Chapter 12

General Discussion

Difficulties arise when trying to morphologically differentiate between the registered kikuyu grass cultivars and selections of common forms. Hanna *et al.* (2004) claim that much of what is referred to as common kikuyu is actually 'Kabete' and 'Molo', two of the three ecotypes described and named by D.C. Edwards (1937) in Kenya. Much of the common strain of kikuyu grass in eastern Australia could well have originated from 'Kabete' given the efforts of the Waite Institute in the early 1940s to produce a seeding strain of kikuyu. Plants of 'Kabete' were grown throughout NSW and WA where seed was harvested and planted (Cameron, 1960). The release of 'Whittet' allowed farmers to rapidly sow pastures with kikuyu seed as it reduced the manual task of hand planting stolons. Given that 'Whittet' was evaluated alongside another introduction 'Kabete Mk268' (Barnard, 1972b), those responsible at the Grassland Research Station in Kitale, Kenya, who sent the seeds, could have been of the opinion that the location where 'Kabete' was collected was considered as the best source for a seeding strain of kikuyu grass. Thus, 'Whittet' could very well be a hybrid or variant of 'Kabete', or even actually 'Kabete' itself. Further, the original seed introduction intercepted by Australian Quarantine in 1918 could well have been 'Kabete'. In this study it is identified for the first time that John Whittet trialed the Edwards ecotypes ('Kabete', 'Molo', and 'Rongai') at Cowra Experimental Station in 1940, thus providing a sound starting point for the assessment of collections and gene flows should further work on the history of the naturalisation of the grass in Australia ever be undertaken.

It has been demonstrated clearly that significant variation is currently experienced between Australian kikuyu grass accessions, suggesting extensive adaptation has taken place, which reinforces the point that any further work investigating turf type capabilities, or even dry matter production via foliage growth, must be conducted **on-site** in properly designed G x E experiments. The seasonal determinations in

growing conditions mid-way through the Lansdowne Farm phenotypic analysis (Chapter 5) highlighted how the various accessions responded in different ways, frequently reflecting their area of origin, thus suggesting that they are adaptational ecotypes rather than random variants.

Additional, and more detailed, research in kikuyu DNA analysis is required, particularly with regard to two areas of this study, firstly the complexity of male sterility, and secondly the resistance to *Verrucalvus flavofaciens* exhibited by cultivar 'Noonan'. The RAPD analysis carried out in this study, even with a limited number of primers, showed how significant the variation is between the accessions, but failed to shed any light on the resistance to kikuyu yellows by 'Noonan', as there were no individual identifiable bands which separated 'Noonan' from the remainder of the selections. Given that the oomycete *Verrucalvus flavofaciens* is gradually spreading throughout NSW, on top of the current devastation of pastures it has caused in northern NSW, identification of a marker becomes a critical area of research. There are a number of questions which remain unanswered about the disease, such as whether it has already mutated, how long does it take to infect the plant, what toxins are involved, and the lack of a systemic fungicide to control it. The lack of control with fungicides, such as Metalaxyl-m, that are known to suppress oomycete diseases (eg. *Pythium* spp.) in turf is greatly concerning. As the Kikuyu Yellows oomycete originated in Australia and adapted itself to the introduced kikuyu grass, the potential for it to infect other forms of plant life, turfgrass and even agricultural crops must be addressed with a sense of urgency.

The discovery in this study of a probable endophyte which is present in the seed of kikuyu also provides an avenue of future research, particularly in improving its already good stress resistance in a turfgrass environment. Many improvements would be addressed in future breeding programmes, where apart from further collections and examination of those in G x E experiments, the production of new elite hybrids via irradiation principles should provide great potential for new registered kikuyu grass lines on the turfgrass market. It is the opinion of the author that while breeding a hybrid kikuyu which demonstrates a multitude of resistance and improvement factors is desired by many, it is not obtainable in the short to medium term. Rather, a step by step approach which focuses on individual

resistance and improvement traits over a multi-year breeding programme is the best approach. Growth data of the hybrid lines presented also indicates the potential presence of heterotic pools, both positive and negative. This study has been unable to draw upon prior detailed work on the grass because there is almost none, so it is hoped that the results reported in this thesis will provide a solid base in at least some areas from which future research work can evolve.

The potential for improved turf and pasture forms of kikuyu grass is tremendous, given the land area occupied and range of uses that kikuyu currently supplies. The discovery of naturally occurring fine leaf forms such as KC965 and KC941 proves this is possible, and the deliberate production of improved hybrid lines can only further enhance the use of this valuable grass in Australia.