

**GENETIC AND BIOCHEMICAL BASES OF
RESISTANCE TO BACTERIAL WILT IN CHILLI**



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THESIS

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CERTIFICATE

Certified that the thesis entitled "**Genetic and biochemical bases of resistance to bacterial wilt in chilli**" is a record of research work done independently by **Smt. Baby Lissy Markose**, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.


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ABSTRACT

Investigation on "Genetic and biochemical bases of resistance to bacterial wilt in chilli" was carried out in the Department of Olericulture, College of Horticulture, Vellanikkara during 1992-96 to study the inheritance and mechanisms of bacterial wilt resistance and to develop a near isogenic line of Pusa Jwala with resistance to bacterial wilt.

Pseudomonas solanacearum, the bacterial wilt pathogen was isolated from infected chilli plants and its pathogenicity was established. The resistance to this disease showed a monogenic and incompletely dominant type of inheritance.

Studies on biochemical basis of resistance revealed that total phenol, OD phenol and protein content and enzyme activities had a positive association with bacterial wilt resistance. Ujwala, the resistant variety showed high protein content and had higher activities of peroxidase and polyphenol oxidase enzyme in all plant parts. Higher total phenol was found only in roots and OD phenol in roots and stems of Ujwala. All these biochemical constituents recorded an increasing trend on inoculation in both resistant and susceptible varieties. The wilt resistant variety had higher OD phenol and protein contents on inoculation whereas the susceptible variety was higher in total phenol content. Both peroxidase and polyphenol oxidase activity were higher in resistant than in susceptible variety. The higher amount of OD phenol and their oxidation products like quinones formed by increased peroxidase and polyphenol oxidase were ascribed for resistance in Ujwala.

In the protein gel electrophoresis, the resistant and susceptible genotypes possessed similar bands with identical electrophoretic mobility. The isozyme patterns

of peroxidase and esterase were studied. Roots for peroxidase and leaves for esterase showed clear bands. The resistant and susceptible varieties were different in banding pattern before inoculation. Inoculation did not evince any change in the banding pattern for peroxidase and esterase enzymes.

The resistant variety had a well developed secondary xylem with thick and compact piliferous layers and cortical cells compared to the susceptible variety.

In the radiotracer studies, radioactivity counts were more in susceptible than in resistant variety after inoculation in both ^{32}P and ^{35}S labelled plants. In the autoradiography, the ^{35}S labelled bacteria were more in susceptible plants than in resistant ones. However there was no appreciable difference between resistant and susceptible plants when ^{32}P tagged bacteria were inoculated.

A near isogenic line of Pusa Jwala, moderately resistant to bacterial wilt, was developed by crossing Ujwala with Pusa Jwala and advancing the F_1 s to BC_2F_4 generation.