

COMPETITION BETWEEN CROFTON WEED AND SIRATRO

B.A. Auld

Department of Agriculture, New South Wales

P.M. Martin

University of Sydney, New South Wales

Crofton weed (*Eupatorium adenophorum*), an erect perennial herb, is a serious weed of the far north coastal dairying areas of New South Wales, where it occupies slopes suitable for improved pasture. Mature stands of crofton weed can be removed by chemical or physical means. However, because of the large number of buried seeds under infestations, which can germinate when the parent canopy is removed, reinfestation is likely in the absence of competition.

One of the most successful of the introduced perennial legumes in the region is Siratro (*Phaseolus atropurpureus*). It has shown great ability to establish under rough seedbed conditions, such as would be created by ripping or ploughing a crofton weed infestation. For this reason it was chosen to be examined as a potential replacement species for the weed.

METHODS

A comparison of the two species was made by growing them under identical conditions in a glasshouse during summer and performing a growth analysis.

One-week-old seedlings of each species were placed into sets of three for the calculation of growth rates. Each plant was grown in a separate pot of washed river sand with a complete nutrient culture. There were five replications of each species at harvests made at 2, 6, and 8 weeks after emergence.

RESULTS AND DISCUSSIONS

Siratro clearly had a much greater initial crop growth rate (C) than crofton weed, which would give the former a marked early advantage in a competitive situation. This ability could have been brought about by more or larger leaves, i.e. a higher leaf area index (LAI), or more efficient leaves, i.e. a higher net assimilation rate (NAR). Since $C = NAR \times LAI$, it was found that Siratro's initial advantage arose from a relatively high LAI, which was between twenty and thirty times that of crofton weed. This early difference in LAI between species is brought about by a large difference in seed size and consequent cotyledon and seedling size. (Siratro seeds are several times larger than crofton weed seeds.)

In the field, however, the disadvantage of the small size of crofton weed seedlings is partly compensated for by an extremely high viable buried seed population. Furthermore, the crofton weed seedlings had a high mean initial relative growth rate of 1.42 g/g/wk, which enabled them to approach the weight of Siratro towards the end of the experiment.

This suggests that the best results in crofton weed replacement would be obtained if the legume were sown as soon as possible after weed removal in order to take full advantage of Siratro's initially greater crop growth rate and provide the maximum degree of competition for the crofton weed seedlings. The fact that scarified Siratro seeds usually germinate 3-5 days before crofton weed, under most conditions, is another useful attribute in favour of Siratro in a competitive situation. Sowing a compatible grass species to utilize the nitrogen fixed by Siratro would also help suppress crofton weed; molasses grass (*Melinis minutiflora*) has shown promise for this purpose.

It is considered that the examination of the germination and seedling growth of Siratro and crofton weed provided a sound basis for later ecological control studies in the field.