

## Studies on Watermelon Germplasm Sources Resistant to Fusarium Wilt Disease at the Seedling Stage.

Wang Ming and Zhang Xian, Department of Horticulture, Northwestern Agricultural University, Yangling, Shaanxi, China

### Abstract

Three seedling inoculation methods (soil inoculation, radical inoculation and the root dip inoculation) were compared to identify and screen for Fusarium wilt resistance (FWR). The results showed that the root dip inoculation method is a fast, correct and material saving method suitable for seedling screening of watermelon for FWR. The optimum spore concentration for inoculation was  $5 \times 10^3$  spores per millilitre and the suitable root dipping time was three minutes. Resistance to Fusarium wilt of 79 watermelon varieties from different origins was studied using the seedling root dip inoculation technique. Watermelon varieties from different sources and different ecotypes were found to differ in resistant to Fusarium wilt. Watermelon varieties of African ecotype, West European ecotype and partial American ecotype were resistant type ones; the bulk of the watermelon varieties of the Xingliang ecotype, Russian ecotype, East Asia ecotype and HuaBei ecotype were susceptible-types ones.

Based on the above results, the cross section of the main roots of seedlings of 3 watermelon varieties differing in disease resistance were observed with the Scanning Electronic Microscope. Isozyme analysis of peroxidases (POD) and esterases (EST) in different organs of 11 watermelon varieties differing in disease resistance were compared and analyzed at different stages by means of Polyacrylamide Gel Electrophoresis. Activity of peroxidase, polyphenol oxidase and vitamin C oxidase in 13 watermelon varieties was determined. Seventeen kinds of amino acid, 4 kinds of organic acids and total organic acid content in 6 watermelon varieties in the root system were determined as well. The relationship between the above results and resistance to Fusarium wilt in the different varieties was studied and analyzed. The results showed that the distribution of vessels, the number of central vessels of the root system and the thickness of the cell wall of the xylem determined FWR of the watermelon varieties. There was no significant correlation between the activity of polyphenol oxidase and peroxidase and resistance, but there was a remarkable correlation between activity of vitamin C oxidase and resistance. Thus, activity of vitamin C oxidase can be used as a biochemical parameter for screening watermelon varieties for resistance to Fusarium wilt. There was no significant correlation between content of malic acid, oxalic acid, total content of organic acid and FWR, but there was a significant correlation between both acetic acid and citric acid and FWR. Thus, they also can be used as parameters to identify FWR of watermelon varieties. There were some differences between POD and EST isozyme spectrum in stems and leaves and the varieties differing in FWR. Therefore, the isozyme method can be used to screen watermelon varieties for FWR. Fusarium wilt resistant watermelon varieties have a higher content of glycine, serine, alanine, threonine, proline and arginine than Fusarium wilt susceptible watermelon varieties which in turn have a higher content of leucine, methionine and tyrosine.