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CROPPING IN THE MARGINAL LANDS OF SOUTH-WEST NEW SOUTH WALES

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ABSTRACT

The expansion of cropping into pastoral country of south-west New South Wales is discussed, along with an examination of the types of country involved.

Bare fallowing is a practice necessary in cropping in this low rainfall area but it results in most of the problems encountered by both the landholder and the soil conservationist.

The roles of the soil conservationist in marginal cropping lands are threefold; advising the land administrators, assessing the relative erodibilities of different sites, and encouraging farmers to modify their clearing and cultivation practices so as to minimise erosion.

INTRODUCTION

Extensive cropping on grazing leases began in the early 1960's but the last ten years have seen the major thrust of expansion in the area sown to winter cereals, particularly wheat (See Figure 1). However, some areas have been cropped since the 1930's (Kyalite, Balranald and Euston areas) and these are considered locally to be traditional cropping areas.

These areas are within the Western Land Division of New South Wales, and properties are crown leases, usually leases in perpetuity.

Pressure to continue cropping resulted in an amendment to the Western Lands Act in 1980, which requires that lessees must obtain a cultivation licence, with an annual fee depending on the area cultivated. The issue of a licence is subject to advice from the Soil Conservation Service.

Property inspections associated with licence applications have revealed that 25 percent of the area shown on figure 1 has already been cropped or is proposed to be cropped.

Landholders involved in marginal area cropping fall into three main groups:

1. Full-time farmers mainly associated with the traditional cropping areas around Kyalite, Euston and Balranald.
2. Graziers who have taken an interest in farming but have run the majority of their holding as a grazing enterprise. This group includes the "opportunistic" farmers who undertake cropping only during favourable periods.
3. Graziers with sharefarmers handling the cropping, with the grazier carrying out little if any of the farming.

Description of the Area

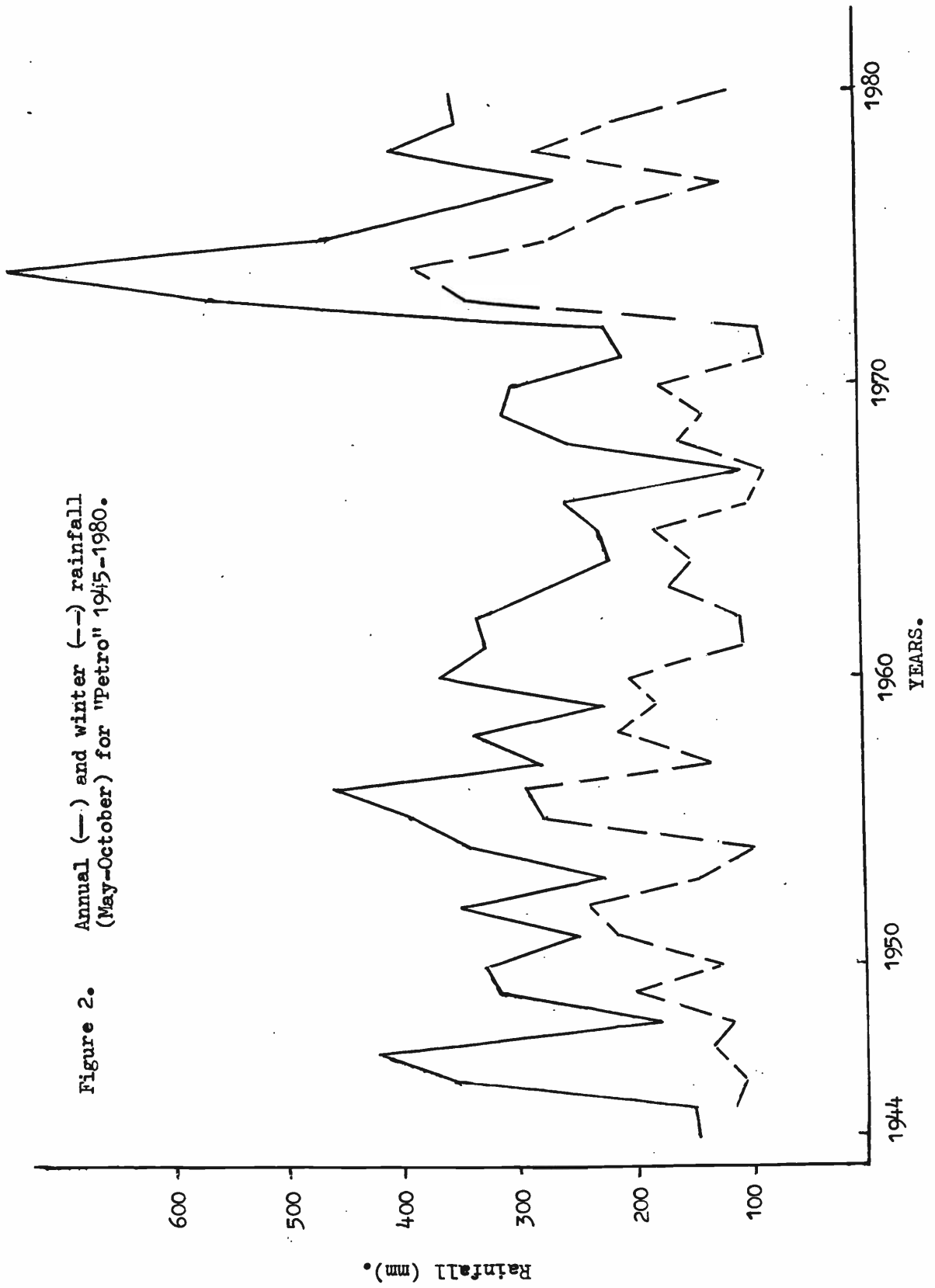
Rainfall for the area is winter dominant, and this dominance increases from about 25%* in the north to 35% in the older cropping areas around Balranald. The annual rainfall and May to October rainfall are shown for "Petro" Station for the years 1945 to 1980 (Figure 2).

Cropping is being carried out on four main types of country:

1. Dunefields and plains with mallee (*Eucalyptus* spp.).
2. Plains (often calcareous) with dense belah (*Casuarina cristata*).
3. Slightly undulating plains with open belah-rosewood (*Casuarina cristata*)-*Heterodendrum oleifolium*) often with bluebush (*Maireana sedifolia*-*Maireana pyramidata*). Here cropping is largely confined to the more open areas where clearing costs are minimal.

* 25% winter dominance means that 25% more rain falls in the six winter months compared with the six summer months.

Figure 2. Annual (—) and winter (---) rainfall (May-October) for "Petro" 1945-1980.



4. Lakebeds with heavy clay soils. Cropping is usually carried out to take advantage of stored moisture on a receding waterline.

Soils of the cropping area are mainly solonised brown soils (Gc 1.12, Gc 1.22 - Northcote (1971)) with surface textures ranging from sands to loamy sands on dunes and to clay loams in the depressions between dunes. Siliceous and earthy sands (Uc 1, Uc 5) occur on the higher dunes and are particularly susceptible to wind erosion. Crusty, red duplex soils (Dr 1) often occur in the swales.

Problems for the Landholder

The biggest problem facing the marginal area farmer is the lack of sufficient rainfall during the growing season. Because of this low rainfall, bare fallowing* is necessary to achieve economic yields in most years. Long term studies at Walpeup Research Station in Victoria have shown that yields increase with the length of fallow (Sims, 1965). Fallowing is often carried out from August through to sowing in April/May. When compared with the normal grazing enterprise, grazing capacity during this period is considerably reduced.

Costs associated with delivery of grain to silos (see Figure 1) and farming equipment can be a deterrent to farming. The price of a reasonable second-hand four wheel drive tractor, wide-line scarifier, sowing equipment and header are in the vicinity of \$350 000. The farmer can either:

- (1) Buy modern equipment and be committed to farming for many years in order to pay it off, or,
- (2) buy cheaper, second-hand equipment, eg. disc ploughs, which usually are not designed for conservation farming, or,
- (3) enter into an agreement with a sharefarmer, who supplies his own plant.

Drought is likely to hit harder at the farmer than the grazier, especially if he is trying to pay off equipment.

* Bare fallowing or simply "fallowing", is the practice designed to store subsoil moisture from one season to be used by a crop in the subsequent season.

Benefits to the Landholder

Crop returns can be used to finance the clearing of large areas of land in order to improve grazing country, create speargrass*-free areas, improve water supply and improve fencing.

A few landholders consider narrow-leaved hopbush (*Dodonaea attenuata*) control and vermin eradication as their primary reason for cropping. In some cases, previously cleared dunes have become infested by woody shrubs and cropping of these dunes may keep the shrub problem under control. Cropping may also be useful in making fire control in mallee and belah areas more effective by enabling easier access by fire control vehicles and by segregating areas of fuel.

Benefits to the Land

Specialized cropping can be used as a reclamation technique, especially in areas which were previously cropped and have since fallen out of production due to weed invasion or erosion.

Cropping can lead to an increase in the fertility level of the soil if fertilizers and legumes are used.

Adverse Effects on the Land

Wind erosion and drift are the most serious problems resulting from cropping in this area. Drift is evident on fallows in most summers and occurs when the following conditions are met (Woodruff et al, 1972):

- * loose, dry and finely divided soil,
- * smooth, bare surface,
- * wind velocity in excess of 20 km per hour.

* speargrass (*Stipa variabilis*) can cause sheep and lamb deaths due to skin penetration by seeds.

At the present time, most of the uncleared areas are stable and if erodible sites (eg. dunes) are left uncleared, erosion is expected to be minimal. If dunes are cropped, moderate to severe drift is inevitable with the cropping techniques presently used in the area. Increased dust is already evident in the cropping areas.

Salinisation is a potential problem in some areas, both at local and regional levels. Soil salting on arable land is well documented for north-western Victoria (Rowan and Downes, 1963), but little is known of its potential hazard in New South Wales, particularly along the Murray River.

Introduction of weeds is also a problem as evidenced by the rapid spread of onion weed (*Asphodelus fistulosus*) into the cropping areas. It is likely that the spread of weeds will continue, particularly if sharefarmers from established cropping areas continue to operate in south-western New South Wales.

Loss of vegetation communities and their associated faunal habitats will result from uncontrolled clearing. At present two areas have been set aside as National Parks (Mallee Cliffs and Mungo National Parks) in which a number of the vegetation and landscape types are preserved.

Other Effects of Cropping

The increase in cropping has resulted in other effects:-

1. An increase in land values brought about by increasing demand for cropping land particularly by interstate farmers.
2. With more land being cropped and less used predominantly for grazing there is likely to be a loss of grazing management skills.
3. Should the present run of good seasons continue, pressure may be put on the Western Lands Commission to subdivide larger holdings. This happened in the Euston area some 40 years ago but farms were subsequently amalgamated.

The Soil Conservationist's Role

Although broad scale resource surveys on a land system (Christian 1958) and individual property basis are carried out by the Soil Conservation Service, they go only part of the way to solving present and potential problems in this area.

Two basic problems confronting the extension worker/researcher are:

- (1) Assessing the relative erodibility of different sites; and
- (2) Encouraging farmers to modify their clearing and cultivation practices so as to minimise erosion.

Despite the fact that a large area of south-western New South Wales is being cleared and cropped there is little apparent erosion at present. However, erosive winds produce low to moderate amounts of drift on cropped dunes in most years. During the August to April fallow period, a study conducted on similar soils in north-western Victoria (Speedie, in press) found that 47% of fallows had been drifting. The soil conservationist and the community must decide on an acceptable level of erosion. Quantitative data on soil loss, soil erodibility, wind speed and wind direction are needed as a basis for more precise future recommendations for cropping rotations, fallowing practices and clearing limitations.

The Soil Conservation Service is responsible for inspecting individual holdings and reporting to the Western Lands Commission on possible hazards associated with cropping. Special conditions have been devised for different types of cropping country in the Western Division. The normal conditions applied to mallee-belah country are given in Appendix I. Attached to this list of conditions is a set of recommendations designed to reduce or eliminate drift. These include:

1. Cultivation of soil when damp rather than dry.
2. Cultivation at slow speeds and across the direction of the prevailing winds.
3. Less frequent cultivations of the more erodible sites.
4. Use of tined implements rather than disc implements.

5. Use of fertilizers and pasture legumes.

Written conditions and recommendations go only part of the way to getting the message across. Although many farmers seem prepared to modify their practices, there is a lack of local research data with which to quantify the problems of cropping light soils and for explaining the restrictions which are imposed. As cropping areas are widely scattered throughout this large area the establishment of a close working relationship with farmers is difficult to achieve.

Research work to overcome some of these difficulties has been planned by the Soil Conservation Service and is expected to commence before the next wheat-growing season.

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APPENDIX I

1. Uncleared (and uncultivated) ground must occupy at least 15% of the total area to be treated, which shall include a 100 metre perimeter strip uncleared and uncultivated.
2. The distance between any one uncleared area and the two nearest uncleared areas (of which one may be the perimeter) shall not exceed 1 kilometre.
3. Any clump of timber left (including any surrounding uncultivated ground) shall not be less than 2 hectares in area. Clumps of smaller area may be left but shall be disregarded for the purpose of conditions (1) and (2) above.
4. Uncleared and uncultivated strips at least 100 metres wide shall be left across level areas between parallel sandhills, at right angles to the direction of the hills, and at intervals not exceeding 2 kilometres.
5. As an alternative to (1) above, clearing and cultivation may be carried out in blocks not exceeding 120 hectares in area and each block shall be surrounded by a strip of uncleared country not less than 100 metres in width. Where there are no trees, each block shall be surrounded by a strip of uncultivated country not less than 100 metres in width.
6. Sandhills shall be left uncleared and uncultivated except as may be specified below.
7. Defined drainage lines which carry water after storms shall be left uncultivated in the channels and for a width of at least 20 metres on either side.
8. 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 at the expense of the lessee.

APPENDIX I (CONTINUED)

9. Any cultivated area which becomes affected by erosion will be subject to inspection by Soil Conservation Service and to implementation of remedial measures as appropriate, at the expense of the lessee.
10. Cultivation of bluebush stands shall be limited to areas where the average spacing between shrubs is greater than 30 metres.
11. There shall be no clearing or cultivation within 50 metres of any fence. Alternatively, there shall be no clearing or cultivation within 100 metres of any internal fence on the upwind side, with clearing and cultivation allowed up to the fence on the downwind side.
12. There shall be no clearing or cultivation within at least 100 metres of any public road.
13. No more than three (3) crops may be grown in any successive nine (9) years. For the purpose of this clause the term crop shall include the pre-sowing operations, a failed crop or a long fallow.
14. With every third crop, pasture seed (appropriately inoculated) shall be sown. The pastures shall include species in accord with Departmental recommendations. Alternatively, the pasture seed may be sown separately in the following year.
15. Stubble shall be retained except where burning is required to control scrub and timber regrowth or to reduce the buildup of plant disease. Burning operations may be carried out only with the approval of the Soil Conservation Service after consultation with the Western Lands Commission and/or Department of Agriculture respectively.