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The effect of ice nucleation-active *Xanthomonas campestris* on the occurrence of bacterial shoot blight disease of tea caused by *Pseudomonas syringae* pv. *theae*

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ABSTRACT

Bacterial shoot blight (BSB) disease, caused by *Pseudomonas syringae* pv. *theae* (*P.s.t.*), is a major disease of tea (*Camellia sinensis*) in western Japan. Severe outbreaks of BSB disease are associated with cold and frost damage of the tea plant; however *P.s.t.* itself has no ice-nucleation activity. Because we have frequently isolated *P.s.t.* with ice nucleation-active *Xanthomonas campestris* (INAX) from lesions of BSB disease, the effects of INAX on the incidence of BSB disease were examined. A high density of INAX caused severe cold damage on tea leaves at -4°C and promoted lesion formation by *P.s.t.* in both cold chamber and field inoculation tests. In field conditions, INAX was isolated at high frequencies from lesions in mature lesions collected when in rainy weather, but at low frequency from young lesions in fine weather. Occasionally in naturally diseased fields, seasonal population dynamics of both *P.s.t.* and INAX on the phyllosphere were synchronous, and populations of both were higher during the winter. INAX were also detected in 54% of lesions collected from 56 naturally diseased fields. All data indicates that INAX often enhances the incidence of BSB disease in the field during the winter.

Key words: bacterial shoot blight (BSB), *Camellia sinensis*, *Pseudomonas syringae* pv. *theae*, ice nucleation-active *Xanthomonas campestris*, cold damage



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