Aim is to combine beneficial traits of Lolium and Festuca

Perennial ryegrass (Lolium perenne L. (Lp)) is the most common fodder grass in the temperate maritime environment. Due to global warming more dry spells occur during summer, causing severe reductions in dry matter yield of perennial ryegrass. Tall fescue (Festuca arundinacea Schreb.) (Fa) on the other hand, is more drought tolerant thanks to its higher root biomass (Fig. 1). However, digestibility of the F. arundinacea organic matter is lower compared to L. perenne. We aim to combine the beneficial traits of both genera by interspecific hybridisation (Festulolium synthetics).

Seed yield in Festulolium hybrid populations is lower than in Lolium

The seed yield of both Festulolium synthetics was inferior to the seed yield of the Lolium species. The seed yield of Lp (4x) x Fp (4x) remained stable in the two consecutive generations. The seed yield of Lm (4x) x Fa (6x) dropped extremely from syn1 to syn2.

Genome instability in F2 and F3 Festulolium affects a genetic shift towards Lolium

The chromosome number (2n=4x=28) remained the same in the successive generations of the Lp (4x) x Fp (4x) hybrids. GISH analysis revealed no clear shift to one of the composing genomes, indicating a quite stable genome composition (Fig. 5).

However, in the Lm (4x) x Fa (6x) hybrids, the chromosome number decreased in the successive generations. In addition, GISH analysis showed an unstable genome composition with a clear shift towards the Lolium genome (Fig. 6).

Tetraploid and pentaploid F1 Festulolium have great potential for breeding towards more stress tolerance

Both F1 hybrid combinations Lm x Fa and Lp x Fp had good scores for stress parameters (crown rust resistance, drought tolerance (Fig. 2), winter hardness) compared to the parental species. In addition, both F1 populations showed the expected chromosome numbers and genome composition (Fig. 3).