

Stress resistance as standard

4turf® is the new turf type tetraploid perennial ryegrass. Our perennial ryegrass breeders have developed the new 4turf® technology which makes a great turf grass even better.

This enhanced turf perennial ryegrass establishes faster than the traditional perennial ryegrass and is bred especially for rapid installation and unique stress tolerance.



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4turf®
by DLF
Stress resistance as standard



4turf® – for Golf
by DLF

For strong and healthy tees and fairways, reduced costs and a healthy environment

4 reasons why 4turf® makes sense

- Stronger establishment
- Exceptional colour, Needs less water and fertilizer
- Drought, salt and disease resistance
- Outstanding winterhardiness for cold areas

4turf® – tetraploid perennial ryegrass bred with you in mind

Golf courses have high standards. You want to grow perfect, yet easily maintained tees and fairways because that's what your customers expect. And you want to run an efficient golf course based on lower input costs and maximum play.

Our innovative 4turf® makes this happen. We bred it for the characteristics you need. 4turf® is a new turf-type tetraploid perennial ryegrass. Agricultural grass-growers have long understood the value of tetraploid perennial ryegrasses: rapid establishment, growth in cool temperatures, and better environmental stress tolerance like drought and diseases. Our breeders set out to pass on these characteristics to golf courses. They developed tetraploid technology to the point where you, too, can experience the tetraploid advantage in a unique range of fine-leaved, high density turf-type tetraploid ryegrasses. 4turf® ryegrasses are as far removed from agriculture as their diploid relatives.

4turf® – tetraploid perennial ryegrass explained

Diploid and tetraploid plants have different amounts of chromosomes in the nucleus of each plant cell. Diploid plants have two sets of chromosomes in each cell; tetraploid plants have four. Polyploidy – the ability of a plant to contain more than two sets of chromosomes – can be artificially induced by the application of the natural alkaloid plant hormone, colchicine. Colchicine, which is derived from the autumn crocus, acts as a mitosis inhibitor; it leads to a doubling of chromosomes within each cell.

Historically, perennial ryegrasses bred for amenity use have been diploid. Tetraploid perennial ryegrasses are a technological step forward. They perform better because they have twice as many chromosomes and therefore twice as much chloroplast in each cell. The extra chloroplast boosts chlorophyll production, creating a healthier, high-energy plant. Tetraploids are robust and hard-wearing, with improved stress-tolerance and ability to recover, even in cooler temperatures.

4turf® – proven performance you can trust

Tetraploid perennial ryegrasses out-perform diploids in numerous ways. They have larger, high-energy seeds for rapid establishment, even when soil temperatures are as low as 4°C. Rapid establishment reduces Poa annua invasion, while low-temperature winter growth gives you a healthy hard-wearing turf all year round. Beneath the surface, the increased root mass improves drought-tolerance and increases the efficiency of the plants use of nitrogen in the rootzone.

In trials, our latest tetraploid cultivars exhibited greater shade and wear tolerance. Even at reduced light levels of 60% PAR (photosynthetic active radiation), they had greater ground cover and wear-tolerance.

Tetraploid cultivars are also better at fighting disease. Independent researchers (for the French GEVES Turfgrass List and Scandinavian Scanturf) recorded excellent tolerance to microdochium (fusarium) patch, red thread and rust diseases. The UK STRI turfgrass seed trials repeated these results and measured exceptional tolerance to red thread.

4turf® – from golf courses to global sports events

Although 4turf® is relatively new to the amenity market, it has become hugely popular among turf professionals. For numerous gardeners, park managers, green keepers, and groundsman, 4turf® tetraploid ryegrasses are their first-choice grass seed. Across the world, sports fans have seen how well 4turf® performs at the highest level of international sport.

4turf® tetraploids blend well with other grasses. They can be mixed with diploid ryegrasses, fescues and Poa pratensis for a beautiful hard-wearing turf that's easier and cheaper to maintain. They also help to protect the environment because they need less water, nitrogen, or chemical applications.

4turf® varieties from DLF:

- **Fabian**
- **Double**
- **Tetrastar**
- **Tetragreen**



Faster establishment crowds out Poa annua and cuts production time

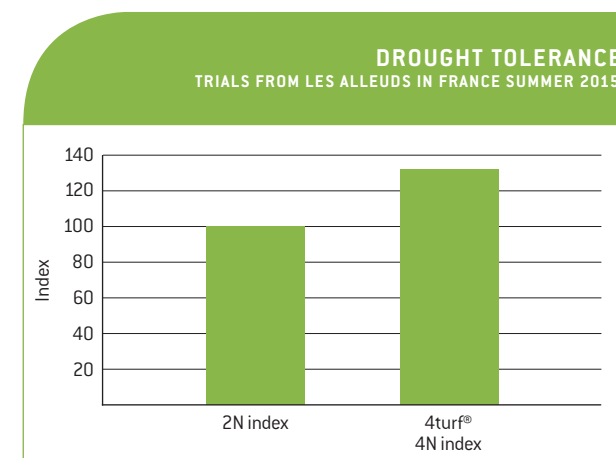
The greater energy reserves within 4turf®'s larger seeds support stronger, faster establishment and healthy plant development. Faster plant growth at the critical establishment phase helps fight Poa invasion. 4turf® cultivars will even germinate at temperatures as low as 4°C.



Stronger rooting for enhanced stress-tolerance and less watering

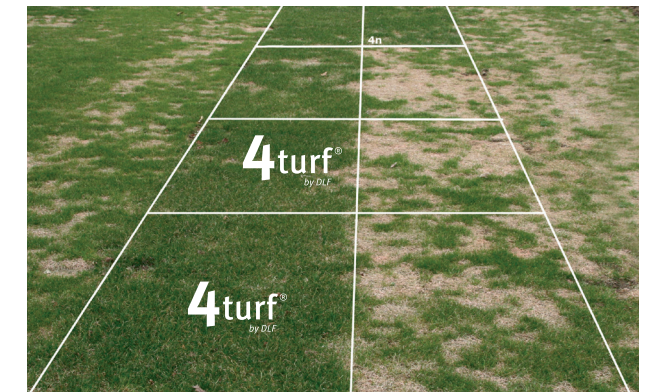
4turf® needs less water during a drought. Its larger root system and natural water reserves help it stay greener for longer. 4turf® varieties are not just drought-tolerant, they also recover quicker when the rain returns.

Drought trials conducted in the Loire Valley in France confirmed that 4turf® cultivars were significantly more drought-tolerant than diploids.



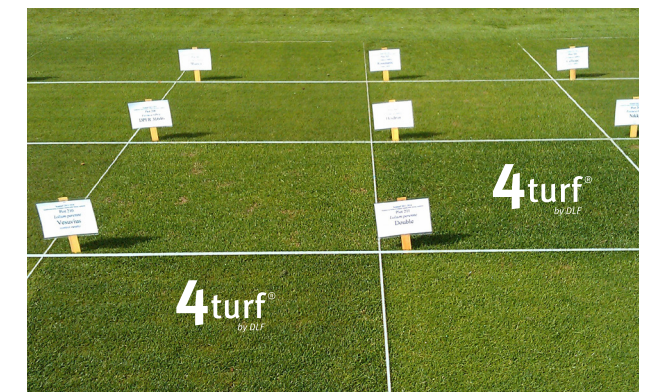
Exceptional disease resistance and winter hardiness for reduced maintenance and chemical applications

4turf®'s larger energy reserves significantly increase natural disease resistance. This valuable characteristic helps maintain a healthy looking turf during autumn and winter. In trials undertaken in Finland, 4turf® Fabian showed superior winter hardiness. And in Scandinavian Scanturf trials, it ranked No 1 for general turf quality.



Attractive deep green colour and enhanced nitrogen use efficiency for beautiful turf and reduced fertiliser applications

4turf® is more attractive than traditional ryegrass varieties. Its dark green is deeper and glossier, which makes it more inviting. With an improved cellular structure and more efficient photosynthesis, 4turf® cultivars keep their colour all year round, even when light levels are low. Better colour and increased root mass means 4turf® uses nitrogen more efficiently. That's good for the environment and for turf managers because 4turf® needs less nitrogen fertiliser.



4turf® – stronger establishment, easier maintenance, reduced input costs
by DLF

4turf® – For the future

”Tetraploids were first seen in a lawn grass situation over 25 years ago when the standard of turf quality in general was not as high. What is new is that this new generation of varieties we have developed are able to compete in performance and appearance with the best modern standard varieties. It has taken us over 20 years to achieve this. Even that first variety many years ago exhibited improved stress tolerance and this is what has motivated us as breeders to continue improving and refining 4turf®. 4turf® will open new horizons in Perennial ryegrass breeding.”

Christophe Galbrun · Plant breeder



4turf® – stronger establishment, easier maintenance, reduced input costs
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4turf® – For the future

”I’ve been using the new 4Turf tetraploids on two different courses and we always get great results.

I use Johnsons JTe with 4Turf for divoting tees and we also disc seed these areas twice a year to help build up a strong seed bank at the start of a long season as well as to help repair the tees before the winter.

At both courses we generally use the tees all year round so the turf gets a really good test, the JTe with 4turf has established quickly and gone on to provide us with a hard wearing grass sward that looks great.”

Steve Lloyd · Course Manager, The Worcestershire Golf Club · United Kingdom



4turf®

”We are experiencing a faster germination and establishment, especially at low temperatures. The growth starts earlier so the tees are ready for use earlier in the spring.

Our experience with 4turf has shown it can be used under all weather conditions including drought, shade and in soils that retain too much water. Using 4turf has improved the condition of the turf on our tees and it acts as a nurse crop for other grasses.

By using 4turf we get a beautiful, deep green colour turf from early spring, which stays healthy and has a great wear tolerance throughout the year.”

Morten Terkelsen · Course Manage · Esbjerg Golf Club · Denmark

