ABSTRACT

"Plant transgenes: integration, silencing and overexpression"

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I will describe the general picture of plant transgenesis by presenting the latest results obtained in the group on the integration and expression of transgenes in plants. Although Agrobacterium mediated transformation is widely used, the system is certainly not completely understood and there are still many unanswered questions.
A first big unknown is how and when the variable number of T-DNA copies are integrated at random positions in the plant chromosomes. However, using the new recombination technologies, the target position and copy number of transgenes can now better be controlled.
A second enigma is how a particular transgene may show up to 1000 fold different expression levels in independently obtained transformants. It became clear that the transgene expression level is not only controlled by its sequence such as the quality of the promotor and transcript maturation signals but also by the transgene insertion site, the copy number, genetic background and several expression controlling mechanisms. Studying transgenes, it was found that chromatin modifications, DNA scanning mechanisms and posttranscriptional control all modulate the expression level. Particular determinants are inverted repeats and thresholds for aberrantly processed transcripts in nucleus and cytoplasm.. We will present 2 examples of how various epigenetic mechanisms can change transgene expression levels.
I will conclude by illustrating the application of plant transgene expression for molecular farming of valuable recombinant proteins. For this, we will focus on the protective ability of IgA antibodies when provided in the feed against enterotoxigenic Escherichia coli infection in weaned piglets.