Open up a bag of seed. Reach in and let the grains flow through your fingers. Did you know that within each seed is at least 15 years’ worth of technology?

At the Top Green breeding and research station in Les Alleuds, France, sits the partnership development centre for Rigby Taylor’s grass seed mixtures.

At this site, research is underway, with the singular aim of creating the next generation of turfgrass species.

Did you know it takes 12-15 years to develop a new amenity grass cultivar?

This means the work being undertaken at Les Alleuds is hugely valuable for the future of golf course management. Not only that, but it could also all be for nothing.

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.

There are 60,000 plants, 4,000 breeding lines, 8,000 turf plots and 8,000m² of turf performance plots including Rigby Taylor mixture trials. Seed yield trials are all continually assessed, maintained and managed and every year the plant breeder walks an amazing 300 kilometres. The research team walks a further 1,000km, assessing every single plot.

STAGE 1. THE DATING GAME

The primary breeding objectives are 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 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 50 years ago. Stored at a constant temperature of 7.50°C and 38-39% humidity, the tiny handfuls of each cultivar are maintained in perfect viable condition.

For each species, seedlings of ecotypes and cultivars with similar heading dates (flowering time) are grouped together and cross pollinated in isolation in glasshouses. The heading date is critical, as only simultaneous flowering will produce fertile seed. The resultant seeds are harvested and sown into trays, then pricked out and grown as individual plug plants in pots, in readiness for field selection trials.
STAGE 2. PROGENY SELECTION

Every year 15,000 plug plants are planted 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, they are subjected to seed yield trials and the most productive 400 are harvested by mini-combine for parent turf trials.

STAGE 3. PARENT TURF TRIALS

Harvested seed is sown out in individual 1m² replicated plots. 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.

STAGE 4. POLYCROSS CREATION

Following 2–3 years of rigorous performance testing, the best 80 clones are selected and grouped together by heading date, colour and purpose 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.

Continued over
STAGE 5. GLOBAL ELITE

The elite performance trials are linked to a global network of trial sites in distinct climatic regions throughout Europe 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 three-year trials only the top 10 clones make it through for seed multiplication, during which time the plants are all assessed for homogeneity.

STAGE 6. 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 2-3 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, it’s at this stage potential new cultivars are integrated in Rigby Taylor mixture trials.

Disease prevention

A great deal of research, seed breeding and development efforts have been directed to the turf’s ability to tolerate more effectively against turf diseases. This has always been a focus for seed breeders but is brought more into focus with the ever-increasing revocation of fungicides. The most recent of those being based on iprodione, an active ingredient that has for many years been the ‘standard’ against a wide range of common turf diseases.

Additionally, it has been seen the development of diseases which are new to our industry. For example, in Europe such diseases as brown patch and gray leaf spot. It is considered that going forward, greater emphasis will be given to disease tolerance and plant resistance.

During the past two years, the introduction of Tetraploid perennial ryegrass seed mixtures by Rigby Taylor and their seed breeding partner Top Green, has demonstrated better disease tolerance than the diploids.

Low inputs

The future will also see an increasing demand for low input species and the use of hard and sheeps fescue will increase going forward in phase with future demands from the market.

Less nitrogen

Drought tolerance and using less applied nitrogen will also be factors that will become more and more important. Taking this into account, breeders will still be selecting for the current performance characteristics such as fineness of leaf, density, wear and shade tolerance.
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.

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 must reach European Union minimum standards.

In the UK market, the Fodder Plant Seed Regulations defines a Higher Voluntary Standard, 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 R Range grass seed mixtures.

15 years, 15,000 potential parents, one new cultivar. Quite remarkable!

**Seed Treatments**

Seeds, coated with different products, have in the past provided very variable results and much research and development work has been devoted to liquid seed treatments as there is no risk of broken particles or dust. With such a small increase in bag weight (less than 2%), there is no requirement to increase the recommended sowing rates.

Liquid Seed coating showing penetration of seed. The treatment has a surfactant, which will allow moisture to penetrate the seed more rapidly and stimulate earlier germination.

The future for liquid seed treatments looks very positive, with one particular commercially available treatment showing excellent results in stimulating and supporting accelerated germination and emergence. This has been achieved by incorporating speciality surfactants with penetrant properties that allow moisture to enter into the seed, carrying target nutrients for early root mass development and to aid faster establishment.

Additional research has been carried out, looking at the addition of trichoderma, which will add additional benefits for disease tolerance.