PERMACROPPING INTO A PERENNIAL NATIVE PASTURE BASE

D. Cluff[1], C. Seis[2] and C.E. Jones[3]

[1]"Olive Lodge", Birriwa, NSW 2844
[2]"Winona", Gulgong, NSW 2852
[3]Department of Botany, University of New England, Armidale, NSW, 2351

Abstract

Diverse perennial native pastures offer the advantage of high productivity combined with long term persistence. Conventional crop production techniques have required the destruction of these pastures, resulting in undesirable side effects such as soil erosion, compaction, acidity and soil salinity. Permacropping is an innovative practice which combines "farming" and "grazing" into a compatible single system of land management that has the potential to overcome, or greatly reduce, these side-effects. The results of field trials on two properties in the Central West of NSW show that productive viable crops can be grown whilst allowing diverse native pastures to regenerate.

Key words: Permacropping, native pasture.

In pre-European times, the vegetative cover of the wooded grasslands of the tablelands, slopes and plains in the Central West of NSW was, almost without except-ion, perennial in nature. The introduction of European agricultural and grazing systems led to the intentional and non- intentional replacement of the perennial species with introduced annual plants. This transition was hastened by the widespread use of bare fallows maintained by repeated cultivation, and more recently by multiple herbicide applications. These cropping practices have contributed to soil structural decline, markedly increased the risk of erosion and salinity and reduced the level of biological activity in soil.

However there remains an economic imperative for many farmers to grow crops. The challenge is to achieve economic crop production without damaging the resource base. Whilst enormous effort has been devoted to the methodologies of reduced tillage and conservation farming practices little progress has been made in improving soil structure, increasing soil infiltration rates or organic carbon levels (refer I. Packer, this proceedings). Solutions have been sought by modifying farming techniques, but it is difficult to address problems using the same tools that created the problem.

It is normally regarded as necessary to remove all vegetation prior to an annual crop being sown. With a re-direction in thinking many avenues for the inclusion of water-use efficient native perennial vegetation in annual cropping systems could be found, bearing in mind that the more closely our agricultural systems mimic natural perennial ecosystems, the more likely they are to be environmentally stable. A balanced mix of the grass and legume species that originally covered the landscape is considered the most appropriate vegetation cover for long-term high productivity. Direct drilling cereal crops into frost-dormant native pastures is seen as a means to enhance winter fodder production or producing an economically viable cereal crop. Winter germinating annual grasses and weeds are suppressed and the principally summer growing native pastures are not active until the crop nears maturity. The perennial pasture base remains unharmed and is avail-able for grazing immediately after completion of the harvest.

This paper presents results of the field trials carried out by the authors in 1995, 1996 and 1997.

Method and results

The properties "Olive Lodge" (red podsolic soil, Birriwa, NSW) and "Winona" (granitic loam, Gulgong, NSW) have had a long history of cereal crop production as well as grazing sheep and cattle. The initial ground preparation for cereals was disc ploughing followed by a number of tined implement cultivations for weed control followed by sowing. The rotation principle was generally one or two years of crop followed by up to five years of pasture, based on subclover.

The permacropping method being progressively developed on these properties over recent years has involved retaining the natural populations of *Bothrio-chloa, Paspalidium or Eriochloa* based native pastures for grazing over summer and autumn then direct drilling cereal crops (wheat or oats) in May. The paddocks are heavily grazed in autumn to reduce the pasture bulk, and sprayed one or two days prior to sowing with Round Up? to control annual grasses and broadleaf weeds. Fertiliser application rates are determined prior to sowing by soil testing. Additional weed control, if need-ed, is carried out using post-emergent selective herb-icides. Approximately 300 ha. is currently being perma- cropped on these properties. In 1997, crops were sown without herbicide on "Winona" and similar yields to those on "Olive Lodge" were obtained (Table 1). The dominance of perennial native pastures over annual grasses and broadleaf weeds could ultimately allow the production of winter cereal crops without the need for cultivation or herbicide application.

Table 1. Varieties sown, herbicide and fertiliser rates, rainfall received and yields obtained in 1995, 1996 and 1997 on “Olive Lodge and “Winona”

Location	Year	Crop	Herbicide	Fertiliser	Rainfall May - Nov (mm)	Yield
Olive Lodge	1995	Coolabah oats	600 ml/ha Round Up?	125 kg/ha single super	337	4.2 t/ha (hay)
Olive lodge	1996	Jantz wheat	750 ml/ha Round Up? 700 ml/ha MCPA 500? 1000 ml/ha Hoegrass?	120 kg/ha Granuloc?	472	3.8 t/ha (grain)
Olive Lodge	1997	Jantz wheat	750 ml/ha Round Up? 1000 ml/ha Tristar?	120 kg/ha DAP?	278	1.4 t/ha (grain)
Winona	1996	Echidna oats	1000 ml/ha Round Up?	70 kg/ha Starterphos?	494	4.0 t/ha (grain)
Winona	1997	Echidna oats		70 kg/ha Starterphos?	288	1.5 t/ha (grain)

Discussion

The stability of an ecosystem depends not only on its diversity but also on the interconnectedness of its component parts. There is neither diversity nor inter-connectedness in any type of annual cropping system currently practiced. Even the more "sustainable" eco-farming, conservation farming and organic farming regimes lack the living base which ensures continuity of biological activity within and between years. The intrinsic ecological benefits associated with perma-cropping provide a framework for addressing a suite of land degradation problems concurrently with cash flow.

The findings reported here are from commercial size paddocks rather than from small scale research plots. While the latter provides the opportunity for replication and statistical comparisons of treatment means, the reluctance of landholders to adopt the findings from small-scale plots can markedly hinder the transfer of the technology to broadacre farming.

Permacropping is a principle that needs to be implemented on-farm, by farmers, in ways which suit their individual needs. The alternative of bare fallow results in soil left unprotected and biologically inactive for extended periods of time.