ABSTRACT

Prospects for Genetic and Chemical Control of Bacterial Spot in Barbados

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Changes in prevalence, aggressiveness and sensitivity to copper and zinc bactericides of *Xanthomonas campestris* pv. *vesicatoria* races from bell pepper and tomato in Barbados since 1989 to 1990 were determined in an attempt to determine prospects for genetic and chemical control of the bacterial spot disease. The occurrence of bacterial spot on species of *Capsicum chinense* for the first time and the contribution of these species to bacterial spot of pepper and tomato were also investigated.

Of 24 races of *X. campestris* pv. *vesicatoria* identified, 20 of them were previously unreported on bell pepper and tomato in Barbados. Race specific host selection, mutation, exchange of genetic material and use of infested seed are postulated to explain the evolution of the bacterial spot pathogen population in Barbados.

Electrolyte leakage patterns and *in planta* growth experiments of *X.*

campestris pv. *vesicatoria* from *C. chinense* cultivar West Indian Red and six additional hot pepper cultivars indicated the possibility that these cultivars carry gene *Bs2* for bacterial spot resistance.

Taxonomic classification of 92 strains of *X. campestris* pv. *vesicatoria* with respect to race, possession of unique proteins, ability to hydrolyse starch and pectate and utilise *cis*-aconitate as a carbon source revealed that races of the bacterial spot pathogen frequently exhibited unique characteristics.

X. campestris pv. *vesicatoria* isolates were resistant to copper, zinc and streptomycin in amounts of 18.3, 78.1 and 2.6 percent, respectively.

Bell pepper cultivars carrying bacterial spot resistance genes *Bs1* and *Bs3* and differentially resistant tomato varieties, Campbell-28 and 913214SBK, succumbed to the disease but at significantly lower frequencies to susceptible cultivars grown alongside them. Notably, tomato cultivar Hawaii 7998 was unaffected by bacterial spot in the field.

Copper resistance of *X. campestris* pv. *vesicatoria* was generally associated with the presence of a unique 0.6 to 0.9 kb plasmid which had unique restriction endonuclease *Hinc* II and *Bam*H I sites, respectively, and

were shown to be transferable between strains. Reversion from copper resistance to sensitivity occurred at high frequency in bacterial cells grown *in planta* and in soil.

Successful management of bacterial spot in Barbados will require a multi-faceted approach including deployment of mixtures of resistance genes and exploitation of the bactericide resistance status of individual pepper and tomato fields.

Keywords:
Xanthomonas campestris pv. *vesicatoria*, bacterial spot, *Capsicum annuum*, *Capsicum chinense*, *Lycopersicon esculentum*, tomato, pepper, plasmid, copper, zinc, resistance.