

GRASS CLIPPINGS NO 38

MY "AGING" FRIEND - C. TRANSVALENSIS (var. BAVIEW)

In 1983 we, at Kowie Bowls Club, Port Alfred planted our new "A" green with Bayview grass (*Cynodon transvalensis*).

Our choice of Bayview was based on my previous experience with two varieties of *C. transvalensis* namely Florida and Elliot on golf greens.

The fact that *C. transvalensis* provided a complete mat which was much thinner than that produced by *C. dactylon* made it the obvious choice for bowling green's.

We selected Bayview because it had originated at the coast.

Over the years my partnership with Bayview flourished. It willingly responded to all our demands and consistency produced a bowling surface which elicited many complementary remarks. It was so successful that we planted 13 other greens all over South Africa with scarifyings taken from the "A" green.

This happy state of affairs lasted for about 23 years.

Although the running surface remained as true as ever certain changes in the grass have caused me to doubt it's stability and convinced me that, in our partnership, I am not the only one exposed to the aging process.

Before going further into details of my friend I will dwell on the origins of the grass and it's relatives.

In South Africa we are heavily dependent on the Genus *Cynodon* to provide the playing surface for the game of bowls.

Apart from a few isolated plantings of *Paspallum* 95% of our bowling greens have been planted with *Cynodon dactylon* or *Cynodon transvalensis*.

Genus Cynodon

The genus *Cynodon* belongs to the tribe Chlorideae.

In sports turf management we normally recognize two species viz. *C. dactylon* and *C. transvalensis* as qualifying for use on our finer sports fields notably Golf, Cricket, and Bowls.

Having worked with both species over many years certain "deficiencies" in *C. transvalensis* have made me question the right of *C. transvalensis* to be regarded as a genuine "brother" of *C. dactylon*. It would be safe to assume that, in evolution, *C. transvalensis* is much "younger" than *C. dactylon* which might lead one to conclude that *C. transvalensis* is actually a mutation of *C. dactylon*.

Cynodon dactylon

Cynodon dactylon is by far the commonest of the species and is internationally referred to as Bermuda grass although in South Africa it is commonly called "kweek".

It is a highly variable warm-season species within which substantial differences exist in colour, texture, density, vigor, and environmental adaptation. Its popularity on sports fields is based on the fact that it spreads laterally by both rhizomes and stolons.

In some species the lateral growth constitutes 80% of the total growth.

The growth characteristics vary from the elongated inter-nodal length and larger leaves found in semi arid conditions to the short inter-nodes and small spiky leaves of Cape Royal - a fine variety of *C. dactylon* found on a golf course near Cape Town

Cynodon transvalensis

C. transvalensis originated in Africa and is often referred to as African Bermuda. It is a much finer species (diminished inter-nodal length and smaller spiky leaves) and exhibits most of the characteristics of the *dactylon* but does not show its environmental adaptability. The *C. transvalensis* are usually sterile and have to be propagated by planting sprigs.

The adaptability of *C. transvalensis* cannot be compared with that of *C. Dactylon*. I have never seen a *C.*

transvalensis survive in semi-arid conditions. There is no elongation in the inter-nodal length or changes in leaf size. The only visible signs of drought stress being wilting, reduction in leaf count, and eventual death of the plant.

In South Africa we have identified 5 varieties of C. Transvalensis - viz.

- Florida - Originally used extensively on the bowling green's of the Highveld. It has, more recently, been supplanted by Bayview. Deep rooted.

Florida has never done well at the coast and attempts to transplant it to Australia or the USA have not been successful. It's real claim to fame lies in the fact that, at the Tifton Research station, Atlanta, Georgia, it was hybridised with a C. dactylon from the USA to produce the Tifdwarf range of grasses - Tifeagle and it's more modern hybrid are very popular on the golf courses in the southern states of the USA .

- Elliot - Originally identified in the North-Eastern Cape - only distinguishing feature being that it tends to turn mauve in early autumn.

- Skaapplaas - Apparently originally found on a farm in the Free Stats - shallow rooting. Dark green colour

- Harrismith - Originally found near Harrismith Yellowish- green colour and deep rooted.

- Bayview - The odd man out. Whereas all the other varieties originated on the highveld with it's summer rainfall Bayview was first identified in the Western Province (winter rainfall). Shallow rooted - very similar to Skaapplaas in texture and characteristics. Is it not a strange co-incidence that the finest C. dactylon (Cape Royal) and the finest C. transvalensis (Bayview) should have originated a few kms from each other near Cape Town.

Of all the varieties of C. transvalensis Bayview is the fastest grower and, strangely enough, better equipped to deal with salinity than any other Cynodon (for a period of 2 years the salinity (or T.D.S.) of the water we had to use at Kowie was more than 3000 ppm.)

Bayview has been the favourite for a number of years and has been successfully planted all over South Africa.

It's fast growth and ability to re-cover a damaged area quickly has endeared it to many relatively inexperienced green-keepers.

Can the speed of growth be evidence of a latent genetic instability?

Note Both Skaapplaas and Bayview have been planted extensively on cricket pitches because of their shallow rooting and ability to bind the upper surfaces.

Bayview - The "A" green at Kowie.

The "A" green at Kowie has, since 1983 provided a magnificent bowling surface for our members and many visitors.

Although we have constantly managed to keep the green free of foreign invasive grasses we have not since 2012 been able to avoid certain changes which have caused me to question the aging process in Bayview.

Certain patches of a different grass have appeared on the green. These patches are, obviously, not foreign grasses but subtle changes in the original grass.

All this has forced me to question the genetic stability of the C. transvalensis var. Bayview.

The Patches

1 About 10 years ago I noticed a small patch which was different from the rest in that it turned mauve in the early autumn and winter. While the texture of this patch is the same and indistinguishable from the rest of the green in the summer the mauve colour makes one think of Elliot grass. There are, now, two such patches which, over the years, have gradually got larger.

2 About the same time a small patch of grass which was much finer and denser than the rest appeared on the green. As this patch got larger it obviously affected the run of the bowl and even the mower changed its tune when running over the patch. More recently another similar patch has

appeared. These patches are now about 1.00m in diameter. They require special management (vigorous verticutting) to keep the texture the same as the rest of the green.

3 Two darker patches appeared about 5 years ago. Do I dare to say that they resemble Skaaplaas?

Note I am convinced that neither of these patches described in 1, 2, and 3 above are foreign grasses which have invaded the green but, rather, an insidious change in the grass itself. At the edges one can, over a period, see how the leaves would take on the new form. This is not an adaptation of the grass to environmental changes because the environment has remained constant. Neither are they hybrids because there have not been any patches of another grass in the vicinity.

Quotation from Internet of unknown origin *"Although mutations can occur in genetically unstable hybrids they can, also, occur in a single specie without any other grass being in the proximity."* I believe we are dealing with genetic changes in the grass but then why in two forms and what would have triggered it off

Hybrids and Mutations Hybrids - Defined as the offspring of genetically dissimilar parents, especially the offspring produced by breeding plants of different varieties, or species.

My first contact with a hybrid was at the Wits University Sportsturf Research Station at Frankenwald in the early 50's.

Between a square of Cape Royal (C. Dactylon) and an adjacent square of Elliot (C. Transvalensis) another grass developed. It was isolated and propagated and then called Frankenwald Fine. It was sold commercially to some golf courses and bowling clubs. Unfortunately, as soon as it was under stress it became unstable and patches of the parents appeared on the greens. Further production was stopped.

The development of the Tifdwarf range, at Tifton, is an obvious example of successful hybridization

While some hybrids eventually become genetically stable they usually have a problem developing an acquired immunity to infection and weeds.

Mutations *"It has been demonstrated that some cultivars planted on our greens have an inherent genetic instability that can lead to the creation of "mutations "(cultivars with different characteristics).* (Genetic Purity) Internet.

The first mutation I saw was on an old Florida green in Gauteng - a patch of denser and finer grass. The next mutation was this one described at Kowie. The strange part of it all is that when I planted grass from this patch into a specially prepared nursery the grass that grew reverted back to the original Bayview.

Having completed my clinical examination and without arriving at an acceptable diagnosis I turned to a more scientific evaluation of the problem.

The answer came in an article on RAPD analysis in DNA testing by R. ROODT*, J.J. SPIES* and T.H. BURGER *"These results were used to determine the genetic distances among cultivars. The cultivars Silverton Blue and Bayview exhibited the greatest genetic variation. RAPD analyses can therefore, be used to distinguish between different C. dactylon cultivars and to determine the genetic variation between them by calculating genetic distances. The distances within some of the existing cultivars are very large, which indicate large levels of genetic variation within these cultivars. This is especially true for the two cultivars Bayview and Silverton Blue.*

These results, in which these two cultivars are clearly non-monophyletic, might indicate that either the taxonomy of these cultivars are confused or the samples are in fact not purebred cultivars any more. The last possibility is very feasible in this group of grasses that constitute a heterogeneous group of varieties with considerable genotypic as well as phenotypic variation and in which outcrossing is frequent.

The above excerpt from the article appears to confirm the fact that, over an extended period, Bayview can become genetically unstable.

Here we have the position that the Bayview was taken out of its natural environment in the mountains of the Western Cape and planted at a coastal town in the Eastern Cape. Can we say that for 23 years the

Bayview tried to adapt to its new surroundings and eventually failed and broke down genetically into alternative forms of the specie.

Logically the next obvious step would be to take samples from each patch to determine its DNA profile. Unfortunately our limited funds would not justify the expenditure and we would, therefore, have to abide by our tentative diagnosis

Prof. J.J Spies (one of the co-authors of the above article) assures me that mutations are very rare (one in a million) but as he points out that as there are more than a million plants on a bowling green it is possible to have a few mutations. My question therefore is - if one individual plant becomes genetically unstable and mutates what makes that condition spread to the adjacent plants - as is happening now. Speaking as a doctor I would imagine that it is not beyond the bounds of probability for there to be a causative organism e.g. a virus spreading to the adjacent plants irritating the grass plants to the extent that it develops a genetic instability.

Comment Talking about mutations and looking at the enormous variations of grasses classed under C dactylon, do we assume that they are genetic variations within the broader mantle of one specie?

Looking further afield to ascertain whether the other countries planting warm-season grasses are having the same problem I find it interesting that the Australians (since 1963) will not use a green for State or National tournaments if it is "tainted" with foreign grass. (Question - are they only referring to foreign grass or have they also experienced genetic changes in their hybrids?).

Their larger bowling clubs re-plant their greens regularly to avoid any foreign patches disturbing the run of the bowl.

In the USA the major Golf Clubs regularly re-plant the greens - ostensibly because they want to plant new - more acceptable cultivars. Are they also being cautious because of the possibility of genetic instability in some of their hybrids?

It is very difficult to find authoritative publications on the origin and spread of mutations - is it because the other warm-season countries nip the process in the bud by not giving the grass on their greens time to develop mutations.

We, in South Africa, are much more conservative in our attitude towards re-planting the grass on our bowling green's. Very few clubs re-plant their greens. Perhaps the fact that we have been much more lenient towards the presence of foreign grasses than the Aussies has not put any pressure on our clubs to change.

Conclusion

This issue of Grass Clippings is very different from the others and would only be of interest to a limited number of our Green keepers. It poses a number of un-answered questions. Suffice it to say that it is a chronicle of changes which have taken place on a very old green. Perhaps this article will prod some of our green keepers to take a second look at their own greens - perhaps the patches of different grasses they see on their greens are actually mutations

It is interesting to note that two of the most popular grasses used on bowling green's in South Africa (Bayview and Silverton Blue) were indentified in that article as being the most unstable.

Are we now going to condemn Bayview as an unsuitable grass for bowling green's or is it more fitting to accept the fact that a grass subjected to environmental changes and the intense cultivation required on a bowling green has every right to call it quits after 20 years.

What I have seen on my green has not dimmed my regard for Bayview.

Whilst I know that there have been many successful plantings of Silverton Blue in the warmer climes **Bayview is, in my opinion, still the grass of choice for bowling green's anywhere in South Africa**

GRASS CLIPPINGS NO 38 - SUMMARY

This issue of grass Clippings is different from the others as it is a chronicle of the writer's actual experience with a Bayview grass.

Taking note of certain changes in appearance and texture which have appeared on the "A" green at Kowie Bowls Club the stability of the grass must be questioned.

Two subtle changes were noticed -

- 1 Changes in the texture of the grass in a patch which was much finer than the adjacent grass.
- 2 Changes in the appearance of the grass which appeared to relate to another variety of the Specie.

The scientific evidence in the article of which Prof J.J Spies (retired) was a co-author does confirm that genetic changes are more likely in Bayview and Silverton Blue.

It, also, poses the question of the evolution of the Specie C transvalensis in relation to the much older C dactylon.

There are many un-answered question which, unfortunately, cannot be found in the internet because mutations in a warm-season grass does not appear to be a problem in the other countries planting such grasses. They, apparently, do not allow such mutations to develop.

Perhaps this issue of Grass Clippings will encourage some of our green keepers to look more critically at their own greens and discover that the patches they assumed to be foreign grass were actually mutations.