SOIL INCORPORATION OF SUBSTITUTED UREA HERBICIDES FOR WEED CONTROL IN COTTON

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When substituted urea herbicides are used to control weeds in cotton, they are generally applied to the soil surface or very shallowly incorporated into the soil. It seems widely presupposed that the selectivity of these herbicides is based largely on their physical separation from the roots of the crop. Where such herbicides are applied on the surface, they must rely for activation on overhead irrigation or rainfall. Research findings and practical experience have shown that furrow irrigation is not reliable in achieving this activation. In areas where cotton is furrow-irrigated and rainfall following planting cannot be depended upon, surface-applied substituted ureas do not give consistently good weed control.

Experiments have been carried out at both Leeton, in the Murrumbidgee Irrigation Area of southern New South Wales, and at Narrabri, in the Namoi cotton-growing area in the north of the State, to investigate methods of incorporating substituted urea herbicides. At Leeton, fluometuron and norea were subjected to the following treatments:

(1) Applied and incorporated by cultivation to a depth of approximately 3 in. (approx. 7.5 cm) with a power-driven rotary hoe prior to hilling-up and planting.
(2) Applied after sowing and shallowly incorporated by dragging a heavy chain over the hills.
(3) Applied after sowing and not incorporated.

At Narrabri, fluometuron was applied 1 day prior to planting and incorporated by the following methods:

(1) Go-devil discs operating at a depth of 3 in. (7.5 cm).
(2) Lilliston rolling cultivators operating between 1 and 1.5 in. (2.5-3.8 cm) deep.
(3) Interrow cultivating equipment operating 1.5-2 in. (3.8-5.1 cm) deep.
(4) No incorporation.

In both experiments the deepest incorporation resulted in the best weed control. At Leeton, with both chemicals, incorporation with discs gave significantly better control of grasses

(principally *Echinochloa* spp.) than did surface applications. Shallowly incorporated treatments were intermediate. At Narrabri, control of grass populations (a sown infestation of *Echinochloa crus-galli* var. *frumentacea* and naturally occuring *Echinochloa* spp.) were in order: Go-devil discs < Lilliston cultivators < interrow equipment < unincorporated. (All differences were significant.) Broadleaved weed populations, although lower than those for grasses, showed the same trends.

There was no reduction in cotton plant numbers, nor were there significant symptoms of phytotoxicity to the crop. Cotton plant heights measured at Narrabri showed that the crop grew taller where weeds were better controlled.

These results indicate that soil incorporation of substituted urea herbicides increases weed control efficiency without endangering the crop. Even when cotton seeds were in, or very close to, the herbicide-treated zone, no damage occurred.

Substituted urea herbicides in cotton are often used in combination with chemicals such as trifluralin which require pre-planting soil incorporation to a depth of approximately 3 in. (7.5 cm). It seems feasible that a substituted urea herbicide could be applied and incorporated as a mixture with these other herbicides. As trifluralin is known to restrict the lateral root growth of cotton in the treated soil, crop tolerance to such a mixture may be greater than tolerance to a substituted urea applied alone. Such mixtures have been used successfully in experiments in the Murrumbidgee Irrigation Area over a number of years, with no evidence of crop stand reduction or significant phytotoxicity symptoms.