

CHANGES IN NON-ARABLE PASTURE FOLLOWING MEASURES TO  
CONTROL SERRATED TUSSOCK AND BRACKEN FERN

J.A. Carnahan

Australian National University, Australian Capital Territory

Herbicidal and sowing treatments were applied to non-arable experimental plots at Gundaroo and Robertson, New South Wales, which before treatment were infested respectively by serrated tussock (*Nassella trichotoma*) and bracken fern (*Pteridium esculentum*). Changes in botanical composition were then followed for about six years.

SERRATED TUSSOCK AREA

Before treatment, tussock cover was about 50%. The sparse ground herbage was sominated by volunteer clovers (especially *Trifolium arvense* and *T. campestre*), sorrel (*Rumex acetosella*), and catsear (*Hypochoeris radicata*). There were rare individuals of *Themeda australis* and of species of *Poa*, *Danthonia*, and *Stipa*.

Treatment with 2,2-DPA gave massive reductions in the cover and basal area of serrated tussock for about two years, but regeneration was complete within six years. Subterranean clover (*Trifolium subterraneum*) was the only improved species to become established. In plots where the clover was fertilized with superphosphate, tussock cover and basal area were reduced in the early years by about one-third, relative to the corresponding values in those sown plots that had not received superphosphate. By the end of the sixth year, the cover was still flourishing in the fertilized plots, but the earlier effects on serrated tussock had been reversed, to the extent that tussock cover and area were markedly greater than in the unfertilized clover plots. Superphosphate by itself produced similar effects; these were presumably related to an observed increase in the volunteer clovers.

There was no change in the status of the native grasses, which remained rare under all treatments.

BRACKEN AREA

Before treatment, bracken cover was about 90%, and a ground layer of weedy grasses and herbs provided up to 30% cover, the predominant species being creeping fog (*Holcus mollis*), *Microlaena stipoides*, *Carex* spp., water pepper (*Polygonum hydropiper*), and scrub nettle (*Urtica incisa*).

Treatment with 4-CPA reduced the density and cover of bracken fronds by about one-third in the growing season following treatment, and this effect largely persisted. Cocksfoot (*Dactylis glomerata*) was the only improved species to become established. Within two years, it was providing more than 60% cover in the plots that had received the herbicide, and slightly less in those that had not; and these levels of cover persisted.

The development of cocksfoot was accompanied by a persistent reduction of more than 50% in the cover of the weedy grasses and of *Carex* spp. The cover of water pepper and scrub nettle declined greatly within the experimental area as a whole; these decreases were partly balanced by increases in such species as sorrel and spear thistle (*Cirsium vulgare*), especially in the plots that had not been sown with cocksfoot. Further, blackberry (*Rubus fruticosus*), which had been present initially only as scattered small plants, gradually became more prominent until it was providing about 15% cover in the cocksfoot plots, and twice that in the unsown plots.

In both areas, observations beyond the sixth year were confused by severe drought effects, but the same general trends appeared to apply.