

AIN'T NOTHIN' FINER!

CREEPING BENTGRASS & THE DISTURBANCE THEORY PART 1

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The logo for the Society of Turfgrass Researchers in Ireland (STRI) features the acronym 'STRI' in white, bold, sans-serif capital letters. To the right of the text is a stylized graphic of green grass blades.

Start again

The Disturbance Theory articles so far have been about favouring the development of the Browntop bents (*Agrostis tenuis*) and Red fescues (*Festuca rubra*) in UK golf greens. They have applied an understanding of plant growth strategies to guide the management necessary to favour a dominance of these finer grasses over annual meadow grass (*Poa annua*). In the UK an increased proportion of browntop bents and/or fescues over annual meadow grass can bring improved playing qualities with reduced susceptibility to stress, disease and thatch accumulation. The basic DT understanding is that browntop bents and the red fescues have evolved markedly different growth strategies than the annual meadow grass and they require the provision of different environmental conditions to flourish. The DT way is to encourage the finer grasses primarily by creating a settled and undisturbed environment and to a lesser extent by exerting stress against the weakness of the meadow grass. This article launches the theory into a new area. You see Creeping bentgrass (*Agrostis stolonifera*) has developed a completely different growth strategy than the other fine turf grasses and so it needs to be handled in another way. Creeping bentgrass has drive.

I should co-co!

It would be wrong to say that the traditional fine grass browntop and/or fine fescue dominated greens are the only surfaces that golfers demand in the UK these days. Many new American style developments now use Creeping bentgrass in their greens to create the authentic US golf experience on these shores. They are designed to be receptive on approach and fine and fast for putting. To retain their authenticity and playing qualities we strive to maintain their purity. The focus of the maintenance strategy is to minimise annual meadow grass invasion. So, can knowledge of plant growth strategies help with the management of British Creeping bentgrass greens? You already know.

Healthy and pure

Creeping bentgrass (*Agrostis stolonifera*) has evolved its growth strategy over time. It was categorised by Grime, Hodgson and Hunt in their study: "Comparative Plant Ecology – A functional approach to common British species" (1988) as being a Competitive-Ruderal (see "Changing the Nature of your Greens" for a detailed explanation of the concept). So-called C-R strategists are adapted to flourish under moderate or infrequent levels of disturbance and low levels of stress. They try to take over the environment at the expense of others given the correct conditions. They possess genuine competitive drive and they will strive to assume complete dominance. Good. Creeping bentgrass competes *in response* to mowing disturbance through extremely high shoot density and extensive rooting designed to monopolise resource capture. Given good growing conditions and an appropriate degree of mowing the creeping bentgrass will actively try to take over the sward. It's what CR strategists do. The resultant

dense and fine close mown turf makes for terrific putting surfaces. Well-maintained creeping bentgrass greens are receptive on approach, lightning fast and super smooth for putting, which is great as long as they are allowed to stay healthy and pure.

Disturbance lovers

The Disturbance Theory articles so far have explained that the success of annual meadow grass (*Poa annua*) in golf greens is primarily due to the constant disturbance pressure being inflicted on the sward. Disturbance being defined in this sense as the physical damage or removal of living plant tissue. Annual meadow grass is classified by Grime as being a straight Ruderal (disturbance lover) and it has evolved to thrive under constantly damaging conditions. It grows quickly to recover from disturbance pressure (such as mowing, aggressive verticutting and also wear) and it seeds prolifically to take advantage of sward openings. You already see that the problem with stopping annual meadow grass from invading a creeping bentgrass sward is that both have developed growth strategies that *require* disturbance. So, for purity's sake, is it possible to create a suitable putting green environment that exclusively favours creeping bentgrass over the annual meadow grass?

The crux

The key difference between the evolved growth strategies of creeping bentgrass and annual meadow grass is that creeping bentgrass only really thrives under mowing disturbance to assume strength and it finds most other forms simply damaging. Annual meadow grass being a complete Ruderal takes advantage of all forms of damage. Too much or the wrong kind of disturbance will weaken the competitive functioning of the creeping bentgrass. The resultant thinning and lack of recovery then makes way for annual meadow grass invasion and establishment. To manage creeping bentgrass you have to appreciate the impact of the different types of disturbance and understand the damage that the wrong kinds can do. You need to concentrate on maintaining the competitive ability of the creeper by keeping the sward system functional. You now see the face of the enemy - annual meadow grass doesn't actively compete against others it needs wider environmental disturbance to damage potential competitors and then takes advantage of the result. Annual meadow grass is advantageous rather than being actively competitive. This is its strength but also its weakness. Given the chance a plant with true competitive ability can maintain dominance. So, to manage creeping bentgrass properly you need to keep it actively competitive and limit unnecessary functional damage.

Preparing the surfaces

The secret is to keep the creeping bentgrass moving and actively competitive but without producing *too much* growth. Too much growth forces aggressive treatments to maintain playing qualities and remove accumulating thatch. Aggressive treatments that can damage the competitive functioning of the creeping bentgrass. Understand that you don't have to constantly fertilise and water to keep creeping bentgrass competitive you need to be more cultured than that. Be optimal with your nutrition and irrigation rather than excessive and lazy. Once again, you just need to strike the right environmental balance. Plant growth regulators can be used to enhance competitive density and root production and they may also reduce the need for overly aggressive treatments. Prepare the surfaces with appropriate mowing heights to maintain playing qualities but without it eating into the functioning of the plant. Focus on regular brushing, top dressing and turf ironing to maintain fast, smooth and true surfaces on

which to play (and to dilute thatch accumulation). Verticutting should only be employed with great care to keep from damaging the sward. Brush to lift the knap prior to mowing if needed. Just set the right balance and do the necessary whilst avoiding the damage.

Bad disturbance

Overly damaging disturbance can come in many forms and all favour annual meadow grass invasion and establishment. Overly close mowing, aggressive verticutting and scarification, inconsiderate aeration will all pave the way for thinning, gap formation and deterioration. Integrated pest and disease control is essential to avoid scar formation and it must have prevention in mind. Wear damage needs to be spread around to allow recovery. Pitchmarks need repair and quickly. All thinning and gaps need to be avoided if possible and closed up if they do occur.

Bad juju

The big problem is winter play. Dormancy kills competitive ability and heightens the impact of damage. Gaps naturally appear under winter play and they can remain open for long periods. You need to be able to protect creeping bentgrass greens in the winter. It is important to overseed in spring and at regular intervals during the growing season to try to take better advantage of the gaps.

The truth is...

For a busy year-round golf course in the UK the situation is hardly perfect. Annual meadow grass invasion usually proceeds (for all the reasons outlined above) and it is very difficult to stem the flow without relying on resource sapping cultural practices such as hand picking and plugging. This course of action may not be possible in every situation and it needs to be a big consideration when the initial sward species selection is being made. Chemical products are available around the world to control annual meadow grass seed formation, to prevent seed germination or even restrict annual meadow grass growth to favour the competitive ability of the creeping bent and these are all very helpful but most aren't yet available in the UK. In the UK the retention of sward purity is tricky.

Give up?

So, is everything lost? Is annual meadow grass invasion inevitable and impossible to prevent? Well with all good stories there's a twist in the tale. There might be a pressure to save the day. Enter stress. Although neither creeping bentgrass nor annual meadow grass are naturally stress tolerant, the creeping bentgrass has evolved an advantage in this area. Creeping bentgrass has a slightly improved drought tolerance that might allow you to exert a selection pressure against the *Poa annua* at certain times of the year. Annual meadow grass has no stress tolerance. The deeper rooting characteristics of the creeping bent allows for a wider irrigation interval that can be used to place a background pressure on the annual meadow grass during dry periods (assuming there are some). A little insidious stress will hamper annual meadow grass seed germination and establishment. Watering deeply, with wider intervals supported by focused hand watering can help keep the surface relatively dry but still maintain the health of the desired species. Take all measures to maximise the effectiveness of your irrigation treatments (surface pricking, wetting agents etc) to reduce the need for them. The use of drought stress may force *Poa annua* to stay annual by stimulating seed head production and so giving us a better

chance to hound it out. Be careful but try. Also consider acidifying forms or fertiliser to place additional light stress against the *Poa annua*.

Where are we now?

So, this journey tells that the management for creeping bentgrass purity requires the creation of an appropriately productive environment being managed without too much damaging disturbance. It needs healthy growth, the careful management of disturbance pressure and possibly a subtle element of stress. To create the desired surfaces you need to regulate growth levels properly, apply regular light topdressings to match the thatch production rates, brush, top dress and roll to maintain playing qualities, be sensible with your mowing, interseed sensitively at regular intervals, regulate play properly, use plant growth regulators to your advantage, be careful with the timing and intensity of invasive renovations and use stress if you are very good (or mad). Simple when you know how!

The Disturbance Theory

Interestingly, disturbance pressure remains the key factor but in this case we have to manage it with great skill rather than simply trying to reduce it. The creeping bentgrass *needs* some disturbance to thrive and close mowing will certainly be needed to gain optimum performance – you just need to hold back on damage. Too much disturbance can affect the competitive ability of creeper and it will quickly lead to annual meadow grass invasion and dominance. Good greenkeeping is always the art of striking the right balance. This one's tricky but not impossible once you understand the nature of the grasses. We hope your understanding of the plant growth strategies helps you to strike the right balance for the beauty that is good creeping bentgrass greens.

Ain't nothin' finer?

Part 2 of this series tackles the specifics of creeping bentgrass management.

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