“Fixing” the Greenhouse Effect

Jayne Leyland
Seeds & Line Marking Product Manager
Rigby Taylor Ltd

“Fixing” the Greenhouse Effect

Rigby Taylor and its seed breeding partner Top Green, have a long and very successful relationship. Top Green’s seed breeding and research facility is situated at Les Alleuds In France and is the partnership development centre for Rigby Taylor grass seed mixtures.

The Greenhouse Effect

The carbon cycle and carbon sequestration impact upon our everyday lives. Grasses, just like trees, are chlorophyll-based plants, absorbing carbon dioxide (CO_2) from the atmosphere for use in photosynthesis.

Phytosynthesis, uses sunlight and water to convert CO_2 into carbohydrates and simple sugars to generate energy and growth, “fixing” greenhouse gases from the air into the soil by sequestration and providing oxygen as a bi-product; a proportion of this absorbed carbon is transferred from the dense canopy and fibrous root system into the soil as plants senesce and decompose. One hectare of natural, open grassland can sequester up to 2.5 tonnes of carbon per annum, creating a net carbon sink held within the soil profile. A national ecological survey conducted by the universities of Manchester, Lancaster, Reading and Newcastle, together with Rothmansted Research, revealed around two billion tonnes of carbon is stored deep under the UK’s grasslands, helping to curb climate change.

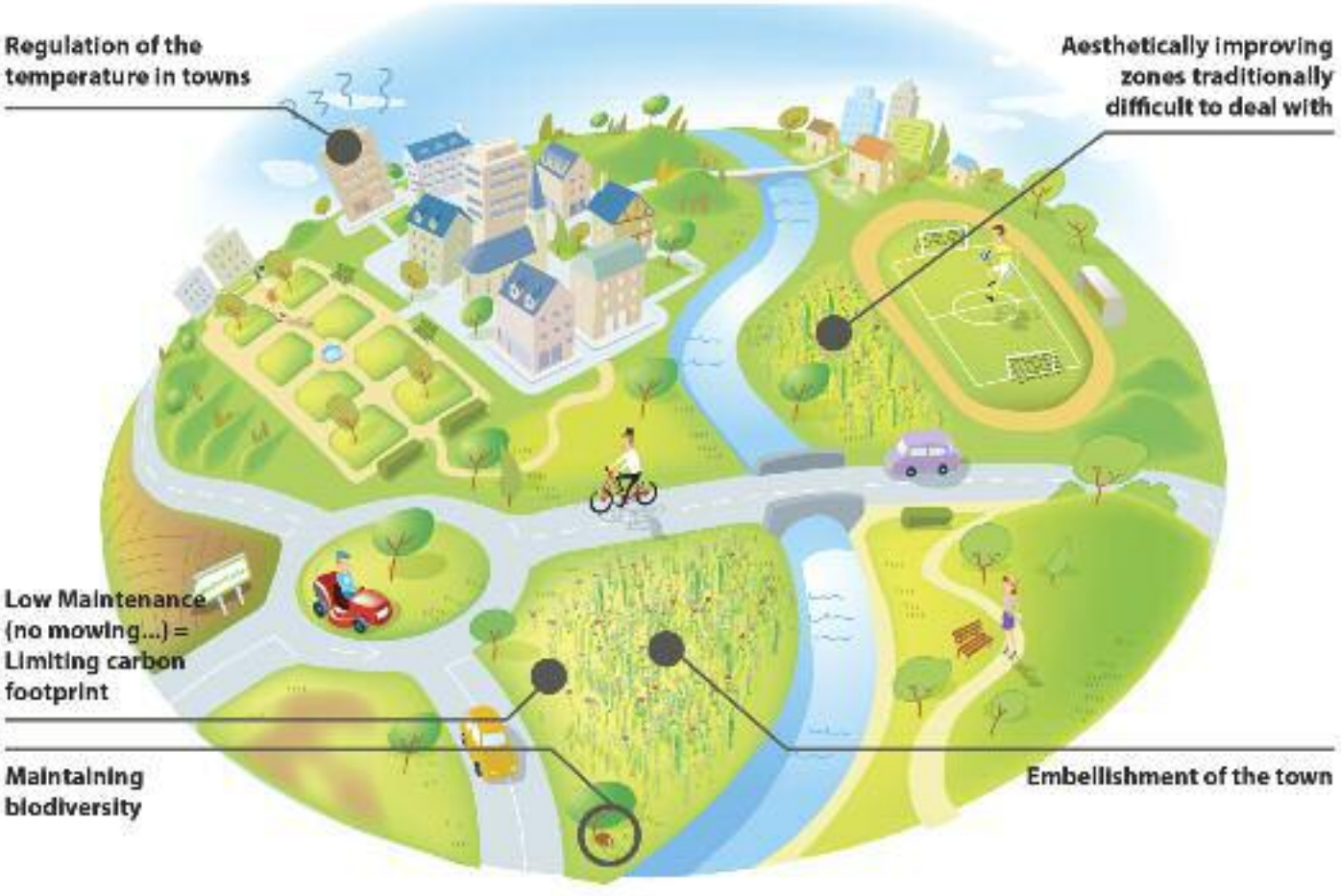
“Our findings suggest that by managing our grasslands in a less intensive way, soil carbon storage could be important to our future global carbon targets but will also bring benefits for biodiversity conservation”

Professor Richard Bardgett University of Manchester, 2016

Net Carbon Sink

All well and good on one hand for infrequently managed grassland, but what about the intensively managed amenity grass surfaces we all enjoy which, by definition, have a much greater environmental impact?

Because managed amenity turf has higher plant populations per square metre than natural grassland, having the availability of amenity cultivars which sequester (lock up) relatively more carbon can make a significant contribution in mitigating the environmental impact of essential maintenance inputs, preserving a net carbon sink. With the introduction of the **Carbon4Grass** mixtures, the opportunity is now here to select the correct grass species for a specific surface that will impact significantly on both carbon sequestration rates and management inputs, which again improves the net carbon sink figure.



Grass and flower plantings offer great benefits to the urban landscape

Carbon4Grass Mixtures

Streetscene & Green Infrastructure

RT Super Root

Tetraploid & creeping rye with creeping red fescue

30% Tetragreen	Tetraploid perennial ryegrass
20% Stolawn	Creeping perennial ryegrass
30% Greensky	Perennial ryegrass
20% Mystic	Strong creeping red fescue

Sowing rate	30-40g/sq.m
Sowing depth	4-8mm
Overseeding rate	15-25g/sq.m
RT Product Code:	0323010/020

Where to Use

Parks, playing fields, cricket outfields
Golf tees, fairways, semi-roughs & walkways
Hard-wearing landscaping
Stabilisation & embankments
Terraseeding and hydroseeding
Permeable cellular paving systems

RT Low Maintenance

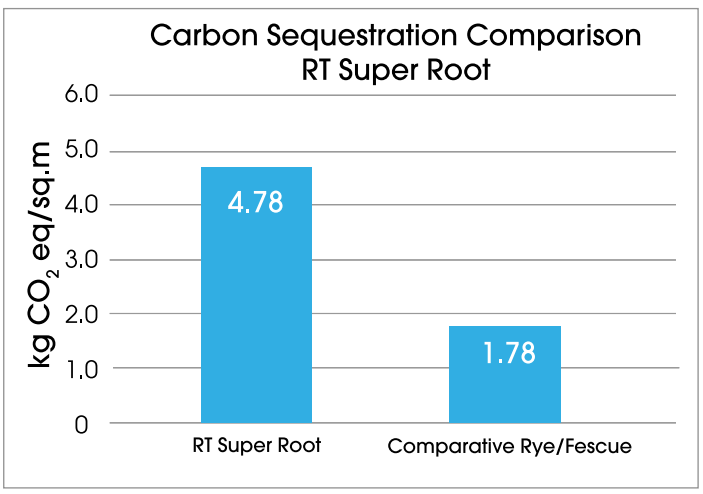
Low maintenance fine rye/fescue/bent

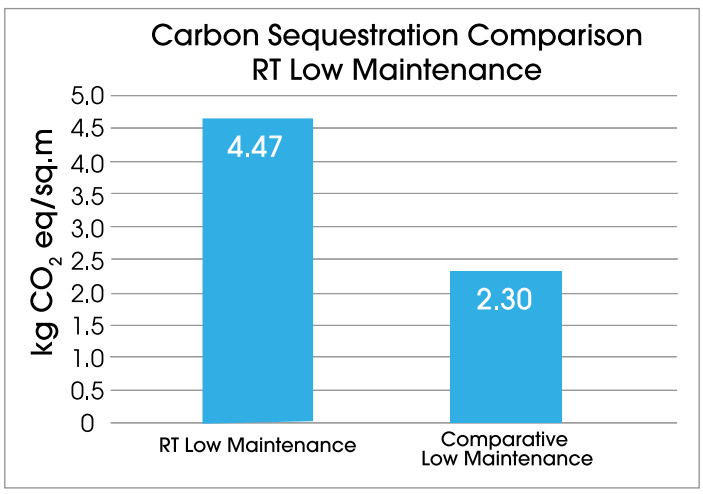
30% Angelina	Perennial ryegrass
30% Greensky	Perennial ryegrass
25% Mystic	Strong creeping red fescue
10% Dumas 1	Hard fescue
5% Highland	Bent

Sowing rate	25-40g/sq.m
Sowing depth	4-6mm
Mowing height	Down to 10mm
RT Product Code:	0323003/020

Where to Use

Landscaping where low maintenance & fast establishment is vital
For low growing height and reduced mowing frequency
Cricket outfields, golf tees, fairways & semi-roughs





R450 Road & Rail

Rye/Fescue/Bent with micro-clover

25% Greenway	Perennial ryegrass
42.5% Mystic	Strong creeping red fescue
25% Dumas	Hard fescue
5% Highland	Bent
2.5% Pipolina	Micro-clover

Sowing rate	25-40g/sq.m
Sowing depth	4-6mm
Mowing height	Down to 25mm
RT Product Code:	0322450/020

Where to Use

Verges, roundabouts & embankments
Impoverished soils
Soil stabilisation, fast establishment & a high percentage of creeping grasses
Reduced mowing, annual sward growth <300mm under a single spring cut regime

R460

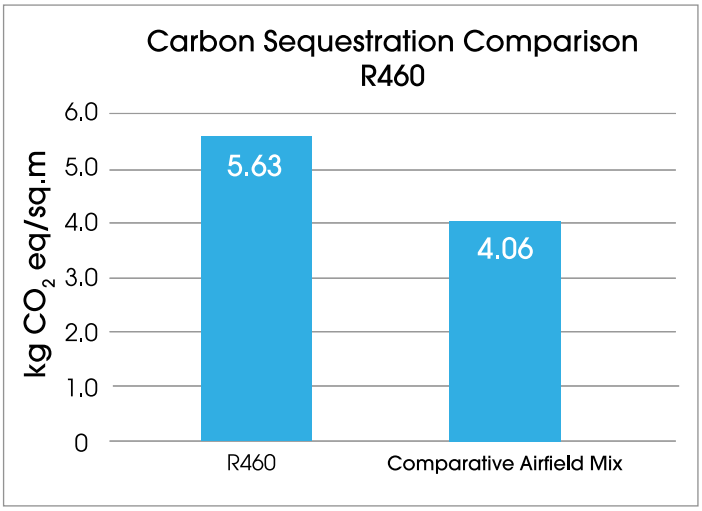
Rhizomatous tall fescue & tetraploid perennial ryegrass

25% Grandite	Rhizomatous tall fescue
25% Essential	Tall fescue
25% Tetragreen	Tetraploid perennial ryegrass
25% Greenway	Perennial ryegrass

Sowing rate	35-50g/sq.m
Sowing depth	30-35mm
Overseeding rate	10-15g/sq.m
Mowing height	Down to 25mm
RT Product Code:	0322460/020

Where to Use

Managed airfield grassland
Heat and drought tolerant landscaping & sports pitches
Sow in warmer soils minimum 10°C, April through September



Sports, Equestrian & Golf

Sports Field Renovation

Tetraploid & diploid ryegrass blend

25% Tetragame	Tetraploid perennial ryegrass
25% Tetragreen	Tetraploid perennial ryegrass
25% Columbine	Perennial ryegrass
25% Berlioz 1	Perennial ryegrass

Sowing rate	40-60g/sq.m
Sowing depth	12-15mm
Overseeding rate	25-35g/sq.m
Mowing height	Down to 12mm
RT Product Code:	0399558/020

Where to Use

Sports pitches & playing fields
Racecourses
Transitional autumn overseeding

R140

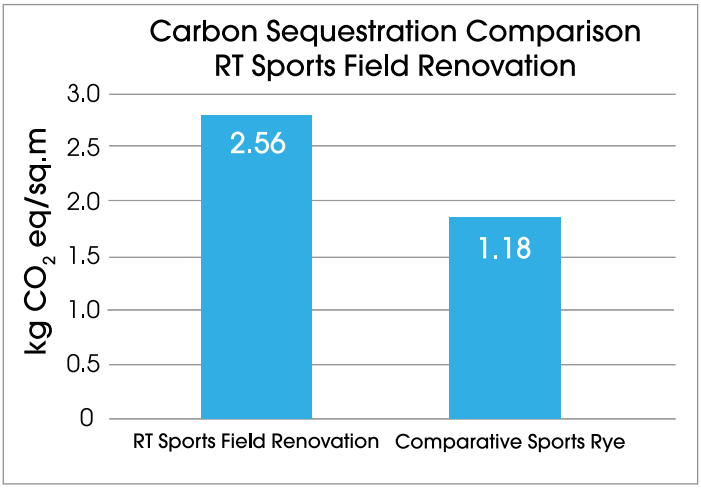
Tetraploid & diploid perennial ryegrass blend

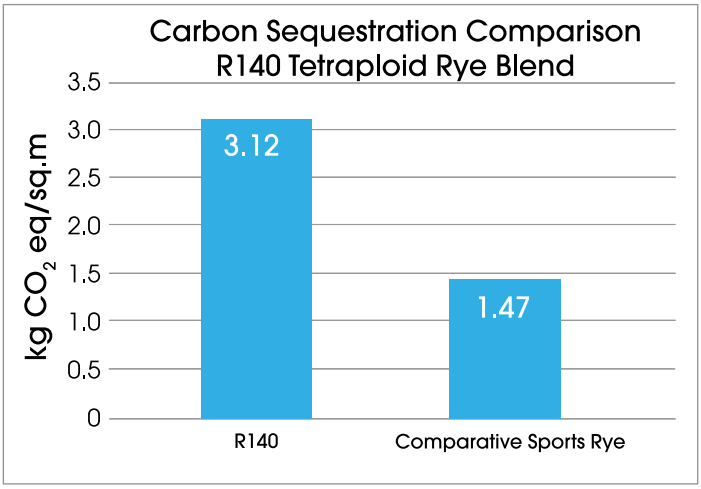
25% Fabian	Tetraploid perennial ryegrass
25% Tetrastar	Tetraploid perennial ryegrass
25% Eurosport	Perennial ryegrass
25% Columbine	Perennial ryegrass

Sowing rate	40-60g/sq.m
Overseeding rate	25-35g/sq.m
Sowing depth	12-15mm
Mowing height	Down to 12mm
RT Product Code:	0322140/020

Where to Use

Stadium pitches & training grounds
Sports pitches, cricket outfields & playing fields
Golf tees & racecourses
Transitional autumn overseeding





R25CRT

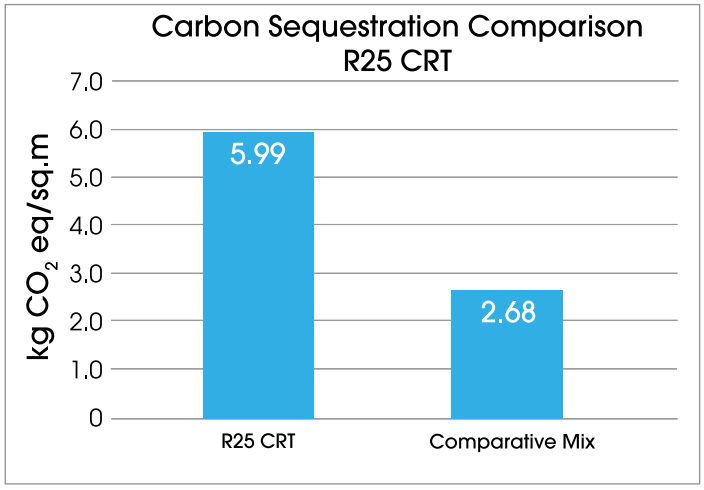
Tetraploid, creeping & diploid ryegrass blend

25% Fabian	Tetraploid perennial ryegrass
25% Stolawn	Creeping perennial ryegrass
25% Duparc	Perennial ryegrass
25% Gianna	Perennial ryegrass

Sowing rate	35-50g/sq.m
Sowing depth	10-15mm
Overseeding rate	15-30g/sq.m
Mowing height	Down to 7mm
RT Product Code:	0322025/020CRT

Where to Use

Sports pitches & racecourses
Cricket, behind the crease, bowler's run-ups and outfields
Golf tees, fairways & semi-roughs



R91

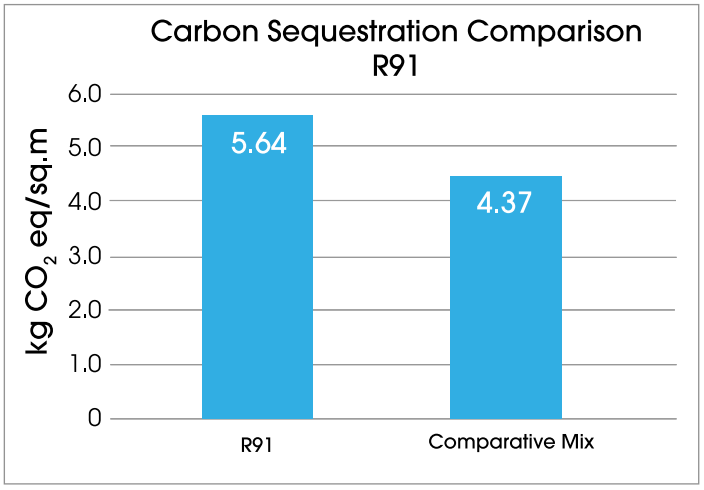
100% Ultra-fine dwarf rye blend

30% Clementine	Perennial ryegrass
35% Europitch	Perennial ryegrass
35% Duparc	Perennial ryegrass

Sowing rate	25-40g/sq.m
Sowing depth	12-15mm
Overseeding rate	15-25g/sq.m
Mowing height	Down to 5mm
RT Product Code:	0322091/020

Where to Use

Golf rye greens, tees, fairways & semi-roughs
Cricket squares & outfields
Tennis courts



R6 CRT

Tetraploid, creeping & diploid ryes with fine fescues

20% Fabian	Tetraploid perennial ryegrass
20% Stolawn	Perennial ryegrass
20% Duparc	Perennial ryegrass
20% Beudin	Slender creeping red fescue
20% Dumas 1	Hard fescue

Sowing rate	25-40g/sq.m
Sowing depth	4-6mm
Overseeding rate	25-35g/sq.m
Mowing height	Down to 12mm
RT Product Code:	0322006/020CRT

Where to Use

Golf surrounds, tees, fairways, semi-roughs
Cricket outfields

ULTRA LOW

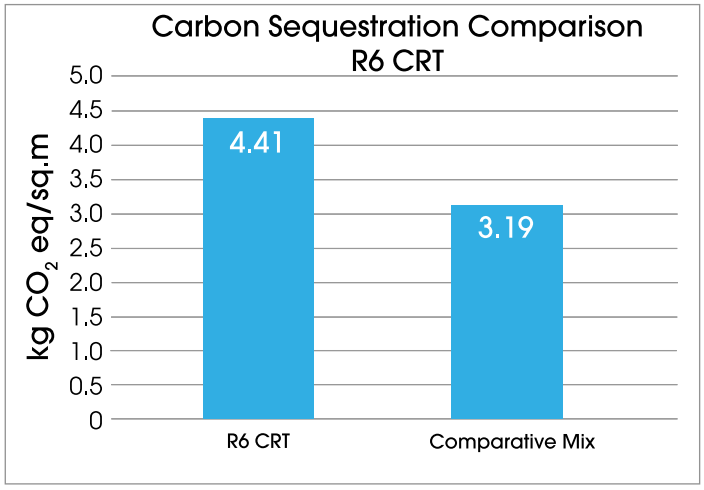
Fescues & bent

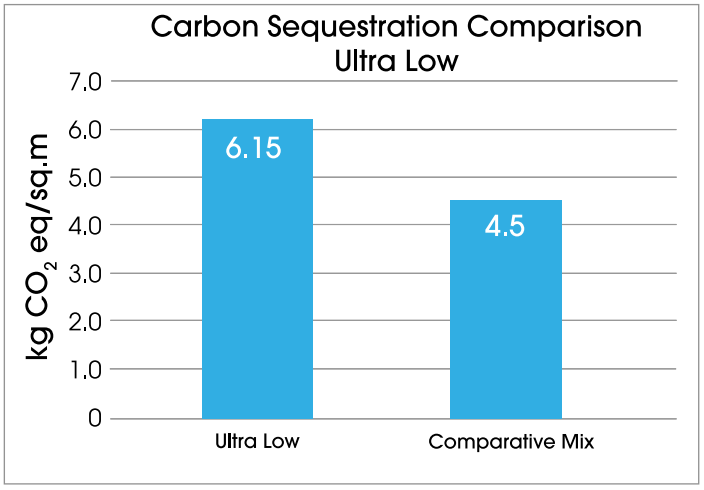
40% Hastings	Strong creeping red fescue
30% Greenmile	Chewings fescue
25% Dumas 1	Hard fescue
5% Egmont	Browntop bent

Sowing rate	25-40g/sq.m
Sowing depth	4-6mm
Mowing height	Down to 12mm
RT Product Code:	0323004/020

Where to Use

Golf tees, fairways & roughs
Low maintenance landscaping & grassland





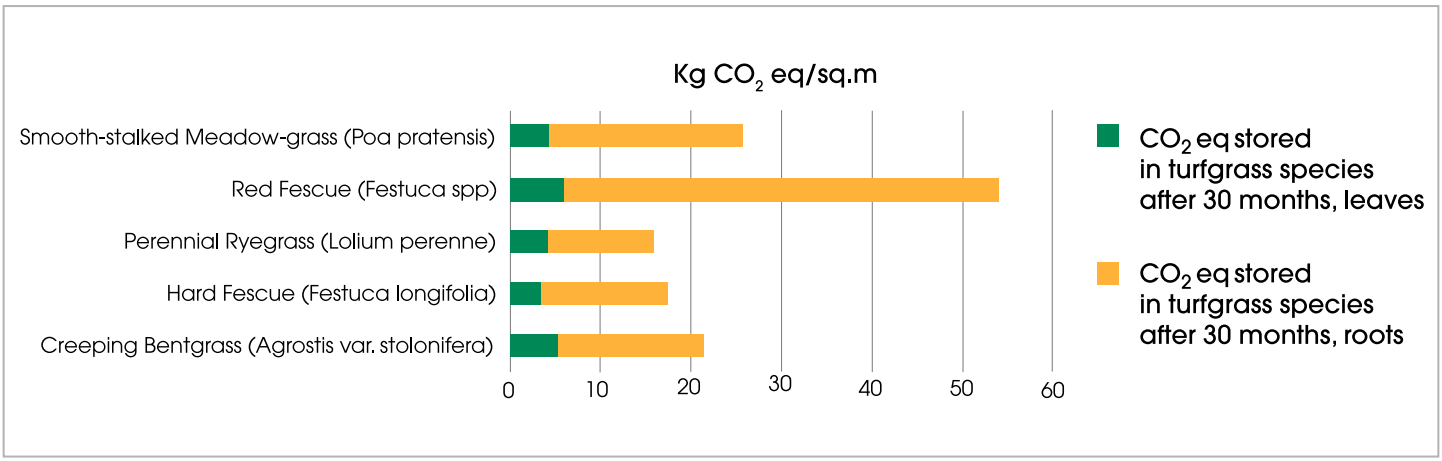
Carbon Credentials

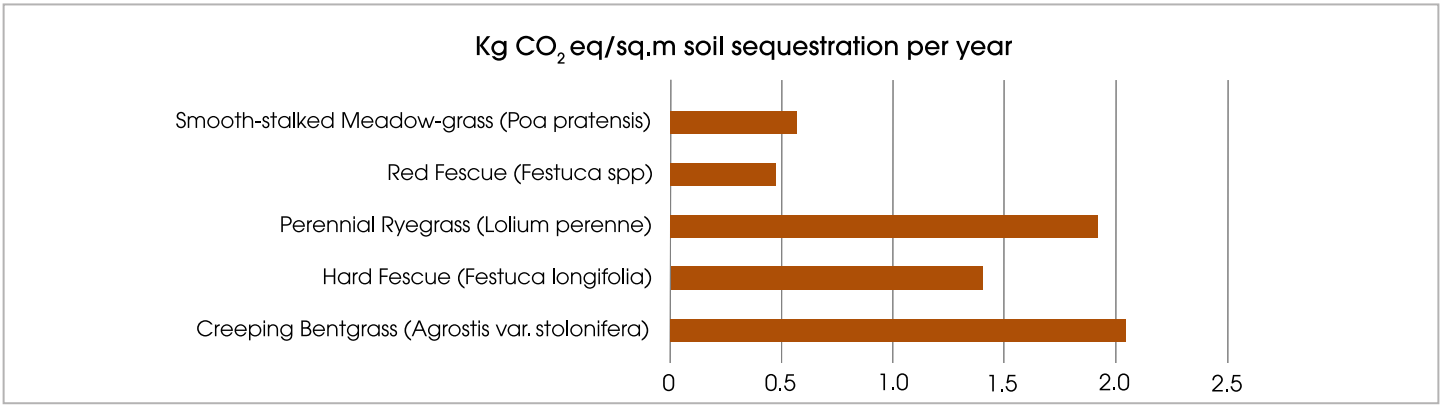
A "**Carbon4Grass**" study at Top Green Breeding & Research Station in Les Alleuds, France commenced in 2005. Using well-established grass plots (shown below), the initial aim was to identify differences in the carbon sequestration values of managed amenity grass species. The study revealed significant differences between species in their capacity to store and sequester carbon within the leaves, roots and soil profile when managed under exactly the same environmental conditions*. Of particular note is the ability of red fescue to hold more carbon in the roots than other species, but also the in-efficiency of transferring it into the soil whereas perennial ryegrass holds the least amount of carbon but is very efficient at transference. The typical red fescue inability over the short term is likely due to the high lignin content which results in slow thatch degradation, whereas perennial ryegrass is fast-growing with lower lignin thus making it more efficient.

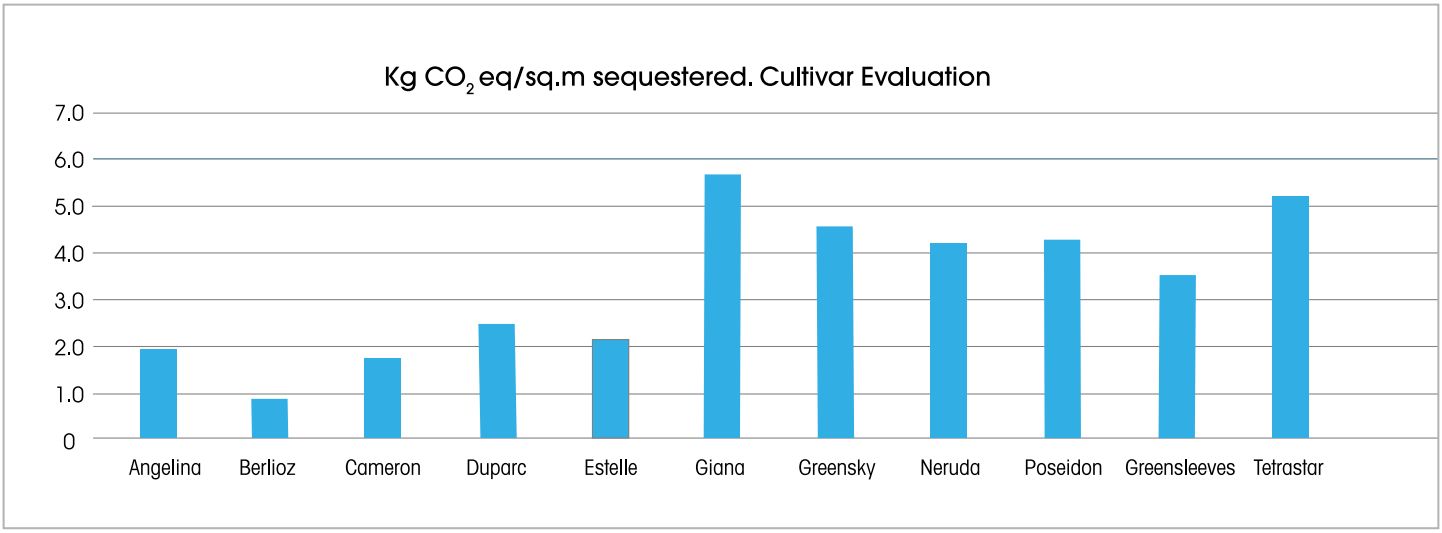
As the study progressed the focus was on individual cultivars within species, with new cultivars from the breeding programme entered into the study over time.

The differences in the efficiency of individual cultivars to sequester carbon proved to be significant and knowledge has been used to create the Rigby Taylor **Carbon4Grass** mixtures, combining increased levels of carbon sequestration potential with desirable amenity characteristics.

Just two square metres of grassland can produce enough oxygen to support one person for an entire day, or for one hectare, one person for 13 years!







Isolation Heading Date Trials

Tetraploid Technology

Grass breeders have over the years, developed high performance, innovative cultivars for a wide range of amenity applications. Low maintenance, slower growing cultivars with higher carbon "scores" have been included to help reduce the impact of tasks, which contribute to the carbon footprint such as mowing or mechanical aeration. A notable innovation is hard wearing *tetraploid perennial ryegrass technology, extending the growing season through cold temperature growth. Tetraploids are actively germinating, growing and photosynthesising in colder conditions from just 4°C, thus maintaining active grass cover for longer to potentially "capture" more carbon.

Tetraploids (4n) have double the chromosomes of a diploid ryegrass (2n), meaning double the chloroplast and chlorophyll for photosynthesis. The root mass of grasses acts as a reservoir for carbon which eventually transfers into the soil profile as roots die and decompose. Tetraploids have a much stronger, deeper, denser root mass than diploids, delivering greater potential for higher sequestration, an important physiological feature when you consider ryegrass accounts for around 90 percent of the seeds used to create and maintain amenity turf in the UK. Potential is enhanced still further with **Germin-8*T*** seed treatment, which boosts germination and establishment particularly in cooler conditions. **Germin-8*T*** also contains both Mycorrhiza and Trichoderma atroviride for symbiotic plant health. Together with tetraploid technology it enables sowing of **Carbon4Grass** mixtures virtually all year round.

Grateful thanks to Howard Wood BSc, of Landscape & Environmental Services Limited for his contribution to this study and document.

Rooting capability of Tetraploid Perennial Ryegrass

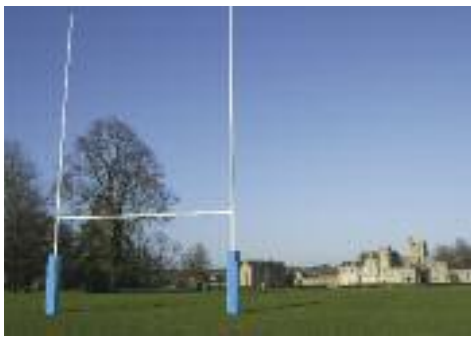
Note: A leaflet describing in depth the tetraploid technology is available on request

Summary

The summer of 2018 was a clear indicator, if one were needed, of how changes in climatic conditions are dramatically challenging and shaping our environment. It is within everyone's duty of care to ensure we do the utmost to minimise or offset our carbon footprint. Seemingly insignificant Individual choices can collectively make a meaningful contribution overall.

Choosing Rigby Taylor C4G amenity grass seed mixtures for sports and landscape applications are small but sure steps in the right direction.

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



Rigby Taylor Limited
Freephone 0800 424919 Website: www.rigbytaylor.com e-mail: sales@rigbytaylor.com