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The Effect of Some Microorganisms on Wilt Disease and Soil Fertility for Hibiscus sabdariffa L. Productivity in Sandy Soil

A Thesis By

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Summary

The wide use of synthetic chemicals with low specificity and low biodegradability encouraged the discovery of bio-products as templates to develop biopesticides with new chemical formulas and mode of actions. The present investigation was carried out under greenhouse and field conditions to study the effects of inoculation of the bacterial mixture of *Bacillus subtilis*, *Pseudomonas fluorescens*, the fungus *Pleurotus ostreatus* and mycorrhiza on controlling wilt disease of roselle (*Hibiscus sabdariffa* L.) plant, and their effects on productivity and soil fertility. The results may be summarized as follows:

- 1- *Fusarium oxysporum*, the casual organism of roselle wilt disease, was isolated and identified from naturally infected plants. Pathogenicity test was performed and showed the infectious symptoms on roselle plant.
- 2- Survival percentage was studied under greenhouse condition in artificially infected soil. The microbial mixture increased survival plants.
- 3- Root colonization and dehydrogenase enzyme activity significantly increased under both greenhouse and field conditions, the microbial mixture was the most effective.
- 4- Studying photosynthetic pigments under greenhouse conditions showed significant differences among treatments in carotenoids, while under field conditions it was significant in chlorophyll a.
- 5- Estimation of total phenols under greenhouse conditions showed that bioagents significantly increased the production of phenols in response to infection which increased plant defense mechanism.
- 6- Studying some growth parameters indicated that shoot length, number of branches and number of calyxes significantly increased with inoculation of microbial bioagent mixture.

- 7- Studying some yield parameters revealed the significant increases in shoot fresh and dry weight, calyx fresh and dry weights and in seed fresh weights in response to microbial mixture inoculation.
- 8- NPK concentrations and uptake in both shoots and calyx of roselle plant significantly increased in relative to microbial mixture inoculation comparable to the control.
- 9- Soil physical properties were studied after roselle plant cultivation. Some bioagents significantly increased soil aggregates due to the production of polysaccharides.
- 10- Chemical soil properties were studied after roselle plant cultivation. Data illustrated that as a result of microbial inoculation, available macronutrients (NPK) significantly increased, while organic matter not significantly increased. The pH, electrical conductivity (EC), sodium adsorption ratio (SAR), exchangeable sodium percentage (ESP) and CaCO_3 were decreased. Coming to final conclusion, it could be stated that inoculation of a mixture of microorganisms is more effective in controlling diseases than individual inoculation, in addition to the slightly increase in soil fertility.