identifiziert werden können, lässt sich anschließend durch eine gezielte Feinkartierung der Resistenzlocus näher eingrenzen und ein für die Züchtung geeigneter Marker ableiten.

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Herzog, Katja[1]; Flachowsky, Henryk[1]; Deising, Holger[2]; Hanke, Magda-Viola[1]

[1] Julius Kühn-Institut, Institute for Breeding Research on Horticultural and Fruit Crops, Dresden; [2] Martin-Luther-University, Faculty of Natural Sciences III, Institute of Agricultural and Nutritional Sciences, Phytopathology and Plant Protection, Halle (Saale)

Ergebnisse zur Etablierung alternativer Strategien zur Erzeugung markergen-freier Apfelpflanzen mit erhöhter Resistenz

Preliminary results to generate marker-free apples (*Malus domestica* BORKH.) with increased fungal resistance

Abstract

The production of genetically modified (gm)-plants without selectable marker genes is one of the most important goals of genetic engineering in apple. Therefore, we started the development and establishment of an effective transformation system to generate marker-free apple plants. The system is based on a site-specific recombination of the selectable marker gene *nptII* controlled by a heatshock-inducible promoter. We tested the system using a monitoring vector which combines the inducible site-specific recombinase for the precise elimination of *nptII* and a GUS encoding gene (*gusA*) to realize a histochemical monitoring of recombination events. Partial marker-free apple plants were obtained after heat shock and fully marker-free plants were generated following a second regeneration strategy. The oral presentation focused on this part of the project. Apple powdery mildew *Podosphaera leucotricha* (Ell. Et Ev) SALM. belongs to the economical important fungal pathogens in apple production and causes decreased yield as well as reduced fruit quality. To increase resistance against *Podosphaera leucotricha* we transformed apple plants with a specific construct. Transgenic plants were selected, characterized by molecular techniques and tested for their resistance to powdery mildew. Four of the five tested transgenic lines showed significantly reduced symptoms of disease compared to control plants.

Keywords**:** *Malus domestica*, *nptII*, marker-free, site-specific recombination system

Admassu, Belayneh; Friedt, Wolfgang; Ordon, Frank

Julius Kühn-Institut, Institut für Resistenzforschung und Stresstoleranz (RS), Quedlinburg

Diversity of *Puccinia graminis* f. sp. *tritici* Population in Ethiopia and Stem Rust Resistance Genes in Wheat

Abstract

Ethiopia is the second largest wheat producer in sub-Saharan Africa next to South Africa. It is an important food grain cultivated on ca. 1.4 million ha. The national average productivity is estimated at 1.7 tons/ha. The low productivity is attributed to a number of factors including diseases like stem rust caused by *Puccinia graminis* f. sp. *tritici* (*Pgt*). As a result of a recent spread of a new and highly virulent race called Ug99, stem rust is becoming a serious threat to wheat production in Ethiopia and other east African countries. Durable stem rust control in wheat requires detailed knowledge on virulence spectrum and genetic diversity of *Pgt*. Molecular markers were proven to be easier and more efficient than the conventional method in variety development for disease resistance. Hence, this project studied the virulence and genetic structure of *Pgt* populations in Ethiopia, and developed a genetic map of a