Chapter 1

General Introduction

Kikuyu grass (*Pennisetum clandestinum* Hochst. *ex* Chiov.) originates in the fertile highlands of eastern Africa. Its introduction, spread and first seeding occurrence across Australia has been continually misinterpreted in multiple publications, ultimately due to the fact that there has been no archive based in-depth research carried out on these topics. Kikuyu grass was supposedly introduced into Australia in 1919 from the Belgian Congo. Grown at The Royal Botanic Gardens, Sydney, and Hawkesbury Agricultural College, Richmond, NSW, cuttings were distributed to farmers around Australia by Ernest Breakwell and John Whittet, Agrostologists of the then NSW Department of Agriculture. Farmers and graziers hailed its succulence and ability to out compete weed species due to its aggressive growth habit, resulting in huge demand from the agricultural sector throughout the 1920s and 1930s. Today it is established throughout a wide range of locations across Australia, adapting itself to varying environmental conditions, and displaying dominance within specific temperature, rainfall and soil nutrient environments.

The agricultural sector represents the major proportion of users of kikuyu grass. Some farmers have planted it willingly, while others have seen it encroach onto their land. Its aggressive spreading habit, combined with thick stolons and rhizomes have appealed to a wider range of commercial usage, such as stabilisation on newly opened and constructed banks, as well as drainage channels beside roads and highways. Its high degree of drought tolerance further reinforces its reputation, on one hand as a tough hard wearing grass species, and on the other as a nutritive and succulent variety for grazing ruminants.

Sporting organisations also appreciate the hard wearing characteristics of kikuyu, and, like the agricultural sector, have seen it planted willingly or allowed it to encroach. One major industry is horse racing, where kikuyu is used on all major metropolitan racetracks across Australia. It is also widely utilised in other sporting
disciplines, being the dominant surface for rugby in South Africa, the preferred surface for a number of events during the Barcelona Olympic Games in Spain, and on major golf courses throughout the world such as Torrey Pines in San Diego, host of the 2008 US Open.

In Australia at present, kikuyu is primarily naturalised through a ‘common’ form, thought to be representative of or spontaneously derived from the original introduction from the Belgian Congo. Over the years, four other cultivars have been released onto the Australian market. Of these, ‘Whittet’ was released in 1970 primarily for its suitability for combination growing with legumes due to its open growth habit; ‘Breakwell’ was released in 1971 primarily for erosion control and stabilisation due to its more prostrate and denser growth habit; ‘Crofts’ was released in 1983 primarily due to its ability to withstand cooler growing conditions; and ‘Noonan’ was released as well in 1983 due to its resistance of the oomycete, *Verrucalvus flavofaciens*, commonly known as kikuyu yellows disease. Part of the reason that neither new cultivars, nor kikuyu in general, have been examined throughout the last 25 years is due initially to the performance of the common form, which is as good, if not better, than the released cultivars under regular maintenance regimes. It is very difficult to differentiate between the 4 registered varieties as there is very little physical variation amongst them. This is in part due to the high degree of plasticity demonstrated by kikuyu. Further, it is not viewed by the commercial market as a desirable sports turf surface.

When placed within a golfing or sporting context, common type kikuyu is generally a high management surface. Applications of anti-gibberellins are required to produce a finer, denser sward comparable to cultivars of couch grass (*Cynodon dactylon*) when used in a sporting environment. It is also prone to high thatching tendencies, and requires diligent maintenance from a home owner’s perspective. In the agricultural sector, the effect of kikuyu yellows can be particularly damaging in pastures. Kikuyu is also suspected to contribute to cattle death due to an accumulation of nitrates and/or some other toxin found in lush new growth after periods of rainfall.
Given that kikuyu grass has now been grown across Australia in a wide range of climates and micro-climates for about 90 years, significant ecotypic variation should be expected to have developed. The opportunity exists for the release of fine leaf kikuyu turfgrass type varieties with multiple stress resistance as well as pasture forms with improved stress resistance, particularly resistance to kikuyu yellows disease.

In this thesis the focus is on exploring the history of kikuyu in Australia, the variation expected within naturalised populations and whether those populations examined can be utilised in a continued turfgrass breeding programme. It is hoped that the work will provide a sound base from which ongoing investigation will result in the release of cultivars bred specifically for the Australian turfgrass market.