

Halo-spot and external stem necrosis of tomato caused by *Pseudomonas syringae* in Sinaloa, Mexico

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Abstract *Pseudomonas syringae* pv. *tomato* has been observed in the fields in Sinaloa causing typical symptoms of bacterial speck. During the 2004–2005 growing seasons atypical symptoms were observed in tomato varieties grown in Sinaloa, consisting of external necrosis of stems, petioles, peduncles and fruit calyxes. Although the disease affected 80–90% of the foliage, there were no speck symptoms on fruit. The objectives of this study were to: (a) identify the causal agent of the disease, (b) determine the sensitivity of the pathogen to various antibiotics *in vitro* and (c) test their efficacy for controlling the disease in tomato plants under greenhouse conditions. The results of the present study indicate that biochemical and physiological characteristics as well as the molecular studies of bacterial isolates associated with the yellow halo spot and external necrosis of the stem of tomato are closely related to *P. syringae* pv. *tomato*,

although whether these isolates indeed belong to pathovar *tomato* needs further assessment. The efficacy of gentamicin sulfate and oxytetracycline chlorhydrate *in vitro*, and *in planta* under greenhouse conditions, represents a possible option for the chemical control of the disease under field conditions. The results also indicate a reduced sensitivity of the characterized isolates to copper hydroxide as compared with the above mentioned antibiotics in northern Sinaloa.

Keywords Bactericides · Identification · *Lycopersicon esculentum* · Symptoms · Tomato bacterial disease

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is the most important vegetable crop in Northern Sinaloa during the fall-winter growing season. This crop requires a considerable amount of manual labor in the field, in packing and in tomato-processing facilities. The dollar value of this crop from exports to the United States of America is over 1 billion US dollars annually (CAADES 2008).

Production and quality of tomatoes are affected by foliar diseases such as early blight (*Alternaria solani*), powdery mildew (*Oidiopsis taurica*) (León-Gallegos 1988), and late blight caused by *Phytophthora infestans* (Félix-Gastélum *et al.* 2004). The most important bacterial diseases are bacterial spot (*Xanthomonas campestris* pv. *vesicatoria*) (Bouzar *et al.* 1996), pith

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