

Yupawadee Pimsamarn 2011: Breeding of Petunia for Tolerance to Stem Rot Caused by *Phytophthora parasitica*. Master of Science (Horticulture), Major Field: Horticulture, Department of Horticulture. Thesis Advisor: Associate Professor Thunya Taychasinpitak, M.Sc. 132 pages.

Breeding of petunia between 4 stem rot tolerant clones of petunia (female parent) and 15 commercial varieties with good potted plant characteristics (male parent) using the cross breeding technique, resulted in a total of 30 successful crosses in the first generation. These petunia hybrids displayed segregation of several characteristics, such as number of days to flowering, plant height, plant width, and flower diameter, with mean values ranging from 44.33-65.00 days, 13.00-17.67 cm, 25.33-33.67 cm, and 3.50-5.70 cm, respectively. The 10 hybrids with early flowering and compact habit were selected for further evaluation of stem rot tolerance against *Phytophthora parasitica*. Three of the crosses P1 x Multis Pink, P1 x Tornado Sky Blue and P2 x Tornado Plum Crystal exhibited low disease incidence (number of infected plants) and disease index (% infected stem area) following *Phytophthora parasitica* base- with mycelium disc inoculation, with values of 11.11-22.22% and index 0-1; and 5.56-11.11% and index 0 at the seedling stage; and adult growth stage respectively.

A correlation between disease reduction and resistance induction was observed. Expression of total phenol and peroxidase were activity detected from the 3 selected hybrids; compared with the resistant clones P1 and P2 (female parent) at 1 and 2 days after pathogen inoculation with the maximum amount detected at days 3 and 4, both at seedling and adult stage. The highest levels of accumulated phenol measured at the seedling stage were 36.43, 35.33, 33.12, 33.93 and 30.33 $\mu\text{g catechol mg}^{-1}\text{protein}$ respectively, and at the adult stage 106.11, 101.51, 103.17, 90.85 and 92.41 $\mu\text{g catechol mg}^{-1}\text{protein}$ respectively. Peroxidase activity was measured at 1.40, 1.29, 0.90, 1.09 and 1.11 $\text{min}^{-1}\text{mg}^{-1}\text{protein}$, respectively, at the seedling stage and 3.75, 3.62, 3.67, 3.48 and 3.30 $\text{min}^{-1}\text{mg}^{-1}\text{protein}$, respectively, at the adult stage. This demonstrates that all 3 of the selected hybrids with suitable characteristics for the ornamental plant market also have the potential to limit disease development with rapid response of their defense mechanisms. The defense-related enzymes detected in the tested plants have been validated as indicators for evaluating tolerance of petunia to stem rot. Therefore, the 3 hybrids developed in this study are resistant to stem rot.

Student's signature

Thesis Advisor's signature