

# Turkish Journal of Agriculture and Forestry

Turkish Journal

of

Agriculture and Forestry

**Microscopic Evaluation of Interactions between Varieties of *Arabidopsis thaliana* Challenged by *Peronospora parasitica***

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**Abstract:** *Peronospora parasitica* (Pers ex Fr.) Pers. is an obligate biotrophic pathogen that causes downy mildew in *Arabidopsis thaliana* (L.) Heynh. In this study, cotyledons of four *A. thaliana* varieties were inoculated with the Cala2 isolate of *P. parasitica* and the degree of susceptibility was observed under the microscope 1, 2, 3 and 7 days after inoculation (DAI). Microscopic examination of infected tissues revealed that early restriction of the pathogen was accompanied by a hypersensitive response (HR) characterised by autofluorescence under UV or blue light excitation. All haustoria, if visible at all, formed in the cells that underwent the HR in both Ws-3 and Oy-0 at all time points tested. Susceptibility was characterised by extensive pathogen growth in intercellular spaces with the formation of haustoria in both epidermal and mesophyll cells without any host response. In the Nd-1/Cala2 interaction, 100% of the haustoria formed in unresponsive cells 1 DAI; 5% of the haustoria was, however, ensheathed with callose deposits by 3 DAI in the same host, presumably because of haustorial ageing. Sexual and asexual sporulations of *P. parasitica* begun approximately 3 DAI. In the intermediate interaction, the deposition of callose around the haustorial body and delayed cell death were identified as the main mechanisms of resistance in the Col-0 variety.

**Key Words:** *Peronospora parasitica*, *Arabidopsis thaliana*, disease resistance, compatibility, hypersensitive response

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Turk. J. Agric. For., **26**, (2002), 125-132.

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