Czech Journal of GENETICS AND PLANT BREEDING

Table of Contents

Home

Editorial Board

For Authors

- Authors Declaration
- Instruction to Authors
- Guide for Authors
- Copyright Statement
- Submission

For Reviewers

- Guide for Reviewers
- Reviewers Login

Subscription

Czech J. Genet. Plant Breed.

Potential of chloroplast genome in plant breeding

Czech J. Genet. Plant Breed., 46 (2010): 103-113

Chloroplast engineering (or chloroplast transformation technology, CTT) is a strategy consisting of inserting a transgene into the chloroplast genome of a plant instead of its nuclear genome. CTT brings advantages such as control of the site of gene insertion, high rates of transgene expression and protein accumulation, lack of transmission of the transgene via pollen due to the fact that plastid genes are maternally inherited and an absence of epigenetic effects. Tobacco remains the species most amenable to CTT to date, although chloroplast genetic engineering has also been achieved successfully in crops such as maize, tomato, cotton, potato, rice and sugar beets. Improving agricultural traits such as herbicide and pathogen resistance, resistance to drought, salt tolerance and phytoremediation potential

are all promising applications. Molecular pharming is another area of chloroplast engineering with high potential; the production of a wide range of products such as vaccine antigens, pharmaceutical proteins (human somatotropin, human serum albumin, human interferon, monoclonal antibodies) and industrial proteins (avidin, beta casein, liquid crystal polymers, xylanase, anthranilate synthase) is economically beneficial in comparison with bacterial cultivation or animal cell cultures. This review summarises the current status of CCT and its potential economic impact from the viewpoint of high levels of transgene expression and high accumulation of foreign proteins.

Keywords:

agricultural traits; chloroplast engineering; industrial proteins; molecular pharming; total leaf soluble protein

[fulltext]

Sciences