Chapter 3

Kikuyu Grass: A History of its Introduction and Spread throughout Australia

3.1 Introduction

Kikuyu grass, (*Pennisetum clandestinum*), has adapted to a wide range of growing environments and conditions since its introduction into Australia. Breakwell (1923) says, on page 95 of his well known book, *The Grasses and Fodder Plants of New South Wales*, that kikuyu grass “was first grown in the Botanic Gardens, Sydney, early in 1919, from seed received from the Belgian Congo”. This statement has been accepted uncritically by all subsequent writers in the subject on Breakwell’s authority (Whittet, 1921; Parker, 1941; Cameron, 1960; Mears, 1970; Aitkin, 1973; Quinlan *et al.*, 1975). A similar statement appeared about two years earlier in an article written by Breakwell’s then assistant, Mr. J.N. Whittet (Whittet, 1921). Breakwell (1923, p.95.) further writes “only one seed grew … thus, from a single plant, many thousands of cuttings have been distributed to all parts of the State”. Once again, later writers, referring to the extensive distribution of vegetative kikuyu material around Australia in the 1920s and 1930s, have accepted without comment on Breakwell’s authority, the single plant origin of all of the kikuyu grass in Australia in the period (Cameron, 1960; Mears, 1970; Quinlan *et al.*, 1975). The 1921 paper of Whittet also included the single plant origin for the distributed material (Whittet, 1921). These statements are repeated in the majority of publications released on kikuyu grass over the past several decades, to the point that this version of events is now accepted as “common knowledge”. Using archival documents and other sources this chapter introduces major corrections into the generally accepted account of the introduction of kikuyu into Australia.

Given the importance of kikuyu grass in Australia for dairy production and for turf, it is important from the plant breeder’s position to check the validity of these
statements because of their relationship to the gene pool from which the bulk of the present day naturalised kikuyu pastures and lawns have been derived.

3.2 The interception of the seed used by Breakwell
In the early part of 1918, Australian Quarantine seized a small packet of seed which arrived with no name and addressed to an ‘unknown applicant’, Figure 3.1. The seized product was forwarded to Sydney’s Royal Botanic Gardens, where Ernest Breakwell, Agrostologist for the New South Wales Department of Agriculture, planted the seeds to observe plant characteristics and identify the species. In 1917 a Seed Testing Laboratory was established at the Royal Botanic Gardens, Sydney, by arrangement with Australian Quarantine, for the examination of imported seeds for purity (Mylrea, 1990). It was here that Breakwell grew the unidentified seeds. However, it seems that even he was unsure of what the new arrival was, as during the identification period the new grass did not set any seed. As a result, he provisionally named it ‘Carpet Grass’, Figure 3.1. He also relied upon the South African authorities and the Kew (U.K) Agrostologist Otto Stapf for a botanical name. This was evident in his July 2nd, 1921, statement in the NSW Agricultural Gazette where Breakwell (1921) wrote that “…..he (Stapf) has established the fact that Kikuyu grass was not *Pennisetum longistylum*” and “…..as the grass had previously been described under the name of *Pennisetum clandestinum*, Kikuyu grass must henceforth be known scientifically under that very appropriate name.”

Out of a reported number of just six seeds in the intercepted packet (Eykamp, 2003), one grew (Breakwell, 1923), the seedling being grown on to allow sufficient material to be forwarded to Hawkesbury Agricultural College (HAC) for further trial work. The first plantings of the new kikuyu grass were planted in the new grass gardens C1 & C2 at HAC on the 23rd of August, 1918, Figure 3.2. The grass gardens, on which now stand a number of buildings, exhibited over 30 different varieties of grasses for current and potential pasture use. These gardens, or demonstration plots, were the subject of a number of high profile visitors to the College throughout the years, keen to witness firsthand the new developments in the burgeoning agricultural sector.
The Principal,
H.A. College,
Richmond,

Dear Sir,

You will probably recollect my mentioning to you at the Show that the Carpet Grass (so named) growing at the College was Kikuyu Grass. I have now gone into this matter thoroughly and find that the botanical name of Pennisetum longistylum, as applied to the grass, is quite in accord with the specimens we have in the Herbarium. Evidently, however, the African authorities have changed the names of the two grasses and are probably calling the Pennisetum longistylum by the older name of Pennisetum villosum and applying the term P. longistylum to the new Kikuyu Grass (which does not seed with us). I received the seed of the Kikuyu Grass seized through quarantine about two years ago. It was then not named, being addressed by parcel post to some applicant. I have grown it since that time, having it would seed with me and then I could name it; thus the provisional name of Carpet Grass given to it. Just lately I have received Kikuyu Grass roots from South Africa and find it is the same as we have at the College.

It is going to be a very successful grass, and I would be glad, therefore, if you would kindly arrange for the Experimentalist to have the labels changed accordingly - Pennisetum longistylum to Pennisetum villosum, and Carpet Grass to Kikuyu Grass (Pennisetum longistylum).

Yours sincerely,

(Signed) E. BREAKWELL
Figure 3.2. Plot layout of grass gardens C1 & C2 at Hawkesbury Agricultural College planted August 23rd, 1918, as drawn August 1st, 1925. By 1925, the botanical name of kikuyu had been standardised as *Pennisetum clandestinum* and can be found in the left hand column.
3.3 Breakwell’s second introduction
When coupled with the initial field observations of the new kikuyu in the grass gardens, Breakwell decided, in 1920, to make a second introduction from South Africa, also detailed in his letter to Henry Potts (Figure 3.1). The plant material was in vegetative form as ‘roots’, a term of the day, which consisted of a clump of rooted plant material. He planted this to compare it to the seeded type introduced two years earlier. In his letter, Breakwell stated that the second introduction “…is the same as we have at the College”. The second introduction by Breakwell originated from Kenya, being the Forbes/Burtt-Davy introduction to South Africa almost a decade prior (Stapf, 1921). Breakwell also made public the importation from South Africa through his own work ‘The Grasses and Fodder Plants of New South Wales’ published in 1923. In it, he included an examination of the nutritive qualities of the introduced material and published a table comparing his material with an analysis from South Africa. Breakwell (1923) wrote “The nutritive qualities of the grass are very satisfactory. The following table (unpublished) shows the analysis of a sample of two months’ growth and that of a South African sample.”

Thus, in 1920 two lines, one from the original source of seed perceived and recorded to be introduced from the Belgian Congo, and the other, a vegetative form from Kenya, were growing side by side at HAC. Both forms then provided the foundation material for further trial work, vegetative expansion and initial distribution around Australia. The mass distribution was not achieved from the bulking up of just the single seedling so commonly reported. Further, as the two selections originated from different areas in east Africa, Breakwell knowingly, or unknowingly, distributed two ecotypes of kikuyu eagerly.

3.4 The originating source in east Africa.
The originating seed source within the Belgian Congo is unclear, with locales of botanic gardens and importation documents suggesting that it may not have been the source so frequently documented. At the time, botanic gardens in their respective countries were the main source of exportation and importation of various forms of seed and plant material, with importation volumes detailing any formal movement. There was no shortage of importations being made into the Sydney Botanic Gardens.
in the period 1900 – 1925, including some of the more commonly known plant species within Australia today. For example, in the first year alone after the establishment of the Seed Testing Laboratory at the Gardens, there were 1,400 seed samples examined (Mylrea, 1990).

Today, these original importation volumes are held at the NSW State Archives. Examination of the volumes detail several importations of the *Pennisetum* genus, such as *P. purpureum* in 1914 from Rhodesia (Zimbabwe) and *P. massaicum* in 1919 from the Belgian Congo, but no recording of *P. clandestinum* or *P. longistylum*. There is also no information or comment detailing the importation and arrival of the kikuyu seed in the archives of the Royal Botanic Gardens, Sydney, a point that has also been commented on by Bartholomew (1998).

The seizure by Quarantine, combined with a lack of documentation at both the Royal Botanic Gardens and NSW State Archives, indicates that the New South Wales Department of Agriculture did not intentionally set about importing kikuyu into Australia for pasture use and research.

3.4.1 The Congo Botanic Gardens.

The two operational botanic gardens during the time of importation of kikuyu into Australia within the Congo, were Kisantu and Eala. Both gardens were established in 1900 and are still operational today with the assistance of Botanic Gardens Conservation International (BGCI). When considering the preferred growing environments of kikuyu, neither botanic garden could have been the originating source due to environmental factors.

Kisantu is located within the Congo approximately 300km from the Atlantic Ocean on the western coast of Africa. Encompassing a total of 225ha and lying at an altitude of 530m (1,743ft) ASL in a hot and humid region, Kisantu has between 2,500 – 3,000 species in cultivation with only a third being native. Eala is located at Mbandaka, a port river junction of the Congo and Ruki rivers in the north-west Congo. Eala today is in a rundown state, encompassing approximately 370ha in area with 4,000 – 5,000 species of majority native plant forms. It too is another hot and
humid environment, lying virtually on the Equator at an altitude of 306m (1,007ft) ASL.

In a visual context, the locations of both Kisantu (5°07′56.26″S - 15°06′10.96″E) and Eala (0°02′30.07″N – 18°20′08.31″E) are well outside of the suitable and marginal legends provided by Cook et al. (2005), Figure 3.3. The suitable zones correctly highlight the highland regions in eastern and central Africa were kikuyu was noted as a forest margin species (Edwards, 1935), and are the preferred highland altitude zones of 6,500 – 9,000ft (c. 2,000 – 2,750m) including surrounding countries suggested by Mears (1970) as Ethiopia, Tanzania and Uganda. Should the seed have originated within the Congo it most likely would have been sourced in the cooler highlands of the eastern Congo, which at the time would have included Burundi and Rwanda (P. Latham, BGCI, pers. comm. 2004).

Figure 3.3. Suggested growth regions for kikuyu grass in Africa (Cook et al., 2005). The locations of Kisantu and Eala have been overlaid.

A number of documents and plant introduction listings amongst John Whittet’s papers at NSW State Archives note that kikuyu grass originated in Kenya (NSW State Archives), and that the only introduction from the Belgian Congo during 1919 was that of *Pennisetum massaicum* (NSW State Archives). Sadly, the originator
who sent the seed to Australia may never be known, and although that seed could have been sent from the higher parts of eastern Congo via Kenya, it seems more likely that it came from Kenya. To recognize the largely concealed flowering characteristics and seed production of kikuyu would have taken a well educated individual. However, seed production could have been inferred by an attentive farmer or planter noticing seed germinating in manure.

It is unclear why there are discrepancies, even from Breakwell personally, in relation to the date of importation and originating location. It is clear that it was 1918 when kikuyu was first grown in NSW, not only from Breakwell’s letter to Henry Potts (Figure 3.1) and the layout of grass garden C1 at Hawkesbury Agricultural College (Figure 3.2), but also from Breakwell’s personal attendance at the Windsor branch of the Agricultural Bureau in 1919 to announce the vegetative material was available for distribution.

3.5 Spread around Australia.
Due to Breakwell’s early recognition of the potential of the grass in Australia (Figure 3.1), kikuyu was displayed, along with various other pasture species, at the Royal Agricultural (Easter) Show in Sydney on an annual basis beginning in 1920. It was at displays such as this which ensured that early distribution was primarily dependant on word of mouth. Breakwell, and the then Assistant Agrostologist, John Whittet, attended the annual shows and monthly meetings of varying township agricultural gatherings, promoting the value of kikuyu as a pasture species. However, Breakwell was so confident and excited by the potential of kikuyu within the agricultural industry that he was promoting it even before it was displayed at the Royal Agricultural Society’s Show. At the monthly meeting of the Windsor Branch of the Agricultural Bureau on the 25th of October 1919, Breakwell promised cuttings of kikuyu to any member interested in trialling it (Agricultural Gazette of NSW, 1920). Over the next several years, Breakwell and Whittet continued to travel to monthly meetings handing out samples and promoting the value of kikuyu to farmers, recommending it for a wide range of growing conditions and sites.
Mass spread of the new kikuyu variety was undertaken during 1920, and a number of testing stations were also added, including Grafton, Wollangbar, Trangie, Cowra, Berry, and Yanco. Cuttings from these stations, as well as from HAC and the Royal Botanic Gardens, Sydney, were forwarded to their respective districts and townships for evaluation.

Whittet (1921) writes “The districts to which it has been sent are Holbrook, Culcairn, Gilgandra, Carcoar, Warren, Grenfell, Coonabarabran, Wagga, Murrumburrah, and Dubbo. Rooted cuttings have also been sent to Glen Innes, Stonehenge, Werris Creek, Tamworth, Quirindi, Singleton, Yanco, Orange, Moss Vale, Mittagong, Unanderra, Pambula, Kiama, Wollongong, Castle Hill, Woy Woy, Gosford, Tuggerah, Wyong, Wyee, Toronto, Windsor, Kurrajong, Coopernook, Grafton, Dorrigo, Kyogle, Casino, Lismore, Byron Bay, South Australia, Victoria, Queensland, Western Australia, New Zealand, and Fiji.”

Reports back from the various districts which were supplied with kikuyu cuttings were overwhelmingly positive. Comments such as “This is the best grass I have ever seen…”; “…we are of the opinion that it will prove very valuable for Queensland”; “…it promises to be an excellent one for grazing purposes”; and “…looks very promising, being very healthy” (Whittet, 1921), provided confidence for farmers who were looking for a durable, low maintenance pasture species. Numerous articles throughout the 1920s continued to report of excellent results with kikuyu and were readily published in the NSW Agricultural Gazette.

3.6 Australian demand and expansion at HAC

Of the 33 varieties which were being examined at HAC in the demonstration grass gardens, kikuyu was mentioned in high regard in the College’s annual report of 1921 stating “A small pasture sown with the grass last year contains now no other grass, the kikuyu having taken complete possession of the ground, although stocked fairly heavily. This grass has stood the frost remarkably well, showing its superiority over couch grass in this respect. Its usefulness has become widely known, as numerous requests are received from various parts of the State for trial” (Hawkesbury Agricultural College, 1920-1921).
Excellent reports from around Australia resulted in a huge demand for kikuyu by farmers which continued unabated into the early 1930s. To keep up with the demand from the agricultural industry experienced in the early part of the 1920s, a major increase in the total area of kikuyu was undertaken at Hawkesbury Agricultural College, with 50 acres planted on their River Farm during the latter part of 1924 (Hawkesbury Agricultural College, 1924-1925), and again in at HAC in May of 1930 to serve as an increased source of cuttings for orders. The combined sites at Hawkesbury provided vegetative matter which was then being sold for £1 per thousand cuttings. With orders at Hawkesbury increasing each year, kikuyu proved to be a valuable income source for respective Principal’s Henry Potts (1902 – 1921) and E.A. Southee (1921 – 1954). Significant purchases were being made, such as the 8,000 cuttings for the farm of H.T. Armitage, Deputy Governor of the Commonwealth Bank, who planted 3 acres on his farm at Central Colo near Windsor. During the 1928/1929 financial year alone, 25,000 cuttings were sold.

3.7 Australian trial work
In 1921 (Whittet, 1921), or 1925 (Parker, 1941), cuttings of kikuyu were forwarded to the Waite Agricultural Research Institute at the University of Adelaide, South Australia. Parker (1941) writes “…6 cuttings were received by the Waite Institute from the New South Wales Department of Agriculture and successfully propagated. Practically all the Kikuyu grass in South Australia owes its origin to either the material introduced by the enterprise of the late Mr. Edward Hawker and Mr. V.M. Newland, or that obtained by the Waite Institute from New South Wales.” Kikuyu was grown on a large scale around The Waite Institute as lawns and was reported well suited to the drier conditions experienced compared to its native habitat. Initial reporting from the immediate area suggested that kikuyu combined well with various clovers, and work was to commence on the identification of a seed forming strain, as only male sterile forms had been observed (Parker, 1941).

Kikuyu was imported into Victoria from the South African Department of Agriculture in 1925 (NSW State Archives). The reasoning and influence behind the
importation is unclear with it being planted and tested at Longeronong (Horsham), western Victoria. In the immediate district is the Victorian Institute for Dryland Agriculture (VIDA) in Horsham which may have played a role. The results simply stated “grows well with watering.” Where Whittet sent his original samples to in 1920 is unknown but one could postulate that it would have been to their counterparts at the Victorian Department of Agriculture. VIDA is listed as under their direction, thus Horsham may have been the original destination for the Whittet sample. Given that the second introduction was sourced from South Africa it could quite well mean that it also originated from Kenya. Cullity (1948) also reports an introduction into Western Australia from South Africa in the early 1920s, however there is little documentation supporting this.

During the late 1930s, material representative of the Edwards ecotypes were subsequently introduced and grown at The Royal Botanic Gardens, Sydney, no doubt driven by the release of his 1937 paper. Interestingly, John Whittet, then Chief Agrostologist, did not make mention of the importation event. However, it did not stop him from putting the three ecotypes into trial, this time for erosion control measures at the Cowra Experimental Farm in August of 1940. The Waite Institute also carried out further evaluation of the three ecotypes the same year. Professor B.A. Madson from the Department of Agronomy, University of California, forwarded cuttings from seed imported and grown in 1939 from Kenya (Parker, 1941). The seed imported by the University of California was representative of the Molo, Kabete and Rongai varieties identified in the Edwards paper. Edwards himself also forwarded seed of his Kabete ecotype to the Waite Institute which was grown in September 1940, which subsequently flowered and set seed which was collected in February 1941.

3.8 Further importations
Apart from the importations around 1960 which led to the development of ‘Whittet’, further importation events after this period seemed to slow. Records from Australian Quarantine and Inspection Service list 26 importation events for the *Pennisetum* genus from 1987 through to the latest importation date of November 2004 (Murray,
pers. comm., 2005). Of those importations, twenty-five have occurred since 1997, however because the imports were from countries which did not pose a risk to Australia, the country of origin did not need to be cited on importation records. A similar exemption applies to declaring the specific name within the genus, thus it is unclear if any of the species imported during this period were in fact kikuyu grass (*Pennisetum clandestinum*).

3.9 Conclusions
Kikuyu grass today remains an important agricultural and recreational species. In this chapter, archival and documentary searches carried out provide a clearer background and definitive revision of its introduction and spread. It has been described for the first time that:

- Kikuyu grass was first introduced into Australia by Edward Hawker in 1908 as roots, but the material failed to survive.
- The original seed source into Australia was seized by Quarantine in early 1918, and was not an intentional introduction by the NSW Department of Agriculture, or the Royal Botanic Gardens.
- The originating source was almost certainly Kenya, not the Belgian Congo.
- The seed intercepted by Quarantine was sown by Breakwell in early 1918 and the one seedling successfully established was transferred to the grass garden at Hawkesbury Agricultural College in August 1918.
- The plant material deliberately introduced from the Belgian Congo in 1919 was *Pennisetum massaicum*.
- Vegetative material was imported from South Africa by Breakwell in 1920.
- The vegetative material which was initially distributed around Australia from Hawkesbury Agricultural College from 1921, did not originate from one seed, but included that genotype and one or more lines from the 1920 vegetative introduction from South Africa.
- Several introductions into Australia between 1920 and 1940 have been ignored by more recent writers.
- John Whittet trialed the Edwards (Kenyan) ecotypes in Cowra in 1940.