



# Amenity Grass Breeding & Seed Production



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Rigby Taylor and its seed-breeding partner Top Green have a long and very successful relationship. Top Green's breeding and research station is situated at Les Alleuds in France and is the partnership development centre for Rigby Taylor grass seed mixtures.

## The Fundamentals

The breeding programme includes all major turf grass species including, perennial and annual ryegrass, tetraploid ryegrass, fine fescue, tall fescue, smooth-stalked meadow grass and bent grass, plus minor species.

The time taken to identify, develop and produce a new amenity grass cultivar take 12-15 years; Breeding, selection, experimentation, development, seed production and official GEVES CTPS (Le Comité Technique Permanent de la Sélection des plantes cultivées) trials all take place on the 30 hectare site at Les Alleuds. The programme of continual assessment, maintenance and management, involves 60,000 individual plants, 4,000 breeding lines, 8,000 turf plots and 8,000 sq.m of turf performance plots, including Rigby Taylor mixture trials plus seed yield trials. Every year the plant breeder walks an amazing 300 kilometres (187 miles) and the research team a further 1,000 kilometres (622 miles) assessing every single plot.

## The Dating Game

The primary breeding objectives are extensive and include stress tolerance (wear, disease, cold, heat, drought, mowing height, rooting), appearance (leaf width, growth habit, shoot density, colour) and seed yield. The natural breeding process begins with basic genetic material, crossing ecotypes (wild plants) with registered cultivars individually selected for a specific characteristic from the thousands of cultivars stored in the breeders' genetic seed bank. Cultivars date from the most recent introductions to those bred over half a Century ago. Stored at a constant temperature of 7.5°C and 38-39% humidity, the tiny handfuls of each cultivar of breeders' seed is maintained in perfect viable condition.

For each species, seedlings of ecotypes and/or cultivars with similar heading dates (flowering time) are grouped together and cross pollinated in isolation in the glasshouses. Heading date is critical, as only simultaneous flowering of individual plants will produce fertile seed. The resultant seeds are harvested by hand and individually sown into trays, then pricked out and grown on as individual plug plants in pots in readiness for field selection trials.



*Field Selection Trials, Les Alleuds Research*





*Isolation Heading Date Trials*



*Individual plug plants for Field Selection Trials*



*Progeny Selection Trials*

## Progeny Selection

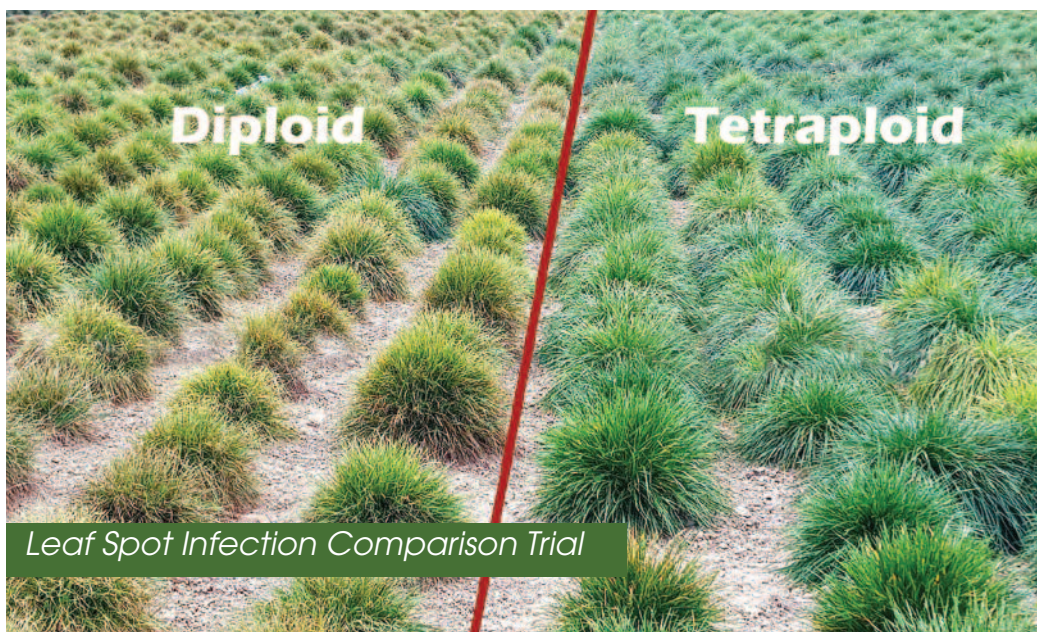
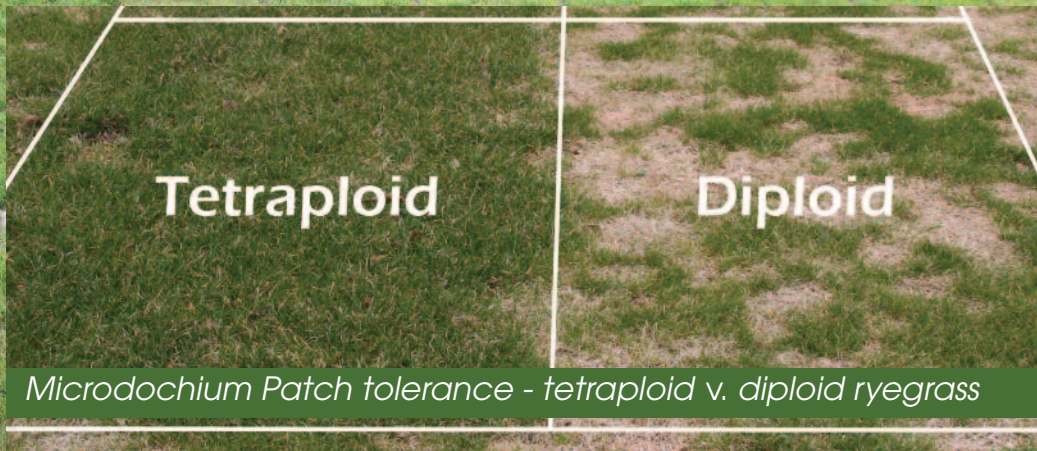
Every year 15,000 plug plants are planted out by machine into the field nurseries. Meticulous weekly observations of every single plant are digitally recorded throughout the seasons to assess characteristics including disease, heat, cold and drought tolerance, leaf width, shoot density, growth habit, winter and summer colour and genetic leaf colour. Only 5-10% of plants make it through to the next stage and the successful 750 survivors remain in the field for further observations, including heading date, disease and leaf colour. Finally subjected to seed yield trials the most productive 400 are harvested by mini-combine for parent turf trials.



*Harvesting Seed Yield Trials*



Parent turf trials





## Parent Turf Trials

Harvested seed is sown out in individual 1sq.m replicated plots at a sowing rate of 10-35g per sq.m depending on species. The 4,000 seeded plots are scrutinised for appearance and performance qualities including leaf width, sward density, disease tolerance, winter colour, drought tolerance, simulated wear and close mowing.

## Poly Cross Creation

Following 2-3 years of rigorous performance testing the best 80 clones are selected and grouped together by heading date, colour and purpose i.e. sports, close mowing, landscape, for polycross (clone crossing) creation.

The clonal groups are planted together in small blocks. A total of 4,000 grouped plants are grown in isolation to avoid cross-pollination, with the plots typically surrounded by taller growing forage and cereal crops for protection. The first seed harvest is collected by hand then sown in rows to produce 60-80kg of breeder's seed, some of which is destined for the elite turf trialling stage.

## Global Elite

The elite performance trials are linked to a global network of trial sites in distinct climatic regions

throughout Europe, including the UK, and the USA, testing the polycross clones to the limit.

During the trials the numbers are whittled down from 80, to 20 and finally 10 parent plants. At the end of the 3 year trials only the top 10 clones make it through for seed multiplication, during which time the plants are all assessed for homogeneity.



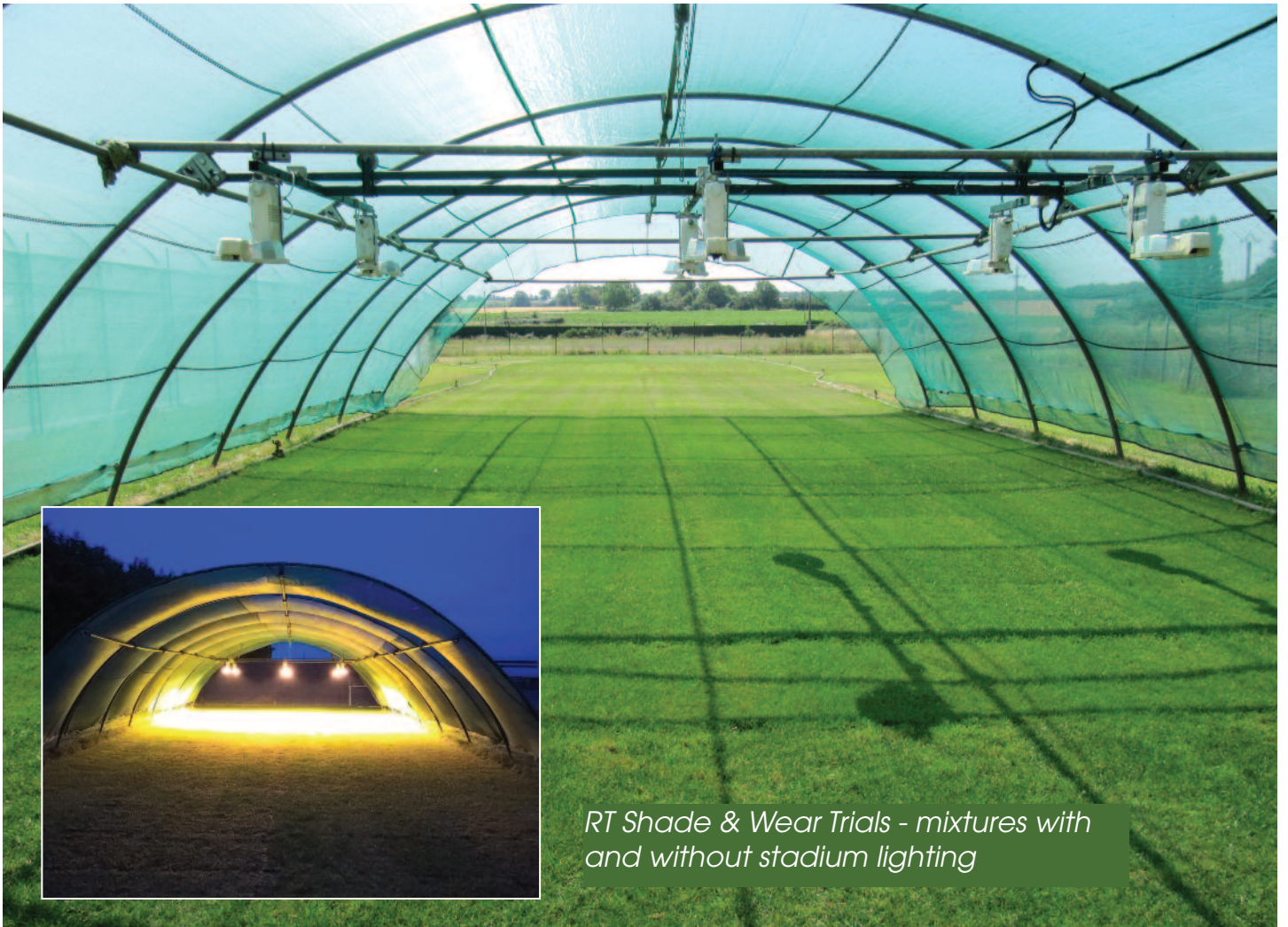
*Selection for intense wear tolerance*

The first seed multiplication of each polycross yields 2-5kg from each 50m<sup>2</sup> isolation plot and the second 100-400kg from each 2,000m<sup>2</sup> plot. Seed from the second multiplication harvest is destined for further homogeneity testing, official registration trials and pre-basic seed production.



*Polycross clones selections*





*RT Shade & Wear Trials - mixtures with and without stadium lighting*



*Isolation - Seed Multiplication Trials*





*RT Sports Wear Trial at STRI*



## Testing Times

Official registration and national list trials will determine the ultimate success or failure of 15 years of hard work and investment. Just one new cultivar from the original 15,000 progeny will likely make it through to commercial production.

All grass seed cultivars marketed within the European Union must attain registration on the European Commission Plant Variety Database.

The proposed cultivars are officially scrutinised over a two-three year period to prove they are...

**Distinct** Must display identifying physiological or morphological characteristics that are completely distinct from existing registered cultivars

**Uniform** Every offspring from every seed must be absolutely identical e.g. growth habit, colour, heading date

**Stable** There must be no reversion to parent plant type

Official registration enables the new cultivar to be named and placed on the Common Catalogue, making it eligible for sale and marketing in the UK.

Simultaneously or immediately following registration, national listing trials finally determine the destiny of the new cultivar. Lasting 2-5 years depending on protocols, climate and use this could include British Society of Plant Breeders (BSPB) trials at STRI (for Turfgrass Seed) the GEVES

CTPS in France, Bundessortenamt in Germany, Grasgids in Holland, Scanturf/Scangreen for Nordic countries and the National Turf Evaluation Program (NTEP) trials in the USA. Leading up to commercial production, it's at this stage potential new cultivars are integrated in Rigby Taylor mixture trials.

## Commercial Production

Pre-basic seed from the polycross multiplications is harvested to produce basic seed for the first commercial crop production. Basic seed is used by experienced growers to produce certified seed. Each step of field seed production process is carefully monitored by licensed crop inspectors.



*Grass crop harvesting*



## Production & Certification

Production competition from fodder crops, cereal crops and bio fuels has led to a significant global reduction in grass seed production. The generational loss of experienced growers, chemical restrictions and climatic pressures affecting yields all contribute to making grass seed a challenging crop to grow. Denmark remains a key production area for grass seed, at around 40% of the market, with the remainder grown in Eastern Europe, the USA, New Zealand and a minor percentage in the UK. Danish production is generally under-sown as a companion crop with cereals or legumes, good cultural practice to naturally support clean crop production.

Following combine harvesting the crop is immediately dried down to around 12% moisture, then cleaned and sampled for purity and germination testing. In order to be officially certified seed much must reach European Union minimum standards. Supplementary for the UK market, the Fodder Plant Seed Regulations defines a Higher Voluntary Standard (HVS), delivering still higher levels of purity. These regulations provide a legal framework for the production, certification and marketing of grass seed, further ensuring varietal purity, freedom from noxious weeds and minimum quality standards.

Finally the new cultivar is ready for availability as an 'R' Range grass seed mixture; 15 years, 15,000 progeny, one new cultivar. Quite remarkable!

## Rigby Taylor and Top Green provide innovative, quality mixtures for all Sports Turf and Landscape surfaces.



Rigby Taylor Limited

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