Analyzing effects of natural selection on populations of *Lolium perenne* L. and developing selection methods for the complex feature ‘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 different objectives:

- component in forage seed mixtures (cultivated only a few years, maximum yield)
- sown for generation of persistent grassland also in rough regions
- amenity grass (intensive and extensive lawn)

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):

  Detern (1), Lower Saxony; moor;

  Schmalenbeck (2), Lower Saxony; moor;

  Spitalhof (3), Bavaria; mountainous;

  Hötzelsdorf (4), Bavaria; mountainous;

  Malchow/Poel (5), Mecklenburg Western Pomerania; maritime.
- within the variety set: winter hard and less winter hard varieties

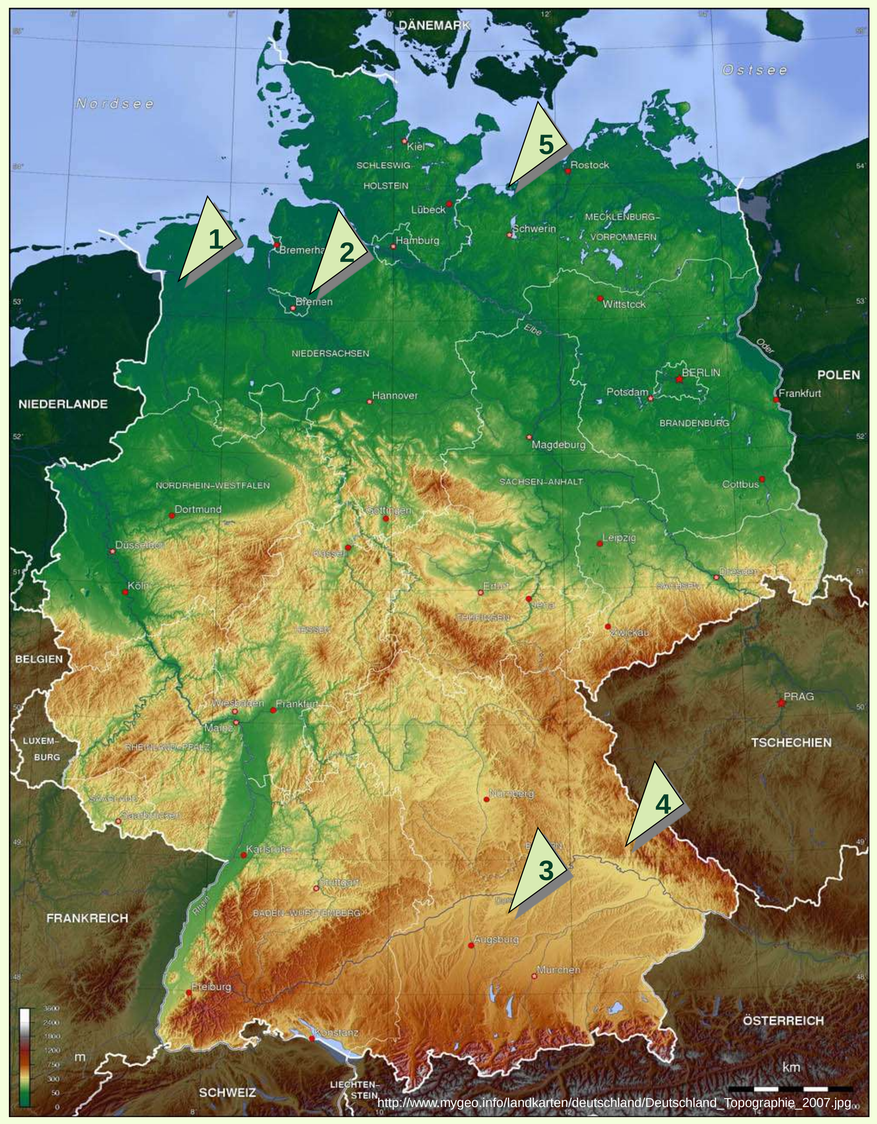

Figure 1: Map of Germany showing the five experimental sites (for numeration, cf. to ‘Material‘).

Project & Objectives

In a project on genotype persistence, initiated by the LfL, IPK is involved in the following objectives:

- Is there any genetic alteration in the genotypic composition of the above varieties in the period from sowing until the end of the second year of full yielding at the different trial sites?
- Can genetic drift be detected?
  If yes: to which extent? in which direction? at all sites? in all varieties?
- Can the effects of selection be detected reproducibly on the DNA in all respective varieties? Which alleles are common to successful plants and which alleles are lost?
- Which characteristics distinguish the superior genotypes?

Current experiments

- detection of changes in SNP allele compositions between original genotypes (seeds) and genotypes in the field after four years (plants, cf. Fig. 2)
- starting material: two visually fittest varieties in trial locations vs. two least fit varieties
- based on the results: detailed analyses, aiming at selection of genotypes with increased persistence

Acknowledgement

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

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