SUMMARY

Tomato powdery mildew disease is considered one of the most important diseases, which attack tomato Nile plantations in Egypt causing great damage to foliage and yield. The results of the present pathological, physiological, and control studies can be summarized as follows :-

1. Tomato powdery mildew disease was more severe in both Ismailia and El-Fayoum governorates than in middle and governorates of Upper Egypt (Giza, Beni-Suef, El-Minia and Sohag). Whilst the least disease severity was found in El-Minufiya and Qalubiya governorates.

2. Disease severity increased progressively from June until September, then begin to decrease to reaches its minimum value during November. The infection and development of tomato powdery mildew disease seemed be correlated with the prevailed averages of both temperature and the relative humidity.

3. According to the observed disease symptoms and characteristics of the conidial stage, the causal fungus identified as *Leveillula taurica*.

4. Investigations revealed the absence of the perfect stage of *L. taurica* (Lev-) Arnaud under greenhouse and field conditions.

5. The artificial inoculation to different hosts under greenhouse conditions revealed that tomato, eggplant and artichoke were the most susceptible hosts to infection with *L.*

taurica followed by pepper and common bramble. However, Egyptian mallow, hollyhock, roselle, kenaf and nasturtum were the least susceptible hosts.

6. Powdery mildew could infect all tested tomato cultivars but to different extents. Supermarmande, Strain-B, Marconi and Super green were highly infected cultivars, meanwhille, Peto-86 and Castle rock were moderately infected. On the other hand, UC 97/3, Cal-Ace, Ace and Super strain-B were the least infected cultivars.

7. Different plant genera i.e. tomato, pepper, eggplant, common bramble, artichoke and hollyhock were inoculated individually with six isolates of *L. taurica* obtained from these genera. The obtained results revealed that each isolate was more severe, in most cases, on its specific host than the other rested hosts. However, conidia of the fungal isolates introduced from eggplant and common bramble could not infect pepper and artichoke, respectively.

8. Percentage of conidial germination was higher on tomato epidermal strips than on dry slides or in water.

9. Clove oil, clove water-extract and garlic water extract were more effective for suppressing conidia germination than the other tested materials. Contrariwise, nigella oil, Rue water extract, manufactured misrona oil, henna and ginger water extracts, manufactured Natrlo oil, Triology (neem oil), thyme and eucalyptus water extracts, mustard, onion, caraway, fennel and jojoba oils encourage conidial germination compared with check water treatment.

10. Spraying tomato plants grown under green house condition with different concentrations of the above mentioned materials one day before artificial inoculation with conidia of *Leveillula taurica* revealed efficiency of Clove oil, Clove water extract, Garlic water extract and Nigella oil in suppressing powdery mildew disease intensity when used at 0.8%, 0.1%, 5.0% and 25.0%, respectively. Applying the latter 4 materials at concentration more than 0.8%, 25.0%, 50.0% and 25.0%, respectively resulted on phytotoxic effects on treated plants.

11. Degree of *L. taurica* infection seemed to correlate with number of stomata and hairs on tomato leaves. The least susceptible cultivars UC-97/3, Cal-Ace, Ace and Super strain-B possessed the fewer numbers of stomata and the higher numbers of hairs especially glandular hairs compared with the highly susceptible cultivars Supermarmande, Strain-B, Marconi and Super green.

12. Artificial infection with tomato powdery mildew [*L. taurica*] resulted in noticeable decrease in chlorophyll (a), chlorophyll (b) and carotene pigments in diseased tissues. The highest disease severity found to be associated with the greatest reduction in these pigments.

13. Sugars content including reducing, non reducing and total sugars contents were obviously higher in healthy leaves of the highly susceptible tomato cultivars Supermarmande and Strain-B compared with the less susceptible Ace and Super strain-B tomato cvs. In both groups of tomato cvs., sugars content was decreased in tomato leaves infected with *L.*

taurica. The highly susceptible cultivars showed higher reduction due to infection than the least susceptible cultivars.

14. The healthy leaves of the least susceptible tomato cvs. Super strain-B and Ace found to be contained higher quantities of free phenolic compounds than the highest susceptible cvs., Supermarmande and Strain-B. Amounts of phenol compounds particularly free and total phenols were increased in diseased leaves compared with the healthy ones. The highest increases of phenolic compounds were associated with the least susceptible cultivars.

15. The highly susceptible tomato cvs. contained higher contents of free amino acids than the least susceptible ones. In all tested tomatoes the free amino acid content decreased considerably in diseased leaves compared with the healthy ones. The least susceptible cultivars contained higher concentrations of sulphoric and aromatic amino acids and lower concentrations of the hydroxylic, alephatic and Emeno (especially proline) amino acids than the high susceptible cultivars. In healthy leaves the aromatic amino acid tryptophan was higher in the least susceptible cvs than the high susceptible cvs but it was sharply decreased after infection in all cvs.

16. The least susceptible tomato cultivars contained higher concentration of vitamin c (Ascorbic acid) than the highest susceptible ones. Reduction in quantities of vitamin c due to powdery mildew infection was higher in the least than the highest susceptible cultivars.

17. Powdery mildew infection increased the rate of activity/sec. of all oxidative enzymes (peroxidase, polyphenoloxidase, catalase and ascorbic acid oxidase) compared with check plants. Clear correlation was detected between each of rate of activity/sec. of each enzyme and relative susceptibility of the three tested tomato cultivars. The less susceptibility of the cultivar, the more rate of activity/sec. was resulted.

18. In healthy leaves, levels of the growth promoters [IAA, GA3 & cytokinins] and growth inhibitor [abscisic acid] were higher in the high susceptible cultivar, Strain-B than the moderately (Castle rock) and the least (Super strain-B) susceptible cultivars. In most cases, growth promoters were higher in mildewed than healthy leaves of all tested cultivars. However, the infected leaves of the least susceptible cultivar contained the highest increase in total amounts of growth regulators followed by those of the moderate and the highly susceptible cultivars, respectively compared with their healthy leaves.

19. As for effect of fungicides on *L. taurica* spore germination, the present results proved that the fungicide delmite only could nearly prevent *L. taurica* conidial germination, whilst microthiol-80, flint, thiophate-14 and domark were significantly less effective.

20. Under greenhouse conditions, all tested fungicides used one day before inoculation caused significant reduction in the disease severity compared with control treatments. In this respect, the fungicides topas-200, domark and bayfidan were

the best followed significantly by rubigan and sumi-8. However, the fungicides golf, microthiol-80, delmite and thiophate-14 were less effective.

21. Under field conditions, the systemic fungicides Topas-200 and Domark were the best for reducing powdery mildew severity and increasing the yield/feddan followed by the systemic bayfidan followed by delmite, microthiol-80 and thiophate-14.