

PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY BIENNIAL CONFERENCE
Official publication of The Australian Rangeland Society

Copyright and Photocopying

© The Australian Rangeland Society 2014. All rights reserved.

For non-personal use, no part of this item may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission of the Australian Rangeland Society and of the author (or the organisation they work or have worked for). Permission of the Australian Rangeland Society for photocopying of articles for non-personal use may be obtained from the Secretary who can be contacted at the email address, rangelands.exec@gmail.com

For personal use, temporary copies necessary to browse this site on screen may be made and a single copy of an article may be downloaded or printed for research or personal use, but no changes are to be made to any of the material. This copyright notice is not to be removed from the front of the article.

All efforts have been made by the Australian Rangeland Society to contact the authors. If you believe your copyright has been breached please notify us immediately and we will remove the offending material from our website.

Form of Reference

The reference for this article should be in this general form;

Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

Disclaimer

The Australian Rangeland Society and Editors cannot be held responsible for errors or any consequences arising from the use of information obtained in this article or in the Proceedings of the Australian Rangeland Society Biennial Conferences. The views and opinions expressed do not necessarily reflect those of the Australian Rangeland Society and Editors, neither does the publication of advertisements constitute any endorsement by the Australian Rangeland Society and Editors of the products advertised.



The Australian Rangeland Society

APPEARANCE OF NEW SPECIES IN PASTURES AT TRANGIE IN
CENTRAL-WESTERN NEW SOUTH WALES

G.E. Robards and D.L. Michalk

Introduction

Numerous lists of plant species, ranging from excursion notes to ecological surveys, have been published in New South Wales during the last one hundred years (Pickard 1972). The more detailed of these documents contain an increasing list of plants in later years due to both the identification of native species and the spread of exotic species. For example, when Moore and Betcke (1893) published their list it contained 243 species, including 24 grasses. However, even by 1939 Anderson had compiled a list of 415 naturalized species other than grasses, and Cross and Vickery (1957) added a supplementary list of 57 naturalized grasses. Also, Vickery (1950) published a list of 366 native grasses.

In agricultural areas some exotic pasture plants may be introduced to improve the feed available for domestic livestock, and some species which spread into an area may be more productive than the native species. However, many exotic species, introduced either intentionally as garden plants or unintentionally in stock fodder or packing material, have become weeds in the agricultural sense. The spread of these plants either by fodder or stock movements, by wind or water, or on clothing or rubber tyres, has resulted in a continuously changing flora in most areas. Examples of such change have not been examined in detail in the literature.

This paper presents a list of plants collected within a grazing experiment at Trangie between 1967 and 1974, which do not appear to have been present in the area about twenty years earlier. The possible importance of some of these species to existing plant communities and to agricultural production is discussed.

Procedures

Site

Plants were collected at Trangie between 1967 and 1974 from within the bounds of a sheep grazing experiment. They were identified by checking against a herbarium collection at Trangie, or in the case of unknowns and doubtful specimens were sent to the National Herbarium, Sydney. Initial results and botanical observations from this experiment were presented by Campbell, Saville and Robards (1973). The experiment was conducted on two soil types, 100 hectares of red-brown loam (40 ha sown to dryland lucerne) and 20 hectares of grey, self-mulching clay. The predominant vegetation alliance is *Eucalyptus popilnea* with co-dominants of *Callistris hugelii* and *Casuarina cristata* (Beadle 1948; Biddiscombe 1963). Dryland cropping has been widespread throughout the area since about 1910 on light soils, but there was a marked increase about 1960, and irrigation farming developed markedly after 1970.

Comparisons of Botanical lists

The list of plants compiled during the grazing experiment from 1967 to 1974 was compared to the ecological surveys of Beadle (1948) and Biddiscombe (1963) for the corresponding vegetation alliance. A comparison was made also with the comprehensive list prepared on Bundemar Station, Trangie by Clark (1948). Thirty five plants which occurred in our collection but were not reported in any of the three earlier publications are listed in Table 1. These plants are relisted in Table 2 in terms of their potential as weeds. The assessment of weed status was made by examining publications by Maiden (1920), Moore (1960), Whittet (1968) and our own assessment of the role of the plants in the Trangie environment and agricultural forms.

Discussion

The plants listed here were collected from only a very small area in comparison to the total area of the *Eucalyptus populnea* vegetation alliance in the Trangie district as described by Beadle (1948) and Biddiscombe (1963). Therefore we are almost certainly conservative in reporting an addition of 35 plants to the earlier lists which had an average listing of 180 species. Nevertheless, the increase is substantial considering that it occurred in little more than twenty years. No doubt some of the species may have been present in very low numbers and so missed by the earlier collectors. Certainly some species were not far outside the area, as Cabbage (1905) recorded *Argemone ochroleuca* and *Goodenia pinnatifida* near Gilgandra. In contrast to their wideranging observations, our detailed studies allowed us to add to our list species which we only sighted occasionally as isolated plants, namely *Phalaris minor*, *Anguillaria dioica*, *Polygonum prostratum*, *Rumex tenax*, *Chenopodium polygonoides*, *Hirschfeldia incana*, *Goodenia pusilliflora*, *G. pinnatifida*, *G. subintegra* and *Brachycome campylocarpa*.

There are no doubt many and complex means (Michael 1970) by which the plants invaded the Trangie pastures. The first could be that the natural pastures had been disturbed (Moore 1960) in such a way that invasion was easier after about 1948 than it had been before then. As a result of disruptive forces such as drought, fire, flood, rabbits and overgrazing by sheep and cattle (Breakwell 1918; Wheller and Hutchinson 1973; Williams 1973), pastures in the Trangie region certainly had changed from the original diverse mixtures of perennial grasses. Biddiscombe (1953) placed particular emphasis on severity of grazing as a principal factor in changing pastures in the Trangie region towards annual dominance and weed susceptibility. From Biddiscombe's description the light soil area on which our study commenced in 1967 was markedly degraded as it was completely dominated by annual species. Similarly, from their description the area of pasture on the heavier soil may have been in an advanced stage of degradation because the perennials which dominated the area were predominantly *Chloris acicularis* and *C. truncata*. Grazing pressure may have contributed to any expansion in the area of annual dominated pastures (Campbell, Saville and Robards 1973) relative to that present when Biddiscombe and his colleagues carried out their studies between 1948 and 1953 (Biddiscombe 1953; Biddiscombe *et al* 1956). This can be concluded because despite a marked increase in dryland cropping during the period, stock numbers remained relatively constant and therefore grazing pressure on natural pastures must have increased (Robards and Michalk 1976).

A second factor operating after 1948 would be the increased rates and distances associated with transportation. The increase in rubber-tyred motor vehicles entering the area, and the greater mobility of stock and fodder, could all have been responsible for the rapid introduction of seeds from anywhere in south-eastern Australia. Further factors in the spread of seeds would be the increased extent of cropping and the development of irrigation channels and banks.

Of the plants more often observed and therefore either established for longer or more suited to the environment, most can be described as potentially important weeds (Table 2). Not only have they been described as such by Moore (1960) and Whittet (1968), but also nine of them were listed by Maiden as early as 1920. In fact, five were listed by Maiden (1920) as being among the twenty most undesirable weeds in New South Wales up until that time.

Further examination of our complete botanical list shows that the fifteen species listed in Table 2 almost doubles the number of potentially severe weeds recorded at Trangie by 1974. The other main species are *Aristida* spp, *Bassia birchii*, *Bassia quinquecuspidata*, *Carthamus lanatus*, *Cryptostemma calendula*, *Emex australis*, *Erodium* spp, *Hordeum leporinum*, *Malva parviflora*, *Marrubium vulgare*, *Muehlenbeckia cunninghamii*, *Sisymbrium irio*, *S. orientale*, *Solanum nigrum*, *Stipa* spp, *Tribulus terrestris*, *Xanthium chinese* and *X. spinosum*.

If pasture conditions due to grazing pressure, particularly following dry periods, is a major factor in the spread of new species into the Trangie area, then graziers may be able to restrict the spread of weed species already in the area and prevent future invasions by the way they manage their pastures. If however, seeds are entering the area in greater numbers due to the movement of stock, fodder, irrigation water or rubber tyred vehicles, and becoming established regardless of pasture condition, then further botanical changes will almost certainly occur. The appearance of such undesirable species as *Cenchrus pauciflorus*, *Cirsium vulgare*, *Salvia reflexa*, *Senecio jacobaea*, and even *Cardus pycnocephalus*, *Centaurea calcitrapa*, *C. solstitialis*, *Cucumis myriocarpus* and *Lactuca serriola* seems inevitable.

TABLE 1 - Plants collected from natural pastures at Trangie between 1967 and 1974 which had not been reported previously.

Botanical Name	Common Name(s) *
Gramineae	
<i>Bromus molliformis</i>	Soft brome
<i>Bromus unioloides</i>	Prairie grass
<i>Digitaria sanguinalis</i>	Summer grass, Crab grass
<i>Enneapogon nigricans</i>	Nigger-heads, Black heads
<i>Phalaris minor</i>	Lesser Canary grass
Liliaceae	
<i>Anguillaria dioica</i>	Early Nancy
Polygonaceae	
<i>Acetosella vulgaris</i>	Sorrel
<i>Polygonum prostratum</i>	Creeping knotweed
<i>Rumex crystallinus</i>	Shiny dock
<i>Rumex tenax</i>	a native dock
Chenopodiaceae	
<i>Chenopodium polygonoides</i>	
Amaranthaceae	
<i>Alternanthera pungens</i>	Khaki weed
Papaveraceae	
<i>Argemone ochroleuca</i>	Mexican poppy
Cruciferae	
<i>Brassica tournefortii</i>	Wild turnip
<i>Geococcus pusillus</i>	Earth cress
<i>Hirschfeldia incana</i>	Hairy bassia, Buchan-weed
<i>Raphanus raphanistrum</i>	Wild radish
<i>Rapistrum rugosum</i>	Turnip-weed
Convolvulaceae	
<i>Convolvulus arvensis</i>	Bindweed
<i>Dichondra repens</i>	Kidney-weed
Boraginaceae	
<i>Echium plantagineum</i>	Paterson's curse, Salvation June
Labiatae	
<i>Salvia verbenaca</i>	Wild sage
Solanaceae	
<i>Datura stramonium</i>	Common thronapple, Caster-oil plant
<i>Solanum sodomaeum</i>	Apple-of-Sodom

Table 1 continued..

Botanical Name	Common Name(s) *
Goodeniaceae	
<i>Goodenia pusilliflora</i>	Small-flowered Goodenia
<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia
<i>Goodenia subintegra</i>	Silky Goodenia
Compositae	
<i>Brachycome campylocarpa</i>	Large White Brachycome
<i>Calotis scapigera</i>	Tufted burr-daisy
<i>Chondrilla juncea</i>	Skeleton-weed, Naked weed
<i>Cirsium vulgare</i>	Spear thistle, Black thistle
<i>Conyza bonariensis</i>	Flax-leaf fleabane
<i>Hedypnois rhagodioides</i>	Cretan-weed
<i>Helipterum variable</i>	Yellow paper-daisy, Golden sunray
<i>Silybum marianum</i>	Variegated thistle, Milk thistle

*

Common Names mostly correspond to those in 'Pastoral Plants of the Riverina Plain' by J.H. Leigh and W.E. Mulham (1965).

TABLE 2 - Weed status of the plants which have appeared in the natural pastures at Trangie.

Botanical Name	Recorded by Maiden 1920	Listed by Moore 1960
Plants which may be a problem under some circumstances		
<i>Acetosella vulgaris</i>	*	*
<i>Alternanthera pungens</i>	*	*
<i>Argemone ochroleuca</i>	*	*
<i>Brassica tournefortii</i>		*
<i>Hirschfeldia incana</i>		*
<i>Raphanus raphanistrum</i>	*	*
<i>Rapistrum rugosum</i>		*
<i>Convolvulus arvensis</i>	*	*
<i>Echium plantagineum</i>	*	*
<i>Salvia verbenaca</i>	*	*
<i>Datura stramonium</i>	*	*
<i>Solanum sodomaeum</i>	*	*
<i>Chondrilla jucea</i>		*
<i>Cirsium vulgare</i>		*
<i>Silybum marianum</i>		*
Plants of only a minor weed problem		
<i>Bromus molliformis</i>		
<i>Bromus unioloides</i>		
<i>Digitaria sanguinalis</i>		*
<i>Phalaris minor</i>		
<i>Goodenia pusilliehora</i>		
<i>Goodenia pinnatieida</i>		
<i>Goodenia subintegra</i>		
Plants not regarded as weeds.		
All other plants listed in Table 1.		

References

- Beadle, N.C.W. (1948) - "The vegetation and pastures of western New South Wales". (Govt. Printer, Sydney).
- Biddiscombe, E.F. (1953) - A survey of the natural pastures of the Trangie district, New South Wales, with particular reference to the grazing factor. Aust. J. Agric. Res. 4:1-28.
- Biddiscombe, E.F. (1963) - A vegetation survey in the Macquarie region, New South Wales. C.S.I.R.O., Div. of Plant. Ind., Techn. Paper No. 18.
- Biddiscombe, E.F., Hutchings, R.J., Edgar, G., and Cuthberton, E.G. (1956) - Grazing management of natural pasture at Trangie, New South Wales. Aust. J. Agric. Res. 7:233-247.
- Breakwell, E. (1918) - "Native grasses and fodder plants of Australia". Advisory Coun. of Sci. and Ind. Bulletin 7 (Comm. of Aust., Govt. Printer, Melbourne).
- Cabbage, R.H. (1905) - Notes on the native flora of New South Wales. Part III. Orange to Dubbo and Gilgandra. Proc. Linn. Soc. 30:203-221.
- Campbell, R.J., Saville, D.G., and Robards, G.E. (1973) Evaluation of natural annual pastures at Trangie in central-western New South Wales. 1. Sheep production. Aust. J. exp. Agric. Anim. Husb. 13:238-244.
- Clark, L.R. (1948) - Observations on the plant communities at "Bundemar", Trangie district, New South Wales, in relation to *Chortorcoetes terminifera* (Walk.) and *Austroicoetes cruciata* (Sauss.) Counc. Sci. Industr. Res. Aust. Bull. No. 236.
- Cross, D.O., and Vickery, Joyce W. (1950) - List of the naturalised grasses in New South Wales. Contrib. N.S.W. Nat. Herb. 1:275-280.
- Maiden, J.H. (1920) - "The weeds of New South Wales" Part 1, Sydney.
- Michael, P.W. (1970) - The weeds themselves - early listing and identification. Proc. Weed Soc. N.S.W. 5:3-18.
- Moore, R.M. (1960) - Weeds and weed research in Australia. Proc. Aust. Weeds Cont. 2:1.
- Noore, C., and Betche, E. (1893) - Handbook of the flora of N.S.W.
- Pickard, J. (1972) - Annotated bibliography of floristic lists of New South Wales. Contrib. N.S.W. Nat. Herb. 4:291-317.

- Robards, G.E., and Michalk, D.L. (1976) - "An evaluation of dryland pastures for sheep grazing at Trangie". Report to the Aust. Wool. Corp. (A.R.S. library, Trangie).
- Vickery, Joyce, W. (1950) - A census of the native gramineae of New South Wales. Contrib. N.S.W. Nat. Herb. 2:67-87
- Wheeler, J.L., and Hutchinson, K. (1973) - Production and utilization of food for ruminants in "Pastoral Industries of Australia" ed. by Alexander and O.B. Williams, Sydney Uni. Press.
- Whittet, (1968) - "Weeds" (N.S.W. Govt. Printer, Sydney).
- Williams, O.B. (1973) - The environment in "Pastoral Industries of Australia" ed. G. Alexander and O.B. Williams, Sydney Uni. Press.