GM Grasses – Field trials

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Perennial ryegrass is an important forage crop throughout the temperate regions of the world, including major parts of Europe, North and South America, South Africa and New Zealand. Although highly valued for its high palatability and digestibility, the nutritional value of grass is inferior to other high quality feeds such as maize silage. A non-flowering vegetative ryegrass plant producing only nutritionally valuable leaves, but no lignin rich stems and flowers, will have considerably higher forage quality, contributing to increased milk and meat production. A non-flowering, biological contained grass product in the end-users hand would also minimize the possibility of gene spread *via* pollen or seed dispersal. However, in order to produce and distribute this type of product an efficient and controllable seed production system is still required. Therefore the implementation of a conditional switch system to induce flowering also had to be developed.

Total repression of flowering was achieved by the constitutive overexpression of a floral repressor, and conditional

flower induction under laboratory conditions could be achieved with the ethanol inducible switch system. Although operational, considerable optimizations on the ethanol switch had to be made to improve the functionality of the system in ryegrass. This task is currently undertaken as part of the EU-FP6 project TansContainer. In another GM-based approach the potential to improve the nutritional value of ryegrass through constitutive expression of fructosyltransferase genes from onion was investigated, and 2 to 3 fold increased fructan levels were obtained in greenhouse grown plants. Together with the Danish authorities for environmental affairs a GM field trial was designed and procedures to minimize any impact on the environment were developed. In autumn 2006 a small scale field trial with the high fructan GM plants was established under restrictive control measures and supervision. Experiences and comments concerning trial design and collaboration with the authorities will be discussed.

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