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CULTIVATION OF MITCHELL GRASS (*ASTREBLA* F. Muell.)

RANGELANDS IN NORTHERN NEW SOUTH WALES

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SUMMARY

The mitchell grass pastures of northern New South Wales are economically important to the grazing industry and occur mainly in the 375 mm to 475 mm annual rainfall zone.

Expansion of the wheatbelt into traditional rangelands has led increasingly to the cultivation of these grasslands.

Legislation to regulate all cultivation in the Western Division of New South Wales has curtailed cultivation of the mitchell grass pastures. However, in the freehold country to the east, valuable mitchell grass stands have been, and continue to be, destroyed by cultivation.

INTRODUCTION

The grasslands of northern New South Wales are economically important to the grazing industry of the state. Among these, mitchell grass (*Astrebala* F. Muell.) pastures provide high quality and more reliable stock feed than other grassland pastures under comparable rainfall regime.

The curly mitchell grass (*Astrebala lappacea*) alliance (Beadle 1948) includes an area in New South Wales from a line from Brewarrina to Narrabri north to the Queensland-New South Wales border.

Rainfall in the area ranges from 375 mm to 475 mm per annum, of which 55% to 70% more falls in summer than in winter.

The mitchell grass alliance is characteristic of, and restricted to, alkaline self-mulching clay soils which are not subjected to flooding. The area falls entirely within the Darling River drainage system of northern New South Wales.

The mitchell grasses are perennial tussock grasses endemic to Australia. Curly mitchell grass is the dominant species in the area described although cow mitchell grass (*Astrebla pectinata*) also occurs in small areas. Cow mitchell grass is susceptible to heavy grazing.

Mitchell grass grows mainly during the summer months, provided sufficient moisture is available.

LAND TENURE

The area west of the Barwon River is part of the Western Division of New South Wales. Land tenure is by way of lease, in perpetuity, from the Crown.

Lessees have, for many years, been required to obtain a licence to destroy timber in order to prepare lands for cultivation. The expansion of the wheat belt into traditional rangelands with lower rainfalls and timber clearing costs, has led increasingly to the cultivation of the treeless grasslands.

The Western Lands Act (1901) was recently amended to prohibit cultivation of any lease country without the approval of the Western Lands Commissioner.

Country to the east of the Barwon River is freehold and is therefore not subject to Crown control.

GRAZING

Mitchell grass pastures are important in arid Australia in that they have a stock carrying capacity of three to four times greater than other arid grasslands under comparable rainfall (Jozwik et. al. 1970). The Soil Conservation Service of New South Wales estimates the long term grazing capacity of mitchell grass pastures as 1 sheep to 1.2 ha. This compares with a grazing rate of 1 sheep to 1.5 ha for a wire grass (*Aristida jerichoensis* var. *subspinulifera*)- variable spear grass (*Stipa variabilis*) pasture (with no trees or shrubs) and 1 sheep to 1.2 ha for a woolly butt (*Eragrostis eriopoda*) pasture.

Under good summer rainfall conditions mitchell grasses dominate the grass sward with a basal area of 4% or less (Everist 1964). Associated perennial species are uncommon unless the community has been modified by grazing or altered by cultivation. Neverfail (*Eragrostis setifolia*), queensland bluegrass (*Dichanthium sericeum*) and fairy grass (*Sporobolus caroli*) are the most important summer growing perennials, together with rigid panic (*Panicum prolutum*) a winter growing perennial. Winter pasture species also include trefoils (*Medicago* spp.) barley grass (*Hordeum leporinum*) and australian carrot (*Daucus glochidiatus*).

The mitchell grasses are well adapted to the hot arid climate.. Roe (1940) observed that mitchell grasses in southern Queensland shot, seeded and dried off within two months after summer rainfall. Jozwik et. al. (op. cit.) established that mitchell grass seeds germinated rapidly over a wide temperature range which indicates that germination is seldom prevented by low soil temperatures after adequate rain. Seedlings grow and mature rapidly at high temperatures with no evidence that extreme temperatures inhibit growth. Established plants respond quickly to light falls of rain by tillering prolifically from the lower nodes (Jozwik. et al, op. cit.).

TREND TOWARD CROPPING

The increase in the area under cultivation has accelerated during the late 1970's. In 1971/72 approximately 3% of the area under discussion was cultivated, mainly for wheat (Australian Bureau of Statistics Handbook 1971/72). By 1978/79 approximately 6.5% of the area was under cultivation (Australian Bureau fo Statistics Handbook 1978/79).

Applications for approval to cultivate Western Lands Lease country totalling 29,000 hectares of predominantly previously uncultivated country have been submitted in 1981. Much of this area includes mitchell grass and other valuable pasture species.

This increase in the rate of expansion of the wheat belt into traditional rangeland areas is due to five main factors:

1. The continuation of an orderly wheat marketing programme.
2. A run of favourable seasons in the 1970's.

3. Improved machinery and techniques. .
4. Improved drought resistant varieties.
5. Favourable commodity prices.

SOIL CONSERVATION SERVICE OF NEW SOUTH WALES INVOLVEMENT

Prior to granting approval for cultivation of Western Lands Lease country the Western Lands Commissioner must seek the advice of the Soil Conservation Service on soil conservation aspects.

The Soil Conservation Service recommendations aim to preserve areas with viable and adequate native seed sources to permit natural regeneration should cultivation prove to be beyond the long term capability of the land. Recommendations also aim to prevent both wind and water erosion by retaining adequate areas of pasture and/or timber.

The high percentage of clay in the soil and the formation of stable aggregates upon drying, make the soils resistant to wind erosion. Water erosion is negligible due to the flatness of the land which precludes both concentration of flow and high water velocities.

The Soil Conservation Service also recommends against the cultivation of mitchell grass pastures due to apparent inability of the species to re-establish after cultivation.

Where cultivation is practised the Service recommends that stubble be retained to provide some vegetative cover during the summer months.

Recommendations made by the Soil Conservation Service for cultivation of heavy clay soils would include the following:

1. Permanently uncultivated ground must occupy at least 15% of the total area to be treated, and shall include a 100 metre perimeter strip.

2. The distance between any one uncultivated area and the two nearest areas (of which one may be the perimeter) shall not exceed 1 kilometre:
3. Any clump of timber or uncultivated area left shall not be less than 2 hectares in area. Smaller areas may also be left but shall be disregarded for the purpose of conditions (1) and (2).
4. Alternatively to the above, cultivation shall be carried out in blocks not exceeding 120 hectares in area and each block shall be surrounded by a strip of permanently uncultivated country not less than 100 metres in width.
5. Defined drainage lines which carry water after storms or high river flows shall be left uncultivated in the channels and for a width of at least 20 metres on either side.
6. No cultivation shall be carried out on lands with a slope exceeding 2% unless and until such areas have been inspected by the Soil Conservation Service and necessary soil conservation measures installed.
7. Areas carrying stands of perennial or bladder saltbush (*Atriplex vesicaria*), old man saltbush (*A. nummularia*) or cotton bush (*Maireana aphylla*), even though presently or apparently dead, shall be left untouched for a distance of at least 100 metres around any stand where the plants are spaced at 10 metres apart or closer.
8. Areas carrying stands of mitchell grass (*Astrebla* spp.), even though dead or apparently dead, shall be left untouched for a distance of at least 100 metres around any stand where plants are spaced closer than 10 metres apart.

CONCLUSION

There is a conflict of land use interests in this area at the present time, with some lessees and farmers wishing to grow sometimes highly profitable cereal crops, and the Crown wishing to retain valuable native pastures with the view that regular cropping cannot be sustained.

While control on cultivation is possible in the Crown administered Western Division, a problem in long term range management exists in the freehold country.

In mitchell grass areas rainfall is summer dominant thereby increasing the likelihood of unreliable crop yields. Mitchell grass, as a drought evading perennial, interspersed with highly productive annuals after good rainfalls, is the system of production best suited to the area.

The inability of mitchell grass to re-establish after cultivation emphasises the importance of the Soil Conservation Service recommendations and the futility of destroying a well adapted grassland pasture unless regular and reliable cropping is possible.

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