

DURABLE *mlo*-BASED RESISTANCE AGAINST POWDERY MILDEW FUNGI IS CONSERVED IN MONOCOTS AND DICOTS

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Powdery mildews are common and economically important plant diseases. In monocotyledonous barley, loss-of-function alleles of barley *Mlo* result in effective immunity against this fungal pathogen and provide durable broad-spectrum disease resistance in agriculture. However, despite its discovery more than 60 years ago, *mlo*-based resistance has been considered a barley-specific phenomenon so far. Barley MLO gene belongs to a plant-specific gene family and it encodes for a seven transmembrane domain protein localized in the plasma membrane.

The genome of the distantly related dicotyledonous plant species, *Arabidopsis thaliana*, encodes for 15 homologues of the barley MLO. Recently, we demonstrated that loss-of-function alleles of three partially functionally redundant *AtMLO* co-orthologs of barley *Mlo* confer resistance to virulent powdery mildew species. These data revealed a conserved requirement for MLO proteins in powdery mildew pathogenesis suggesting that a common entry mechanism of powdery mildew fungi into plant host cells evolved once and at least 200 million years ago. Our data also imply that durable, broad-spectrum *mlo*-based powdery mildew resistance may be engineered in any higher plant species.

Barley [*mlo*] mutant plants grown under axenic conditions exhibit developmentally controlled phenotypes, which include formation of spontaneous cell wall appositions (callose) and senescence-like leaf chlorosis and necrosis. In *Arabidopsis*, similar pleiotropic phenotypes were observed in the *Atmlo* triple mutant with onset at six weeks. However, the molecular mechanisms controlling these pleiotropic phenotypes are still unknown. To address this question, we performed a comparative transcriptional profile analysis of untreated 5-, 6- and 7-week-old *Atmlo* triple mutant and the wild type Col-0 plants using Affymetrix ATH-1 full genome chips. Analysis of genes specifically up- or down-regulated in the *Atmlo* triple mutant is currently in progress.

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