Studies on the effect of interaction between viral and fungal infection on nodulation and nitrogen fixation of faba bean plant

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To illustrate the effects of Broad bean mottle virus or/and Botrytis fabae infection(s) on nodulation and efficiency of N2-fixation in fabae bean plants , pot experiment was carried out using vicia fabae cv Giza 429 ,served to produce sensitive host plants for both pathogens as well as Rhizobium leguinosarrum .For determination of the plant vegetation growth, metabolic, nodulation and efficiency of N2-fixation changes accompanying virus or/and fungal infection(s), the following treatments were used:1) Non-nodulated healthy plants (Control; C),2) R. leguminosarum inoculated Faba bean plants (R),3) R. leguminosarum inoculated Faba bean plants with BBMV infection (RV),4) R. leguminosarum inoculated Faba bean plants with B. fabae infection (RF),5) Nodulated Faba bean plants with prior BBMV infection, then after 1 hr,infected with B. fabae (RV-F), and6) Nodulated Faba bean plants with prior B. fabae infection, then after 1 hr,infected with BBMV (RF-V).Samples were obtained from the different treatments at 20, 40, 50 and 60 days post Rhizobium leguminosarum inoculation, i.e. pre-bloom, bloom and seed set, bloom and early pod, and fill and mature pod.The following parameters were estimated:-1. Plant morphological character, plant height, leaf area and number of branches.2. Fresh and dry matter contents of leaf as well as root nodules.3. Chlorophyll a, b and cartenoids contents of Fabae bean leaves.4. Total carbohydrate percentage of shoots, roots and root nodules.5. Total nitrogen contents of shoots, roots and root nodules.6. Total protein contents of shoots and roots.7. Electrophoretic patterns of total extractable proteins of Faba beanleaves.8. Nodule morphological characters, number and size of nodules .9. Leg-haemoglobin contents of root nodules.10. Nitrogenase contents of root nodules and the amount of N2-fixea were calculated.11. Biological assay of BBMV concentration in leaves, roots , root nodules and pods .12. Disease severity as well as biological assay of BBMV on B.fabae, and vica versa was recorded.The obtained results can be summarized in the following:1. Healthy nodulated Plants showed marked increase in plant height with14.4 %, related to non-nodulated Faba bean plants; Control. whereas, Broad bean mottle virus, Botrytis fabae and both of them (RV-F and RF-V) cause significant reduction in plant height with 16, 16.01, 22 and 26.2 %, respectively (related to nodulated Faba bean plants; Control).2. Both single- (RV and RF) and double- (RV-F and RF-V) infectionspossessed significant reduction in Faba bean leaf area in comparisonWith healthy non-nodulated one (C). whereas, healthy nodulated ones gave the

maximum increase in leaf area during intervals