

Histopathology of bacterial leaf blight of Sesame (*Sesamum indicum* L.) caused by *Xanthomonas campestris* pv. *sesami*

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Abstract

Sesame (*Sesamum indicum* L.) locally called as til is an important conventional oilseed crop of Pakistan. Pakistan is facing a chronic shortage in edible oil and the situation is getting serious with alarmingly explosion of population. Its indigenous production is below the consumption level and there exists wide gap between production and consumption. Sesame crop is subjected to various abiotic and biotic stresses in all stages of growth. Prominent bacterial pathogen associated with sesame is bacterial blight caused by *Xanthomonas campestris* pv. *sesami*. This pathogen is responsible for sesame production constraints during monsoon season in Pakistan. To handle the shortage of edible oil, there was urgent need to explore the basic information on host pathogen interaction. In the present study histological events of bacterial blight of sesame caused by *X. Campestris* pv. *sesami* were conducted by light microscopy to elucidate the process of infection of the causal bacterium. Susceptible and tolerant genotypes were tested for the present task with two methods of inoculation i.e. Dip Bacterial Suspension Method (DBSM) and Injection Method (IM). Healthy leaf/ discs were first dipped in bacterial suspension, then cleared by lactophenol ethanol (2:1) solution and surface view of discs was studied, while transverse sections were prepared from intact plants inoculated by IM. Bacterium was identified in infected tissues as dark blue masses using toluidine blue O.

Results showed that pathogen ingresses its host through stomata. When initial water soaking symptoms were developed at 2-3 days after inoculation (DAI), it was found that bacterium colonized substomatal and intercellular spaces of the spongy parenchyma cells. Discoloration of host protoplasm was evident at this stage. When light brown necrotic lesion appeared at 4-5 DAI, epidermal cells were compressed and destroyed and Veins vascular bundles were also infected. Later, at 5-6 DAI *X. campestris* pv. *sesami* was translocated from spongy mesophyll to xylem vessels and xylem vessels walls appeared as dark blue stained structure using both methods. Bacterial masses were observed in transverse section of xylem

tracheary elements and shown clogging of xylem vessels. Vascular bundles of stem sections also shown infection. Same changes were noted in tolerant genotypes but infection was delayed by 24 hrs.

It was concluded that *X. campestris* pv. *sesami* was reported as xylem limiting pathogen and blight symptoms were to be due to the blockage of nutrients and water flow. This clogging might be due to toxin or any other virulence factor/secondary metabolite.

Key words •Infection process •Histology •*Sesamum indicum* •Bacterial blight

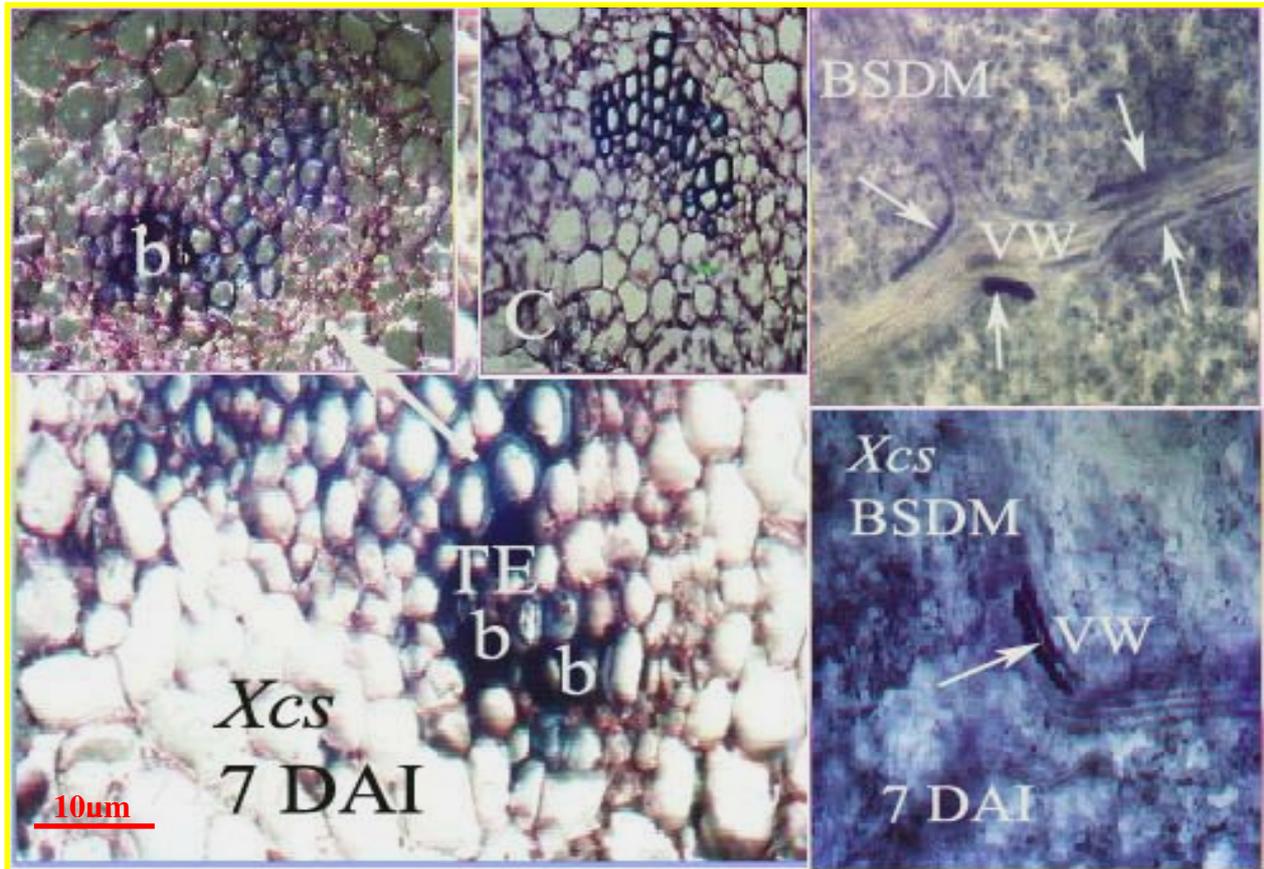


Fig. Histopathology of bacterial blight on sesame leaves through artificial inoculation of plants 7 DAI. T.S. section with bacterial masses in xylem vessels and showed dark stained structure, bacterium attacked the xylem and plugging of tracheary elements (TE) appeared as compared to control (C) X100Lactophenol ethanol cleared infected leaf tissues of necrotic lesion with bacterial masses (arrow) stained dark blue are localized in the transverses xylem vessels also known as vessels walls (VW) using BSDM X60 (Bar = 10µm).