

Technology Offer

Epidermis-specific pathogen-inducible promoter for cereals

Reference Number 06-00059

Challenge

In plant breeding specific advantageous properties such as pathogen resistance are transferred to useful plants by means of recombinant DNA technology in order to increase yields or improve the properties of the products. As ubiquitous gene expression often has negative effects on normal physiology in some tissues, and presence of transgenic products shall be prevented in harvested plant parts, tissue specific expression of the transferred genes is desired. With regard to pathogen resistance especially the epidermis as intrusion border for pathogens is the relevant organ for expression of resistance genes. So far, in particular for monocotyledons such as cereal plants, only few suitable epidermis-specific constitutive promoters are available. As constitutive expression may cause undesired side effects in the transgenic plants, epidermis-specific and preferably pathogen-inducible promoters are needed.



Promotor activity of Ger4c (=GLP4) revealed after induction by local inoculation with powdery mildew (Blumeria graminis f.sp. hordei, Bgh). Expression of the GUS reporter gene (β -glucuronidase) detected by histochemical staining.

Technology

The invention relates to a promoter region that enables and controls expression of transgenes in monocotyledon plants in an epidermis-specific and pathogen-induced manner. The inventive GER4c promoter provides a promising tool to study signal transduction (cis-elements and trans-acting factors) of pathogen-associated molecular patterns (PAMP)-triggered immunity and to engineer strictly localized and pathogen-regulated disease resistance in transgenic cereal crops.

Commercial Opportunity

The technology is offered for co-development of pathogen-resistant transgenic plants or in-licensing.

Development Status

The promoter was validated in transgenic barley plants for powdery mildew and scald as inducing pathogens. Expression data for transgenic maize are also available.

Patent Situation

Granted European and US patent (EP1888754, US7,834 243), Canadian application pending.

Further Reading

Himmelbach et al. 2010 : Promoters of the Barley Germin-Like GER4 Gene Cluster

Enable Strong Transgene Expression in Response to Pathogen Attack. The Plant Cell, Vol. 22: 937–952.



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