

Early southern summer scorcher left a dry taste for turf

Dr Terry Mabbett looks at the knock-on problems that can be created by stressful weather conditions

Southern England's middle summer months left a distinctly dry taste for turf in 2010. A succession of scorching hot and rainless days through June and July left turf dry and drought stricken with a repeat of 1976, one of the hottest and driest summers on record, looking a real possibility.

All grades of un-watered turf across the region became brown and lifeless as turf grasses shrivelled, although many broadleaf turf weeds were still growing and outwardly unaffected. They continued to flower, fruit and seed, staking out a strong and dominant position for the return of normal growth conditions.

In the end the notoriously fickle British weather saved the day following an extremely wet August with the lowest recorded mean temperature for 17 years. Equally remarkable was the speed of turf grass recovery which by September looked lush and green as though nothing had happened, except for the weeds. At the height of the drought in mid-July turf weeds

such as white clover (*Trifolium repens*) and yarrow (*Achillea millefolium*), recognised as drought tolerant, and others like self-heal (*Prunella vulgaris*) and creeping cinquefoil (*Potentilla repens*) which are not, were seemingly unaffected by the drought, flowering profusely with seeds ripening quickly in the hot summer sun.

UK turf generally benefits from a benign climate and environment and is relatively untroubled by biological agents (e.g. weeds) compared with turf grown in other parts of the temperate world. But for the first time since its widespread development and adoption as a playing and leisure surface, UK turf could face a double-whammy of man-made and contrived threats with a combined and related force that could change the face of golf courses.

First is the generally accepted threat of climate change and global warming which promises hotter and drier summers on a regular basis. Second is the EU blitz on turf pesticides right across the sports turf and amenity sectors. Disappearing fast are products using a long-established and traditionally-

used range of sophisticated and high efficacious herbicide actives. Greenkeepers have relied on herbicides to keep their most professional playing surfaces (greens and tees) essentially weed free and to manage weeds as appropriate across the rest of the golf course. At first sight the two seem totally unrelated but nothing could be further from the truth.

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Broad leaved plants are generally better able [than turf grasses] to withstand drought conditions and those which grow in turf always manage a head start over grasses - if they didn't they wouldn't be successful turf weeds. Some might argue that disappearance of established herbicides for managed turf is a 'red herring' [in relation

MAIN PIC ABOVE: Yarrow, a dedicated drought tolerant turf weed had a field day



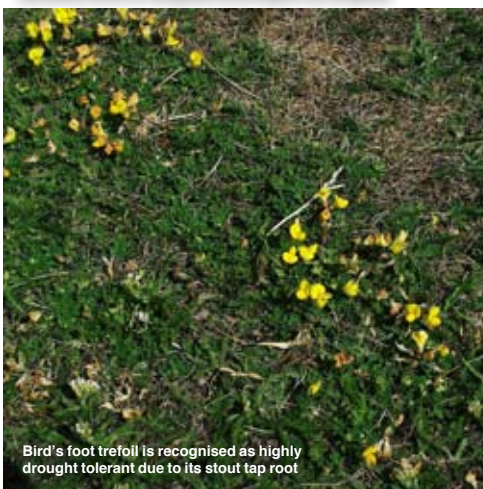
Yarrow, a dedicated drought tolerant turf weed had a field day



Creeping cinquefoil not noted for drought tolerance persisted while all the grass around gave up the ghost



Self-heal is more usually associated with damp turf but that also did well out of the drought



Bird's foot trefoil is recognised as highly drought tolerant due to its stout tap root



The nitrogen fixing legume white clover rapidly spread out to form huge weed patches



By September dandelions were much more in evidence than usual and flowering



Even opportunistic turf weeds like bristly ox-tongue did well, surviving the drought courtesy a deep and strong tap root



By September the normally diminutive and difficult to see parsley piert was spreading across tees like lush green parsley as its common name suggests

to increasingly severe summer drought conditions] because selective herbicides are never applied during extended periods of dry weather when the grass is not actively growing. But on the other side of the global warming 'coin' are predicted wetter winters with the classical December-February UK winter period squeezed at both ends by extended autumns and earlier springs.

These are the seasons when weed pressure, originating during hot dry summers, will be felt. You only had to look at the lush green turf in September 2010 to see how the situation had changed in a matter of weeks. Turf grass growth had recovered but weeds like white clover and yarrow didn't need to recover and simply took over with huge patches across even professional sports turf. And if herbicides are no longer available for prompt application in September when the rain resumes there will be no way of shifting such fast moving and well established weed growth that will persist through to spring.

The industry is preoccupied with new grass species and varieties to withstand hotter and drier summer conditions but largely ignores the inherent capacity of many native and naturalised broad leaf turf weeds to effectively withstand severe drought conditions. We are so conditioned to our inherently wet climate that we never dream to imagine that native and naturalised broad leaf weeds are drought tolerant.

What's more those plant characteristics like finely-divided leaves with thick cuticles and underground vegetative organs, which confer general drought tolerance, are often the very same characteristics that make drought tolerant species difficult to kill with herbicides. In a nutshell plant leaf shape and surface structure that makes it harder for water to escape from the plant make it equally hard for herbicide to get in.

Yarrow

Yarrow is the classic drought tolerant weed of UK turf with finely-divided leaves protected by a thick cuticle and wax bloom and providing the ideal bulwark against excessive loss of water by transpiration during hot dry conditions. These are the self-same plant characteristics that make yarrow one of the most herbicide tolerant of all broad leaf weeds in UK turf. Yarrow thrives in undernourished low fertility soils and swards and will continue to



By July drought resistant turf weeds stretched as far as the eye could see

grow when the grass cannot. The turf root zone may be brimming with nutrients but if the fine fibrous root system of turf grasses cannot enough extract water from the soil to compensate for transpiration then it [the soil] is for all intents and purposes functionally infertile.

Leguminous turf weeds

A select group of leguminous plants including white clover, bird's foot trefoil (*Lotus corniculatus*), yellow suckling clover (*Trifolium dubium*) and black medick (*Medicago lupulina*) are dedicated weeds of UK turf with two essential and related things in common. All have the capacity to access their own supplies of nitrate courtesy nitrogen fixing bacteria (*Rhizobium* species) that conduct a symbiotic relationship with the leguminous plant from their position in the root nodules. In addition all these leguminous weeds are inherently drought tolerant.

Nitrogen is an essential major nutrient for growth which most plants including grasses can only source it as water soluble nitrate ions (NO_3^-). Plants which are unable to source water from soil during drought conditions automatically lose access to nitrate fertilizer. No such problem for leguminous plants which take advantage of

Individual leguminous turf weeds may possess other characters that confer drought resistance

any shortage of soil water and soil nitrogen by 'making their own'.

Individual leguminous turf weeds may possess other characters that confer drought resistance. For instance, bird's foot trefoil has a deep tap root while the relatively small area of the individual leaves on all of these species helps to minimise water loss by transpiration.

Nowhere to hide

Fast growing turf's ability to hide more diminutive turf weeds like parsley-piert (*Aphanes arvensis*), creeping cinquefoil, self-heal, slender-speedwell (*Veronica filiformis*) and dove's foot cranesbill (*Geranium molle*) is a double-edged sword. It may be superficially OK when turf grasses are actively growing but with the onset of drought these small-leaved plants are no longer easy to hide and become prominent weeds in their own right, presented with a free hand to grow and move through the static drought-stricken turf.

None of these turf weeds is generally thought of [like yarrow and white clover] as drought tolerant

but parsley piert and dove's foot cranesbill in particular with their fondness for sandy free-draining soils would be expected to have a high degree of drought tolerance. Furthermore the inherent soil structure of golf greens and tees with their distinctly sandy free-draining bases are clearly potential prime sites for these weeds whether or not water stress in summer is a problem. The clear advantage given to such weeds during June and July was evident by September with parsley-piert spreading on golf tees as its common name implies like parsley fit for a salad.

That apart even those weeds like self-heal which most frequently occurs as a problem weed of persistently damp and poorly drained turf, and creeping cinquefoil typically found in wet neglected acid turf, were doing well enough at the height of heat and drought in July 2010. They were flowering and setting seed to take full advantage of the late summer and autumn rains that would follow just a few weeks later. Even weeds like slender speedwell known to prefer damp swards did not appear to have suf-



Another example of drought resistant turf weeds in July

ferred. By September this dedicated turf weed was growing profusely alongside opportunistic turf weeds such as bristly ox-tongue (*Picris echinoides*).

Tap roots all round

Small leaved weeds may go unnoticed in the grass but there's nowhere to hide for turf weeds from the family Asteraceae (Compositae) irrespective of whether the sward is actively-growing or static. A number of factors contrive to make dandelion (*Taraxacum officinale*), cat's ear (*Hypochaeris radicata*) and to a lesser extent smooth hawk's-beard (*Crepis capillaris*) and mouse-ear hawkweed (*Hieracium pilosella*) formidable turf weeds.

The common factor which enables this group of closely related species to withstand severe drought is a tap root. Packed with polysaccharide tap roots have traditionally allowed these perennial plants to survive the sub-zero air temperatures and frozen soils of winter and get a head start over turf grass in the spring. However, tap roots prove equally useful in enabling them to survive a completely different set of adverse environmental conditions in the form of high air temperatures and soil moisture deficits in summer that will push other plants past

permanent wilting point.

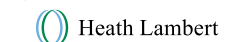
Dandelion was already having a good year (Greenkeeper International, July 2010) and the summer drought just added to this relative advantage over turf grass, so that by September dandelions were much more prominent and frequent in fine turf than usually seen at this time of year. And especially on golf tees where dandelion seeds germinate and establish with ease in the unavoidably damaged turf. Other related species such as ragwort (*Senecio jacobaea*) and bristly ox-tongue were clearly taking advantage especially when the tees were alongside potentially large seed banks like railway embankments.

Neither ragwort nor bristly ox-tongue is regarded as weed of professional turf and as such will rarely appear on the target weed hit list for selective herbicides designed and recommended for use on managed turf. That said it should come as no surprise that both are able, when the opportunity arises, to exploit golf tees by germinating and establishing on bare soil exposed by divots and which offers the ideal sandy free draining base that both prefer. Indeed ragwort is listed as a key species in the plant succession of sand dunes. Once established they are difficult to remove. Like dandelions, ragwort and bristly ox-

tongue are quickly conditioned by close cutting into a prostrate habit that allows most of the leaf rosette to escape the mower's blades. With their deep tap roots able to generate new shoots at will even a low cut is to no avail.

Fears for the future

The drought tolerance of dandelion and other members of the Asteraceae (Compositae) like cat's ear are evident from their success as turf weeds in South Australia where there are four consecutive excessively hot summer months with virtually no rain. Should global warming arrive and develop at the speed and on the scale predicted five years ago for the UK then turf weeds will present a huge problem for golf courses. Not in mid to late summer, when the grass is dried out and herbicide application is not an option anyway, but certainly during the rest of the year starting in autumn, when the rain returns and still-growing weeds have a head start of over turf grasses. And at the very time when on-going EU pesticide legislation seems hell bent on removing chemical herbicides from the marketplace, leaving greenkeepers with few if any proactive practical options for turf weed control.



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