

CONTROL OF ANNUAL WEEDS IN BEET WITH PHENMEDIPHAM
AND ADDITIVES IN NEW ZEALAND

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Over 4,000 acres (1,800 hectares) of fodder beet and mangolds are grown in New Zealand annually. High dry matter yields make beets a highly profitable stock feed crop, especially in the cooler dairy farming districts. Because of their uneven emergence and slow initial growth, beets are very sensitive to early weed competition. No satisfactory broad-spectrum, post-emergence weedkiller was available till phenmedipham, a non-residual substitute carbamate herbicide, became available in 1968. This paper presents results of trials with phenmedipham conducted during 1968-70 and observations on the results of a farmer usage survey.

Rates of application of phenmedipham tested were 0.75-4.0 lb alone (all treatment rates are expressed in pound active ingredient per acre ($\times 1.12 = \text{kg/hectare}$)) and 0.5-1.5 lb phenmedipham combined with 1 or 2 lb 2,2-DPA salt or ester or with 0.5 and 1 lb endotal. Limited field tests were also conducted using phenmedipham mixtures with pyrazon at 2 and 4 lb and with lenacil at 1.6 lb.

Phenmedipham at 1.5 lb applied as a topical band spray at the seedling (two to four leaf) stage gives reasonably effective control of many annual broadleaf weeds. Seedlings controlled include fathen (*Chenopodium album*), spurry (*Spergula arvensis*), chickweed (*Stellaria arvensis*), and wild turnip (*Brassica campestris*). Twin cress (*Coronopus didymus*), willow weed (*Polygonum persicaria*), black nightshade (*Solanum nigrum*), Scotch thistle (*Cirsium arvense*), and cornbind (*Polygonum convolvulus*) need to be sprayed at the cotyledonary leaf stage for adequate control. Even at the first seedling leaf stage, red root (*Amaranthus hybridus*) and wireweed (*Polygonum aviculare*) are only temporarily retarded, with weed recovery likely.

Compared with untreated fodder beet, crop yields can be dramatically increased by early treatment with phenmedipham at 1.0 lb if susceptible, actively growing weeds are present. No significant reduction in yields has occurred with phenmedipham applied at 4 lb at the four leaf stage of the beet. (This is a dose rate twice that likely in field use). Red table beets, the most susceptible beet variety to phenmedipham, can suffer temporary crop suppression when treated at the cotyledon stage under cool, slow growth conditions. Also, under very warm temperatures (85-90°F), just emerged seedling beets can be eliminated by phenmedipham, especially if high humidities are

rapidly followed by hot, drying conditions.

The most effective additive for 1.5 lb phenmedipham has proved to be 2,2-DPA at 2 lb, either formulated as the sodium salt or as a glycol diester. Field trials and farmer usage of the former additive has especially assisted in the control of seedling wireweed and also of seedling grasses. Advanced weeds up to the four leaf stage and fathen up to the eight leaf stage are more effectively suppressed with the phenmedipham-2,2-DPA mixture. No worthwhile improvement in control of red root has been achieved with any beet-selective additive to phenmedipham. A combination formulation of phenmedipham and 2,2-DPA ester has been prepared which is now under advanced field testing. Beet selectivity at the double dosage appears quite acceptable for phenmedipham treatment under normal temperature conditions.

No pre-emergence weed control of significant value has been achieved with mixtures of phenmedipham with soil-acting pyrazon or lenacil except when the soil is moist to the surface. The control of later-germinating annual broadleaf weeds in beets remains a problem nearly as important as that of tolerant weed species. A second application of phenmedipham is now commonly required in field practice to control the second strike of weeds. A soil-incorporated, vapour-acting type of herbicide such as cycloate may be of value for residual weed control if it is followed by phenmedipham for the control of late-germinating weeds, especially in the more sensitive red beet crop.

WEED CONTROL IN LETTUCE

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Weed control in lettuce is important because the crop competes poorly with weeds which are also hosts to pests and diseases (Aphidiodes, Septoria) which can further reduce crop yield and quality.

The growth habit of the lettuce (rosette type) and the brittleness of its leaves make it susceptible to mechanical damage. Mechanical weed control does not give satisfactory in-row control.

Chemical weed control is made difficult as indicated by the use of lettuce as an indicator plant in soil in bio-assays.