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6. SUMMARY

Results obtained from this investigation could be summarized as follows:

- 1) Fungi associated with root rot and wilt of strawberry plants were identified as: *Fusarium oxysporum*, *Verticillium dahliae*, *Rhizoctonia solani*, *Cephalosporium* sp., *Pythium ultimum*, *Sclerotium rolfsii*, *Fusarium solani*, *Alternaria* sp. and *Trichodema harzianum*.
- 2) of the isolated wilt and root rot fungi of strawberry exhibited that *Verticillium dahliae*, *V. albo-atrum* and *F. oxysporum*, were the most destructive fungi causing the highest percentage of infected plants, followed by, *R. solani* and *F. solani* caused higher percentage of root-rot disease. While, the other fungi gave the lowest percentage of infected strawberry plants.
- 3) Reaction of thirteen strawberry varieties to infection with the tested fungi indicated that cvs. Laguna, Afeara, Carlsbad, Pajaro, Camarosa and Sweet Charlie were the most resistant ones. However, cvs. Cousta and Oso Grandi were moderately resistant, while, cvs. Chandler, Sea Scape, and Capitola were the most susceptible ones.
- 4) Studying the effect of inoculum potential on percentage of infected plants revealed that inoculum density of 1×10^8 of each of *V. albo-atrum*, *V. dahliae* and *F. oxysporum* showed the highest percentage of dead plants, while, inoculum densities of 1×10^3 and 1×10^4 caused the least.
- 5) Studying the hosts of *V. albo-atrum*, *V. dahliae* and *F. oxysporum* revealed that Cotton, Tomato, Okra and Strawberry plants were very susceptible for *V. albo-atrum* and *V. dahliae* while, strawberry plants were the only host plant for *F. oxysporum*.

- 6) Maxim followed by Benlate were the most effective fungicides in inhibiting the linear growth, spore formation and spore germination of both *Verticillium* spp. and *F. oxysporum*, while, Rizolcx-T was the least effective one.
- 7) Garlic extract was the best plant extract in inhibiting the linear growth, spore production and spore germination, However, jojoba was the least effective plant extract on the three tested pathogens that caused wilt of strawberry plants. Linear growth, spore production and spore germination of all isolates was mostly decreased with increasing concentrations of all extracts.
- 8) Salicylic acid caused the highest decrease in growth and sporulation, while, Tannic acid caused the highest decrease in spore germination of *V. dahliae*, *V. albo-atrum* and *F. oxysporum*. However, Thiourea and Catechol were the least effective.
- 9) Culture filtrates of *B. subtilis* and *Chaetomium globosum* were more effective in reducing mycelial growth, sporulation and spore germination of the three wilt pathogens than *T. harzianum* and *G. virens*. Ten days old culture filtrates were more effective in this respect than 20 or 30 days old culture filtrates.
- 10) Under greenhouse conditions, Benlate, Maxim, Topsin-M and Vitavax/C were the most effective fungicides in reducing disease incidence and disease severity caused by the three-wilt pathogens meanwhile, Rizolcx- T was the least effective fungicide.
- 11) *Bacillus subtilis* was the best antagonist in reducing disease incidence and disease severity of the wilt pathogens on strawberry cultivars followed by the commercial product Rhizo-N when tested under greenhouse conditions.
- 12) Also, salicylic acid was the most effective antioxidants on strawberry wilt disease development as it reduced the percentage of disease incidence and disease severity. On the other hand, Catechol and Sodium benzoate were least effective.

- 13) On the other hand, garlic extract was the best in decreasing the percentage of wilt disease incidence and disease severity of strawberry plants. Meanwhile, jojoba extract was the least effective extract
- 14) Disease incidence and disease severity caused by the 3 wilt pathogens were significantly decreased by adding the VAM fungi to the soil, where *Glomus macrocarpum* was better than *Glomus australe*.
- 15) As for the effect of chemical inducers, biological control and plant extracts it is clear that they increased phenols content compared with control treatment. On the other hand, they decreased the reducing, non-reducing and total sugars content in roots of strawberry plants infected with the three wilt pathogens.
- 16) Under field conditions, disease incidence was clearly reduced with the application of all tested fungicides where, Benlate caused the least percentage of disease incidence and increased the yield.
- 17) Also, the antioxidants were significantly better in improving disease control and fruit yield production than control. Salicylic acid and Ascorbic acid were the most effective antioxidants on wilt disease and increasing the yield.
- 18) Treating strawberry transplants before transplanting with plant extracts reduced wilt disease incidence where, garlic extract caused the least percentage of disease incidence and increased the yield.
- 19) Treating strawberry transplants with antagonists and its commercial formula reduced significantly wilt infection and increased yield.
- 20) Soil solarization decreased significantly the wilt infection percentage and Yield of strawberry fruit.
- 21) Soil fumigation with methyl bromide, dazomate or metham sodium was very effective in reducing wilt incidence and increasing fruit yield.

- 22) Fertilization with Ammonium sulphate reduced infection percentage and increased yield. On the other hand, fertilization with urea caused the highest wilt incidence and the lowest yield of strawberry plants.
- 23) The best NPK ratio in reducing the disease and increasing the yield was $N_1 P_2 K_2$ (0, 100, 100 kg/fed.) in the first season and $N_1 P_2 K_1$ (0, 100, 0) at the second season.