

Renovation Down Under: Australian Golf Course Fights for Perfect Couch

By Daniel Varrey

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In December 1986, I received a long distance phone call from Craig Millen, a chemical supplier in Perth, Australia. He had read an article I'd written on the black layer. He wanted more information so he could help a local golf course superintendent by the name of Daniel Varrey. Millen saw similarities between my experience and Daniel's at Wanneroo Golf Club.

My first conversation with Daniel took place over the phone at 3:30 a.m. on a winter morning. I must admit having trouble understanding an Australian with a strong French accent, especially when I was half asleep. However, our mutual interest in each other's problems prevailed, and we have maintained a close kinship across the globe through letters and phone conversations.

Varrey has a degree in organic chemistry from a French university and became involved in golf course management in that country before moving to Australia. His peers down under jokingly call him the "algae man." He is an officer in the Western Australian Superintendents Association and has served as regional editor of "Turf Craft Australia," the official journal of the Australian Golf Course Superintendents Association. He has written articles on the black layer and algae in that publication, as well as the Journal of the International Greenskeepers Association in Europe.

I have treasured our friendship over the past two years and take great pride in introducing this fine golf course superintendent to the American turf community.

By Jonathon Scott

Western Australia, had spent a year without a golf course superintendent when I arrived in August 1984. Half the greens were dying, the fairways were infested with weeds that were competing with the *Poa annua* for cover, and the irrigation system was in a state of general disrepair.

In the next four years, with limited funds and even less equipment, Wanneroo again became a course to be proud of. The comeback was tough and not without surprises and setbacks. However, hard work, persistence, and a willingness to experiment paid off in the successful renovation of Wanneroo.

My first priority, naturally, was the greens. On close inspection, it was evident that eight of them had to be rebuilt the first summer. Australian summers occur when my colleagues in the U.S. and France are having winter. The top four to six inches of thatch and mat were removed with a Bobcat loader and carried away. Sand from a pit dug on the course was used to replace what was removed, and then mixed into the remaining greens material with a rotary hoe to avoid layering.

At the time the thatch was removed, I noticed wide areas of white mycelium (filaments of fungi) in the matted material. Although the thatch was starting to decompose, it was quite water repellent. I thought this was due to the saprophytic fungi feeding on the dead organic matter, and I hoped one day to use these organisms to control thatch.

Since that time, I have realized the folly of my hypothesis, as the fungi have brought only fairy rings, dry spots and trouble. Unfortunately, the greens were rebuilt on this soil without benefit of fumigation, due to lack of funds. And the fungal mycelium was rotary hoed all over the place. In future years, this would cause a great deal of trouble at Wanneroo.

Two of the greens were re-turfed with sods from the club's nursery, built on black topsoil. The actual greens soil consisted of a coarse orange and black sand, and I knew this inconsistency wouldn't help matters. The six other greens were seeded on site with Penncross bent. All of this was accomplished in less than three months with the help of the club members.

Trouble began immediately, with algae taking profit from frequent light watering during the seeding and germination stages in hot summer temperatures. I occasionally sprayed Mancozeb in an attempt to control the spread of algae on the new greens, with some success. At this stage, only brown slime and green algae were involved on the seeded greens, but blue-green colonies appeared on the two sodded greens as well.

Three months after establishment, I



began *Poa annua* control with ethofumesate (Prograss) and performed regular grooming (verticutting) every two to three weeks. With the onset of winter, recovery slowed, and this work was discontinued until growth resumed in the spring. Topdressing was done only after verticutting or coring to minimize buildup of layers.

Later that summer, nine more greens were rebuilt. Three of them were turfed with sod from the nursery and the other six received sod cut at 1/2 inch depth from the old greens.

These six "new greens with old turf" were severely infested with Poa. Several applications of Endothal, some at twice the recommended rate, only weakened the Poa temporarily. Practically every plant grew back.

All of this presented only two options: to accept the results and continue with mediocre turf quality, or to try and improve the situation. I chose the latter.

The following winter, or the summer of '86 to those of you in North America, I observed that the thatch buildup on the renovated greens was following a path similar to that of the old greens. The layer of thatch was almost one inch thick on the first set of rebuilt greens and 3/4 inch on the second set. In both cases, the thatch possessed the same color, texture and smell.

It appeared that the capillary forces in the thatch were creating a perched water table (a layer which must be saturated with water before drainage can take place) and were reducing air movement through the soil. This seemed to prevent toxic gases created by the anaerobic decomposition process from escaping the soil, and I assumed that was damaging the turf.

To combat this, I requested funding for a set of spiking attachments for the greensmower to penetrate the layer. Unfortunately the club did not understand the gravity of the situation and my request was denied. It was also difficult to gain permission to core aerify, and it took 15 months to persuade the green committee that this was a necessary disruption of play. Obviously, a great deal of education was required to gain the club's confidence in proper agronomic procedures.

Once aerification began, I observed that algal material was a main constituent of the thatch and mat under my greens, tees and fairways. Contrary to the expected results from the coring, this material seemed to grow even deeper into the core holes—yet another sign that something was terribly wrong with Wanneroo's turfgrass.

In an attempt to gain some measure of control over an ever worsening situation, I applied water very sparingly. This caused some of the members to complain that the greens were too hard. Others thought that my daily syringes to cool the turf on the root-shortened greens were encouraging the growth of algae.

While I was trying to walk this very delicate tightrope to satisfy both factions and still fight my problem, I began to lose turf in September 1986. Two-thirds of one green and smaller areas of several other greens had to be re-turfed. Conditions continued to deteriorate. I knew some drastic measures would have to be taken to save my turf, and ultimately, my job.

The culprit turned out to be the black layer syndrome. Through corrective measures, by 1988 I had completely reversed the situation at Wanneroo. After a recent coring and topdressing of the greens, no algae was present. Within ten days all of the core holes were covered with turf. Roots were down four to eight inches and the general health of the turf was greatly improved.

This turnaround was accomplished by

establishing a management theory summed up as "Beware of Algae in Turfgrass" and taking steps to either reduce or eliminate the problem.

The first step was to find an acceptable algaecide to use on turf without phytotoxicity. I found one that was being used in swimming pools. It contains low levels of a particular form of chelated copper rather than the more commonly used copper sulfate, which is toxic to turf. I also developed an elementary chlorinator for my irrigation system, which helped me with the task of controlling the blue-green algae, an organism with photosynthetic and nitrogen fixing properties. Combined with the proper soil management techniques of coring, spiking and verticutting, results were fantastic.

I now faced an interesting question: Was the algae growing on the Wanneroo Golf Course created by poor management practices of the past, or was there another element?

At first I believed the compacted thatch and soil was the sole culprit. However, I had seen crusts of algae growing on bare, white sand. This crust increased in a matter of weeks to a layer one inch thick. It had the consistency of rubber and seemed to induce anaerobic conditions.

In this case, no waterlogging took place. There were no drainage problems, and the only possible source appeared to be the filthy irrigation water. It is my belief that a continuous resupply of algal organisms from the irrigation water induced poor air exchange in the thatch and root zone. The resulting anaerobic condition caused the bacteria in the soil to create the black layer.

Further support of this theory came from my observations that the mucus produced by algae creates a dense, watertight barrier which leads to "dry patch" or isolated dry continued on page 22



Localized dry patches on 17th fairway in 1986.

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spots. This often occurs in Perth at the end of winter, when the sun becomes warmer and wind dries the greens surfaces over a weekend, taking many superintendents by surprise.

Dr. Clinton Hodges of Iowa State University had similar observations. His articles in various turf publications have been a great help and support to me throughout this period. Similarly, Jonathon Scott had experienced some of the same problems at Grand Traverse Resort in northern Michigan. He generously assisted me with information and a professional kinship not easily found in Australia. It was a great comfort to know that I was not alone with my problems.

Thatch was also a major problem on the fairways. The course was 12 years old when I started to renovate the fairways. The initial cover of common couch, or bermuda, had been invaded by *Poa annua*, water couch, Paspalum, and numerous other weeds which thrive in compacted and waterlogged soils. As a result, crabgrass dominated the heat-stressed Poa every summer, leaving little chance for the couch to grow.

The thatch was up to three inches thick in places supporting a pH of 4.2 to 4.5. It was very water repellent and caused numerous dry spots to appear during hot summer afternoons. In the winter, the thatch became waterlogged and quite anaerobic, further weakening the dormant couch grass. Algae was also abundant during the winter, making the situation chronic.

Again, I had two choices. One was to encourage more Poa, which ultimately meant more thatch and crabgrass. The second was to encourage the couch grasses living in a state of semi-dormancy in the mat. I chose the second, knowing full well that I would be hampered by my inadequate irrigation system.

We began spreading calcareous sand from a shellfish deposit to raise the pH of the fairways. Over three years we used more than 1.3 American tons per acre of the sand, rated at 93 percent CaCO₃3 and 1.5 percent Mg.

Next I cored the fairways with a Ryan Tracaire, getting poor penetration in the compacted dry areas. Initially, this coring severely damaged the heat-stressed Poa, leaving the golfers very displeased. We followed with a Gallagher flail mower fitted with dethatching blades set to a depth of 3/4 to one inch. Needless to say, we proceeded very slowly!

The couch started fighting back and filling the gaps left by the dying Poa, though crabgrass was competing for the same space. Unfortunately, the cost of rebuilding the greens left little money available for herbicide treatments to keep the crab in check.

Another problem in the fairways was black beetle infestation. This was due in part to the excessive watering that had taken place at Wanneroo before 1984. Deep, infrequent irrigation helped keep beetle numbers down, reducing the need for frequent insecticide applications. The worm population began to flourish, breaking down the thatch layer and aerating the soil. By 1988, the thatch mat had become a decomposed layer of humus.

The fertilizer program for the fairways was continuously modified to fit the increasing couch grass requirements, particularly using higher potassium levels. Unfortunately, water repellency was too severe due to the thatch and fungal mat, and the couch recovery was not ideal. In the winter Poa became dominant, further stressing the couch. I found myself having to limit fertilization in order to starve the Poa.

Spring and early summer of 1986 were fairly humid. The fairways began to release a very strong fungal smell, especially when we cored and verticut. In October and November (late spring in Australia) wide areas of fairways were destroyed by a fungus later identified as *Pythium*. It was gratifying that the couch was not affected and quickly filled the voids left by the damaged Poa.

However, bacterial slime grew on the dead plants, adding to the smell and ugly appearance of the fairways. This explosion of saprophytic activity was obviously the result of the liming and repeated aeration. For me, it was a sign of progress. But for the greens committee and most golfers, it was a sign that the course was dying. While I professed to be attacking the fungal problem, I secretly cherished and nurtured it.

By the end of the summer of 1986, most fairways supported an 80-percent couch cover. My plan for 1987 was to continue to use the fungus to my advantage. I would suppress the Poa earlier, allowing the couch to profit from the whole growing season...and watch the fungus do the cleanup.

For the last three years I had cultivated a healthier couch population, and now I was ready to play my trump card with the greens committee. My plan was to treat all fairways with Roundup at a rate which would not injure the couch. I had experimented with Atrazine, Roundup and Tryquat to find a rate that would eradicate the Poa and other cool season grasses and broadleaf weeds without damaging the couch.

After a great deal of argument, I was allowed to proceed. Within two weeks the undesirable weeds and grasses were dying.

What I didn't want, however, was to add to the decomposition problem. I had experimented with a propane burner built by a gas company for the purpose of weed control and thatch burning. I learned that a speed of about six mph would burn off the dead leaf tissue without harming the couch. Unfortunately, the unit was destroyed in an accident in transit to the club. I still believe that the principle is sound and will definitely use this machine in the future.

Without burning, it took several weeks for the dead organic matter to decompose, even after several corings and verticuttings.

My funds were low, but I wanted to spray the fairways and primary roughs with wetting agent. My chemical supplier mentioned that band applications at low rates of Wettasoil, a popular wetting agent in Australia, were successful in wheat growing. Of course, if funds were available, I would have opted for full coverage.

The sprayer was calibrated to the proper coverage, using four-inch spacing, with the fan nozzles of the spray boom directed almost perpendicular to the surface. The results were remarkable. The color of the fairways improved within days, and irrigation spread the wetting agent into the soil between the bands. In the rough, where less irrigation reached, green stripes appeared for a few weeks, showing the efficiency of the product.

To speed the recovery of the couch, my fertilization technique was changed once more. Foliar sprays of urea mixed with muriate of potash, iron sulfate, and other micronutrients replaced granular applications of ammonium nitrate. Applications every two to three weeks encouraged couch growth and made more efficient use of the nutrients possible.

The foliar sprays had another advantage. According to Dr. V. Stewart, a Welsh soil expert, ammonium nitrate is detrimental to earthworms, which I was trying desperately to reintroduce to my soils.



Soil profile shows dark, foul-smelling layer beneath surface.

Finally, I was growing pure couch instead of helping the Poa and other undesirable weeds compete. Still, usually cool, dry weather in the early part of the summer of 1987-88 allowed more Poa to germinate. This forced reapplication of Roundup and left an opening for crabgrass. It took several applications of MSMA to eliminate the crabgrass.

A third treatment with Roundup was made in early February, followed by Kerb in March and a very light rate of Atrazine on several fairways to control Poa germination. Last year the Poa was back under control.

Coring is essential to couch growth at Wanneroo, since there remains a dense barrier of humus composed of the earlier thatch and mat. This could easily lead to anaerobic conditions in a wet winter and continued on page 24







International Patent



Propane burner used as an experiment to burn off thatch and kill fungi on fairway.

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must be watched carefully. Perhaps in the future, sand topdressing can help alleviate this situation and improve the smoothness of the fairways.

None of the renovation at Wanneroo could have been possible had I not also solved the irrigation problems. At one time, the entire PVC piping system was partially clogged with bacterial and algal growth. It was so filled with this organic mulch that some pipes allowed only 15 psi at the sprinkler head.

I had no idea how to begin to clean the system, save pulling new pipe and starting over. A clue came from efforts to clear the irrigation reservoir of years of algal mud and bacteria as well as the effectiveness of treatments with algaecide and chlorine to the greens. During this process the pipes seemed to be unclogging!

I had stumbled upon a method that would work without injury to the turf. By injecting a weak chlorine solution through the pump system every third to fifth week, and algaecide injections three to four times a year, my pipes are now free of organic buildup. The irrigation system is operating efficiently once again.

There are still a multitude of doubters waiting for me to fail in my quest to grow pure couch fairways and good greens at Wanneroo Golf Club. The facts are that given a difficult history of mismanagement, the grass never had a chance.

Replacing a smelly heap of thatch and weeds, there are now beautiful couch fairways and smoother, healthier greens for the golfers to enjoy. Furthermore, the close roughs have benefited from this program and the planned overseeding of these areas was unnecessary.

The entire task would have been doubtful had I not held a firm belief in myself and my profession. In Australia, as well as anywhere, you must stand by your commitment to success and strive for perfection.

I have learned a great deal from my work at Wanneroo and appreciate the opportunity to share my experiences with my American colleagues.

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