THE EFFECT OF DICHLOBENIL ON A NUMBER OF VEGETABLE CROPS

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In 1966 a wettable powder formulation of dichlobenil was made available for field evaluation on an experimental basis. Technical information supplied at that period stated dichlobenil is essentially non-selective in its action. Therefore, dichlobenil is most effective if applied to deeply seeded or rooted crops against weeds in the pre or early post emergence stage. Since dichlobenil is highly volatile and disappears rather rapidly from the soil surface at ordinary temperatures, persistence is increased by incorporation into the soil by cultivation, irrigation or rainfall. It was also claimed that since soil incorporation conserves dichlobenil, effective weed control is achieved with soil incorporation at rates lower than those required where dichlobenil is not soil incorporated.

Since 1966 numerous field trials have been undertaken with dichlobenil on direct-seeded French beans, peas and transplanted tomato and brassica crops. A smaller number of trials have also been carried out on transplanted lettuce and onion crops. French beans, peas and brassica plants have also been grown in a glass-house in nutrient cultures containing dichlobenil.

In all the field trials dichlobenil was applied as a pre-emergence treatment with respect to weeds.

In this paper general conclusions are discussed from a range of trials conducted over four years.

At least 3.0 lb (1.3608 kg) of dichlobenil was required in non soil incorporated treatments to achieve commercial weed control. This rate of application was necessary over a range of soil types from sands to heavy clays and irrespective of seasonal conditions. Weed control was found to be satisfactory at this rate only when application was made to wet soil or rain fell or irrigation was applied within a few days of application.

No obvious crop damage occurred at this rate in transplanted brassica or tomato crops but damage to the hypocotyl region of French beans and peas did occur. It may well be that the damage to French beans and peas resulted from direct contact of the soft hypocotyl tissue with solid particles of dichlobenil in the soil, or from gaseous diffusion into this tissue from the soil. The treatment of French beans and peas at 3.0 lb (1.3608 kg) dichlobenil per acre (3 kg per hectare) significantly reduced marketable yield. The fact that plants can easily absorb dichlobenil from the vapour phase is mentioned in the technical literature. A possible reason why transplants of the brassica group and tomato plants have not shown hypocotyl damage in the trials is that these plants are 'hardened off' before transplanting and the stem tissue is not so easily permeated.

Nevertheless, in commercial practice alleged damage has been claimed from surface applied dichlobenil in transplanted cauliflower, brussels sprouts and broccoli. Where dichlobenil, in the range ^.0-3.0 lb per acre (2.0-3.0 kg per hectare) was mechanically incorporated into the top three to four inches of soil, transplants of cabbage, cauliflower and tomato were killed. The same treatment also killed direct-seeded French beans and peas. Light soil incorporation of dichlobenil, 0.75 lb per acre (0.75 kg per hectare) above the root zone in direct sown French beans and peas, produced a high percentage of plants showing hypocotyl damage in both crops. The hypocotyl lesions observed were similar to those found in the same crops treated with higher rates of non incorporated dichlobenil. The ultimate fate of plants exhibiting hypocotyl lesions depended to a large extent on climatic conditions later in the growing period. Where water stress occurred the affected plants wilted and in severe cases died.

In general very poor weed control has resulted from incorporating 0.75 lb of dichlobenil into the top inch of soil.

In the glasshouse studies rates of dichlobenil as low as one part per million in culture solution completely inhibited all root growth in transplants of cauliflower and cabbage, and in germinated French beans and peas. The trials have shown that dichlobenil is a powerful inhibitor of germination and actively dividing meristems. Selectivity rests very heavily on the placement of dichlobenil in relation to the crops. Much more information is required on the soil movement of dichlobenil, particularly in the vapour phase. It is apparent that dichlobenil does not have to reach the roots of crops to cause damage.

Where selectivity depends on the non soil incorporation of dichlobenil, high rates per acre are required to achieve adequate weed control.