and summer. *C. arcuata* can be controlled by spraying or cutting but these measures must be repeated periodically to control later germinations. In addition the effective herbicides are non-selective, killing all other vegetation.

Experiments near Bendigo indicated that a dense subterranean clover pasture offers strong competition to *C. arcuata*, so restricting its ingress. If the pasture is not sufficiently dense, vigorous *C. arcuata* seedlings will establish and persist despite occasional cutting.

On these soils lucerne does not develop into a productive pasture and offers little competition to seedlings of *C. arcuata*. Although, some of the lucerne plots were mown more frequently than the clover plots, more frequent cutting had no apparent effect in reducing the numbers of young *Cassinia* plants. However it has been observed that mature plants are more severely affected than young ones by mowing or slashing.

It is tempting to speculate on future ingress of *C. arcuata* into pastures if the rising cost of superphosphate causes changes in management practices. Observations suggest that pastures will weaken and become less dense if superphosphate applications are reduced or omitted altogether. Under these conditions re-infestation of the weakened pastures by *C. arcuata* may well occur.

THE CONCEPT OF THE ANTI-HERBICIDE

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Since the last Australian Weeds Conference a potentially important new concept in chemical weed control has been announced. This is the discovery of chemicals which can be used to selectively counteract the effects of soil-applied herbicides. Previously selective protection of plants from herbicides has been demonstrated by physically separating the plant and herbicide by a layer of a strong absorbent, usually activated charcoal. This technique is limited by the large quantities of absorbent required and the need for precision placement of this material over the crop row.

The newer materials appear to act on a chemical rather than a physical basis, although details of the mode of action have not yet been published. The materials can be used one of two ways, as 'seed protectants' applied as a seed dressing prior to sowing, or as 'safening agents' applied as an additive to the herbicide formulation.

Chang, Bandeen and Stephenson (1972) reported that the antidote N, N-diallyl-2, 2-dichloro acetamide (R-25788), used in either of the above methods, protected maize from injury by EPTC. Sorghum was partially protected, but there was no protective effect on a range of other crop and weed species tested. In the absence of herbicide no species was affected by R-25788.

This material is now commercially available in the United States in mixtures with EPTC or with butylate. These mixtures are used in the control of certain grasses and *Cyperus* spp. resistant to other herbicide treatments which can safely be used in maize.

A seed dressing of 0.5% of 1,8-naphthalic anhydride reduced injury to corn by EPTC and butylate in field experiments by Burnside, Wicks and Fenster (1971). The practicality of obtaining protection by seed dressings allows not only improved inter-specific competition, but also intra-specific selectivity.

Henry and Baker (1972) and Smith (1972) experimented with the control of red rice in cultivated rice with various thiolcarbamate herbicides and seed dressings of 1,8-naphthalic anhydride. They obtained promising results in regard to both red rice control and crop safety. In laboratory experiments the protectant reduced the herbicidal effects of molinate on rice, but increased the phytotoxicity of EPTC and vernolate.

In pot experiments at Yanco rice seed treated with 1,8-naphthalic anhydride was not fully protected from the effects of 5 kg/ha molinate, where the herbicide was thoroughly incorporated into the top 2 cm of soil, and the seed was sown in the treated layer. There was no protection from the herbicidal effects of EPTC at 5 kg/ha. Where seed was treated at 1% 1,8-naphthalic anhydride with methyl cellulose as an adhesive, and stored for 3 weeks before testing, the seed dressing reduced germination (from 98.0% germination to 82.4%) and the vigour of the emerging roots and shoots. The use of this material in rice, therefore, may be limited.

In all the above data thiolcarbamate herbicides have been used. Holm and Szabo (1974), however, report that a seed dressing of 1,8-naphthalic anhydride protected maize from an experimental pyrrolidine urea herbicide (*cis* - 2,5-dimethyl-1-pyrrolidinecarboxanilide). The protectant did not affect herbicide uptake, but increased the rate of detoxification of the herbicide in the plant.