

Amenity grass breeding specialist, David Rhodes of Advanta Seeds UK, explains how breeders are giving greenkeepers a helping hand

1 Fields of dreams



Above: An aerial view of Advanta's breeding, research and trial facilities at Boothby Graffoe near Lincoln. The recently constructed reservoir, which holds just under 23 million litres of water, enables the company to replicate average rainfall in times of drought.

The stresses and strains we place on our sportsturf today, tests it to the limits. And these pressures are growing. Golfers, with more leisure time, want to play more rounds. Greens Committees want their courses to be in tip-top condition all year. There are also economic pressures on greenkeepers to cut labour costs, and environmental pressures to reduce chemical usage.

Amenity grass breeders recognise and understand these pressures. They

are working at the forefront of breeding technology, aiming to produce new cultivars that can cope with increased use, with less physical and chemical input.

Up until 1940, commercial use of amenity grasses in Europe was mainly restricted to trading of seed lots, collected from natural stands of species such as bent grasses and fine fescues. But in the 1960's a revolution took place in turfgrass breeding, when new varieties were developed

specifically for amenity use.

At the same time, the introduction of plant breeder's rights for amenity grasses, and the publication of cultivar lists – led to increased investment by breeding companies in this area. Over the past 20 years the number of cultivars included in the Common Catalogue of the EU – which lists all known, distinct varieties, has increased more than six-fold.

The traditional species sown on golf courses, are the red fescues and bents,

which have been in use since the 19th century. Red fescues make up the major part of greens mixtures where a smooth surface is a priority. Cultivars such as Mocassin now have good tolerance to close mowing, high shoot density, and fine leaves. This is a direct result of objective plant breeding over the past few decades. Newer cultivars of strong creeping red fescues are also finer-leaved, and produce denser swards, than they did ten years ago.

There have also been significant improvements in chewing fescues. Varieties like Center now produce high quality, dense, bright green turf, which stands up to close mowing, and has good resistance to disease.

Breeding improvements in ryegrasses have produced finer leaved cultivars, which produce a denser sward. Newer varieties such as the tough, hard-wearing Amadeus, which works well on ryegrass tees, also have a better resistance to crown rust and red thread, than previous varieties.

Breeding objectives

Seed breeders set clear objectives before they start the selection process, and find out from end-users what their expectations are, for the grass seed they will be using in the future. This understanding of the problems and aspirations of greenkeepers is essential to ensure that breeders develop appropriate varieties, which can help greenkeepers in their day-to-day work.

The objectives of our breeding programme, are to produce grasses that:

- tolerate high wear at low cutting heights
- recover quickly from damage/divotting
- grow slowly, which means less mowing
- are disease resistant
- establish quickly from seed – so that repaired areas are out of play for the shortest time possible.
- tolerate drought
- use less fertiliser

An overriding breeding goal is to encourage high reproductive capacity, for however superior the turf grass characteristics of a new cultivar are, if it is infertile, or fails to produce abundant seed, it will have no commercial future.

Linked characteristics

One of the greatest challenges for breeders is to select desirable characteristics, without adversely affecting other connected features. For instance selecting for less dependence on fertiliser, may increase a variety's susceptibility to disease.

Mowing is the most expensive aspect of turfgrass management. To

reduce the frequency of cutting, the growth vigour of the grass plant has to be curtailed. This can be done through breeding, and we are currently carrying out trials in Holland and Belgium, looking at the varying growth rates of a range of different cultivars.

However care has to be taken, as altering growth rate will have knock-on effects on speed of establishment and wear tolerance. Also, plants that grow more slowly are more prone to disease. The breeder's job is to try and combine these contradicting, but vitally important characteristics, into one and the same cultivar.

Twenty years ago, our breeders made disease resistance a top priority in their breeding programme. This foresight has now paid-off, with their latest varieties all showing very good resistance to red thread.

Our breeding programme is centred at state-of-the-art laboratories in Kapelle in Holland. Two senior breeders are supported by ten technical and development managers, working on both agricultural and amenity grasses. In some years the company will be able to launch three or four new varieties, in other years none – reflecting the element of chance inherent in conventional breeding.

The initial crosses are made in Holland. Seed from promising plants is multiplied up to give enough for trialling. This is carried out all over the world, depending on the species involved and the intended market.

UK trials

At our plant breeding station at Boothby Graffoe, in Lincolnshire, we establish merit trials on around 250 cultivars of amenity grass species each year. This is one of the largest sets of amenity grass trials in the UK. We have been trialling amenity grasses here for 20 years, and provide our breeders with information about new varieties in relation to existing ones, under UK conditions. This data is also used to determine which cultivars are put forward for entry into subsequent STRI List trials. New varieties from other breeders are also tested here.

Currently varieties of perennial ryegrass, smooth stalked meadow grass and tall fescue are being evaluated in fairway trials, while cultivars of red fescue, browntop and creeping bent, hard and sheep's fescue are being assessed under a close mown regime.

The fairway trials plots are mown weekly during the growing season, at a height of 13mm, and as required at other times of year.

The close mown trials are mown two to three times a week, at a cutting height of 7mm from April to

September. This is relaxed to one cut per week, at 13mm outside this time period.

Both trials are sown in the summer and scored from the following March for two years.

Mixtures

As well as screening new cultivars, we are also trialling a range of commercial mixtures. When a greenkeeper buys a bag of grass seed it is usually made up of two, three or four cultivars, and we feel it is important to know how these varieties perform together.

We started these trials two years ago, and there have already been dramatic differences. When we look at shoot density, wear, tolerance to close mowing, cleanness of cut and disease resistance, the mixtures are out-performing the individual cultivars every time. This confirms the theory that the positive attributes of individual varieties, when combined in a mixture, produce a better sward than when they are sown in monoculture.

Biotechnology

It can take 15 to 20 years to bring a new variety to commercialisation using conventional breeding techniques. This time lag limits the rate of progress and precludes any quick response to changing market needs.

Biotechnology is changing this situation. Identifying favourable characteristics at genetic level, via gene mapping, allows more accurate selection. This takes some of the guess-work out of the system, and speeds up the breeding process.

This is a very exciting time for our breeders, who are anticipating that by using these new techniques, they can cut the development time by half or more – perhaps even down to five years. This would allow us to bring cultivars to the market much more closely suited to the users' current needs.

Overall the aim is to introduce genes that will increase stress tolerance - be it drought, disease or wear induced - and reduce growth, while trying to avoid any negative effects on sward density, ground cover or disease resistance.

While breeders are working hard to produce grass varieties ideally suited to greenkeepers' needs, these new generations of cultivars will still need top class management, to keep fairways, tees and greens in optimum condition all year round. An integrated approach will always be needed. Only by working together will breeders and greenkeepers produce the fine turf qualities required, by the increasingly demanding golfers of the future.