

Expression of pathogenesis related proteins in black pepper (*Piper nigrum* L.) in relation to *Phytophthora* foot rot disease

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Abstract

Foot rot caused by *Phytophthora capsici* is the most serious disease of black pepper. Though all varieties of black pepper are susceptible to this pathogen, variations do exist concerning the degree of tolerance and mechanisms of defense. The protein profiles of a relatively tolerant and a susceptible black pepper (*Piper nigrum*) variety along with that of a resistant wild species (*Piper colubrinum*) were evaluated to detect variations in the defense related proteins/enzyme expression in response to *P. capsici* infection. The SDS-PAGE analysis revealed two additional polypeptides of 16.5 and 8 kD in the leaves of the tolerant variety ('Kalluvally') on the second day after infection and these proteins expressed only on the fifth day in the susceptible 'Panniyur-1'. Variety specific proteins of molecular weight 90 and 5.5 kD were also found expressed in 'Panniyur-1' while 'Kalluvally' had unique protein bands of 14.3, 8.8, and 7.0 kD. However, *P. colubrinum* with 16 distinct bands had an altogether different banding pattern. The native protein profile obtained also indicated the expression of two additional proteins in *P. nigrum*. The over-expressed protein was characterized as b-1,3 glucanase. The intensity of expression was directly related to the level of tolerance. The role of enzymes like phenylalanine ammonia lyase (PAL), chitinase, and peroxidase in defense mechanism was also analyzed. The resistant genotype *P. colubrinum*, possessed higher enzyme activities than the *P. nigrum* varieties tested. This study thus confirmed the role of b-1, 3 glucanase and related enzymes in the defense mechanism of black pepper against foot rot disease.

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