

more likely for them to have a complementary role, being used, if and when required, to control those weeds not controlled by the selected pre-emergence herbicides. The organic arsenicals, DSMA and MSMA, are almost ideally suited to complement trifluralin. MSMA in particular is capable of controlling the majority of weeds not controlled by trifluralin. Experiments over the last two seasons have established the tolerance of cotton to MSMA under Queensland conditions both as an overall and as a directed spray at various stages of growth. It has been shown that this chemical can be applied as an overall spray at 2 lb a.i. per acre (2.24 kg per hectare) as early as the cotton 3 in. (7.62 cm) stage without a reduction in cotton yield. This feature leaves the way open for possible aerial application.

It is believed that the continued use of the current range of pre-emergence herbicides will tend to increase the problem caused by tolerant weed species. In terms of species controlled, ease and choice of application, low cost, and the reduced soil residue build-up, post-emergence herbicides such as the organic arsenicals offer an effective means of complementing the current pre-emergence herbicides in Queensland.

WEEDS IN SOYBEANS UNDER IRRIGATION IN NEWLY CULTIVATED
LAND AT CAMDEN, NEW SOUTH WALES

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The following weeds were encountered in growing soybeans under spray irrigation at Camden, New South Wales in 1969-70: *Amaranthus hybridus* and *A. powellii*, *Chenopodium album* and *C. pumilio*, *Datura stramonium*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, *E. colonum*, and *E. crus-pavonis*, *Eleusine indica*, *Eragrostis* spp., *Panicum capillare*, *Portulaca oleracea*, *Solanum nigrum*, and *Sonchus oleraceus*. None of these occurred in great numbers but they include a number of the more important weeds of summer crops in other parts of New South Wales suitable for soybean growing.

In an experiment designed to test the tolerance of soybeans (variety Lee) to chloramben and trifluralin, two of the most widely used herbicides in the crop in U.S.A., information on the susceptibility of some of the weeds listed above was obtained. Chloramben at 3 lb per acre (3.4 kg per hectare) applied immediately after sowing and trifluralin at 1 lb per acre

(1.1 kg per hectare) applied just before sowing and incorporated both gave yields of soybeans not significantly different from the controls (about 2,400 lb per acre or 2,700 kg per hectare). *Portulaca oleracea*, *Chenopodium pumilio*, *Digitaria sanguinalis*, *Panicum capillare*, *Eragrostis* spp., and *Eleusine indica* were controlled equally well by both herbicides. The relative performance of each herbicide against *Amaranthus* spp., *Chenopodium album*, and *Echinochloa* spp. could not be gauged as numbers were too small.

Results elsewhere in New South Wales suggest that, under furrow irrigation, which is much more commonly practised than spray irrigation, trifluralin is effective to a much greater extent than chloramben in control, especially of grasses.

Weeds that showed resistance to both herbicides included, notably, *Datura stramonium* and, to a lesser extent, *Solanum nigrum* and *Sonchus oleraceus*. The most serious weed encountered was *Datura stramonium* which, in another small experiment, reduced the yield of soybeans (variety Hill) by 70% from that of the hand-weeded control. This weed presents one of the greatest difficulties in the successful growing of soybeans in New South Wales. A suitable herbicide for its control may be found, but biological and ecological studies on it (and other related species) are necessary before thoroughly satisfying control measures can be worked out.

Weed control in soybeans, as in any other crop, must be thought of in terms of the best combination of cultural and chemical methods. The usefulness of 20 in. row spacing under spray irrigation has been amply demonstrated. The relatively quick attainment of a complete crop canopy (in about 6 weeks after sowing) is an important factor in the suppression of weeds during the later stages of crop growth. Interrow cultivation may be used, in the first few weeks after sowing, to control weeds that escape the effects of herbicides applied at or just before sowing.

In some cases it may be possible to adjust sowing time to avoid the most important germinating period of a particular weed. The delay in sowing to enable more weed killing cultivations may, in some cases, lessen the weed problem.

With the use of herbicides, attention must be given to the possibility of residual effects (for example, of trifluralin) on succeeding grain crops.