of the mycorrhiza andthe pathogenic fungi showed higher contents of caroteinoids thaneach pathogen separately.19- Addition of G. macrocarpum to the soil increased the levels ofgibberellin in bean plants than the other treatments and the control.Also, plants grown in soil infested with R. solani showed highpercentage of gibberellin than the other two pathogens. Additionof mycorrhiza to soil infested with each pathogen decreased thelevel of gibberellin except in case of R. solani + the rnycorrhizawhereas, the level of gibberellin was deceased.20- Transverse sections in roots of bean plants infected with VAMshowed an increase in number and diameter of zylem vesselswhich occupied the zylem parenchyma.