Elucidation of the genetic diversity in populations of perennial ryegrass and development of selection methods for the trait „persistence“

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Introduction

Lolium perenne L. (perennial ryegrass) is an out-crossing grass species of major agricultural importance and is cultivated in temperate regions world-wide. Perennial Ryegrass can be utilized for the following objectives: as a component in forage seed mixtures (cultivated only a few years, maximum yield), it can be sown for generation of persistent grassland also in rough regions and it could be cultivated as amenity grass (intensive and extensive lawn).


http://www.dasferienland.de

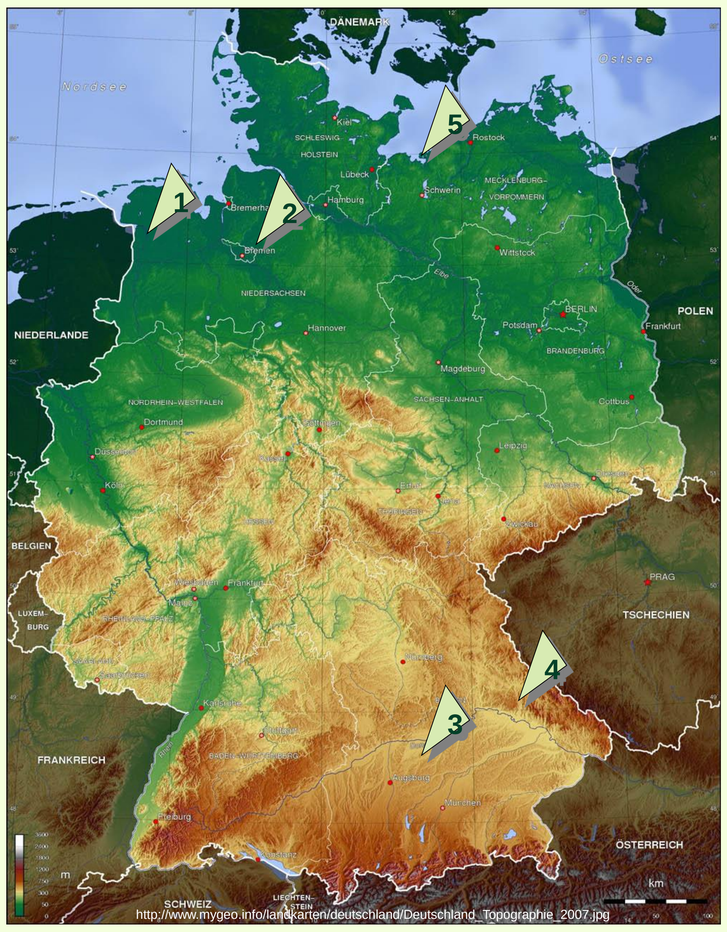

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Figure 1: Map of Germany showing the five experimental sites (for numeration, cf. to ‘Material‘).

Material

- set of 19 forage varieties and 4 lawn varieties
- five defined sites (Figure 1; sites 1-4 sown in 2004; site 5 sown in 2005):

(1) Detern, Lower Saxony; moor;
(2) Schmalenbeck, Lower Saxony; moor;
(3) Spitalhof, Bavaria; mountainous;
(4) Hötzelsdorf, Bavaria; mountainous;
(5) Malchow/Poel, Mecklenburg Western Pomerania; maritime.

- within the variety set: winter hard and less winter hard varieties

Figure 2: Genotype mixtures and winter survival of the variety “Guru“ from the sites Hötzelsdorf (A, mountainous) and Schmalenbeck (B, moor) after four years of cultivation, with drastic changes being visible at Schmalenbeck.

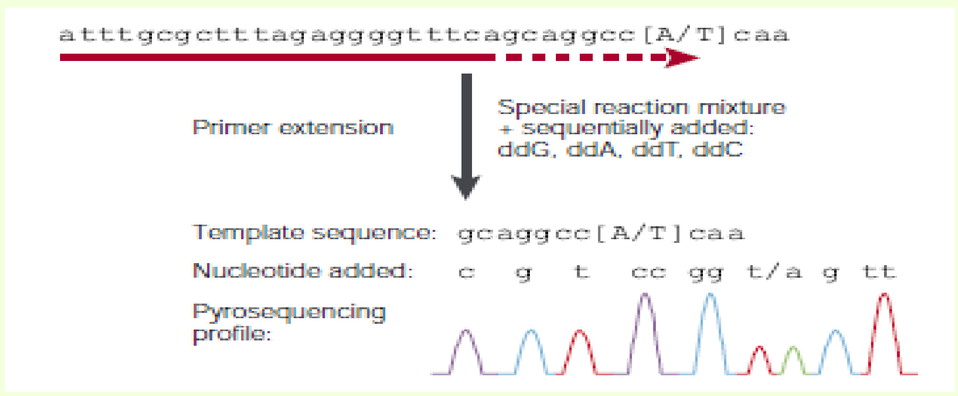

Figure 3: Scheme of the Pyrosequencing method (Sham et al., 2002).

Status & Results

- detection of changes in SNP allele compositions between original genotypes (seeds) and genotypes in the field after four years of cultivation (plants, cf. Fig. 2)
- starting material: two visually fittest varieties in trial locations vs. two least fit varieties with Pyrosequencing (PSQ) method (method, cf. Fig. 3; pyrograms, cf. Figs. 4)
- based on the PSQ results: analysis of differences concerning the allele compositions, aiming at selection of genotypes with increased persistence

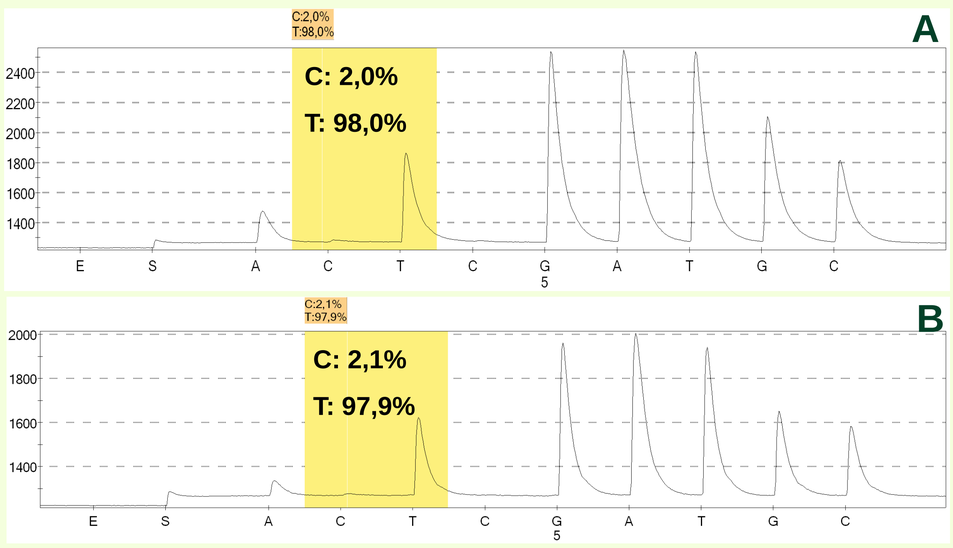

Figure 4: Pyrogram of the variety “Guru” at the sites Hötzelsdorf (A) and Spitalhof (B), respectively, after four years of cultivation.

Outlook

-development of a selection method for the trait “persistence” for the 19 varieties
-augmentation of LfL advisory skills regarding variety recommendations to breeders and growers in order to meet their specific agricultural and local requirements


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