CEREAL WEED CONTROL IN NEW ZEALAND

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Summary

This paper describes the spraying of broadleaf weeds in cereal crops in New Zealand over the last twenty years and in particular the current practices. The needs for spraying are mentioned and the importance of correct timing of application for most efficient weed control is stressed.

BEFORE THE ADVENT of hormone-type weedkillers in New Zealand, seedling weeds were controlled in cereal crops by surface cultivation with harrows. This did kill some weeds but it also created a seedbed ideal for a further strike of weeds. Today the spraying of broadleaf weeds in cereals is a well established practice. This is especially the case in damper and higher fertility areas where weed populations are greater and their presence at crop maturity can make harvesting difficult or in some cases impossible.

Weeds compete with cereal crops for soil nutrients, water and light, and their removal at an early stage is generally well repaid by increased yields. It must be remembered that, though some weedkiller treatments may not give a yield increase, their use may be well warranted because of the better weed control obtained, leading to easier, cheaper harvesting.

Though many selective chemicals have been used in New Zealand over the last twenty years, the most popular have been the salts of MCPA and the amine salts of 2,4-D at $\frac{3}{4}$ to 1 lb active ingredient per acre. This is due to their efficacy and price advantage and, though they may not give complete control of weeds, the smothering effect of a vigorous cereal crop will suppress the weeds once they have been checked by the chemical. Chemicals such as DNOC, dinoseb, the esters of 2,4-D and 2,4,5-T which are used overseas have been evaluated in New Zealand but have not found favour.

When harvesting was done by stationary mills, the weeds together with the crop were carted to one point in the paddock and the weeds seeds which were thrashed out were usually burnt on the site. Today, with the almost exclusive use of the header harvester, these weed seeds are now hrashed and spread over the ground to germinate and re-infest succeeding crops. Also with continued spraying the more susceptible species such as wild turnip (*Brassica camprestris*), fathen (*Chenopodium album*) and Scotch thistle (*Cirsium lanceolatum*) have been reduced in number, and now increasing in importance are more tolerant weeds such as cornbind (*Polygonum convolvulus*), willow weed (*P. persicaria*), wireweed (*P. aviculare*), spurrey (*Spergula arvensis*), fumitory (*Fumaria* spp.), field chickweed (*Cerastium arvense*), stinking mayweed (*Anthemis cotula*) and cleavers (*Galium aparine*). These more resistant weeds require more specific chemicals for adequate control. Recently dicamba, normally used in mixture with MCPA, has provided a useful tool for the control of the polygonums, while mecoprop gives good control of chickweed and cleavers, and prometryne has proven effective for the control of spurrey and fumitory. These chemicals are usually more expensive than MCPA and 2,4-D, but

their use is warranted where the weed population is resistant to MCPA and 2,4-D. In most cases, the more specific weedkiller must be mixed with MCPA or 2,4-D to broaden the spectrum of weed control and provide more satisfactory results.

MCPA is probably more selective towards spring-sown cereals and especially oats under lush growing conditions. Where the crop is oats, or the weeds present are susceptible to MCPA, it is therefore the preferred chemical. However, the use of 2,4-D has been greater than MCPA because of its broader range of weed control, and, where polygonums are present, 2,4-D has therefore been the choice of chemical. From now on, 2,4-D may be partly replaced by mixtures of dicamba and MCPA.

Where autumn- or winter-sown cereals are being treated, they are usually sprayed in the early spring and in general can be regarded as being more tolerant to 2,4-D than are spring-sown cereals.

In west coast North Island areas, weather at harvesting time is not always good and weedy crops do not dry out in the short dry spells between rain. In these areas, 90 to 95% of all crops are sprayed for weed control and, though these are spring-sown crops, almost 80% of them are sprayed with 2,4-D as the weeds present are better controlled with this chemical than with MCPA. The weed populations in these areas include *Amaranthus hybridus*, willow weed, fathen and Californian thistle (*Cirsium arvense*). Recommendations have been made for 2,4-DB for the control of polygonums in spring-sown cereals but, apart from oats, farmers usually prefer to use the more active amine salts of 2,4-D to obtain better weed control.

In the drier east coast areas of New Zealand, the weed populations are not usually as severe as on the wetter areas, and only 40 to 50% of the crops are sprayed. The problem weeds in these areas vary but are mainly the polygonums and Californian thistle. Through the foothills of Canterbury and in Otago and Southland, spurrey is a problem, and in some districts of Marlborough and Otago fumitory is becoming more prominent. There are also isolated areas throughout New Zealand where cleavers and chickweed are the dominant species and stinking mayweed is a problem in the Manawatu area.

Autumn-sown cereals should be sprayed as early as possible in the spring while the weeds are still susceptible. Spring-sown cereals should be sprayed with MCPA or 2,4-D from the five-leaf stage through to early jointing (the appearance of nodes or joints at the base of the plant). Annual weeds are best controlled by early treatments but, where perennial weeds such as Californian thistle are present, they should be sprayed when the wheat approaches the jointing stage, so that there is more chance for a maximum emergence of the thistles. Earlier spraying also reduces wheel damage to the crop as the plants are still soft and soon return to the erect position. Some of the newer chemicals, such as dicamba and prometryne, are better applied at the four-leaved stage as they are most active on seedling weeds and are more selective on the crop at this stage.

In general, wheat is the most tolerant cereal to 2,4-D, MCPA and dicamba. Barley, and in particular malting barley, in soft growth conditions should not be sprayed with more than $\frac{3}{4}$ lb of 2,4-D and preference should be given to MCPA at up to 1 lb, provided the weeds are susceptible. Spring-sown oats should not be sprayed with 2,4-D as it may cause severe reduction in yield.

Cereals which have been oversown with clover for a clover seed crop the following season should be sprayed only with MCPB or 2,4-DB after the clover has developed one to two trifoliate leaves.

The rates of chemical applied vary according to local recommendations, stage of growth, the weeds present and their growth activity. Seedling annual weeds are usually quite well controlled by $\frac{3}{4}$ lb of MCPA or 2,4-D but, as they become young plants (4 to 8 leaves), and when treating under harder growth conditions, then the rate should be raised to 1 lb. The rates for mecoprop are usually $1\frac{1}{2}$ to 2 lb and those for dicamba $1\frac{1}{2}$ to 2 oz plus 8 to 12 oz of MCPA.

Sometimes spraying is not practised from the five-leaved to jointing stage and a weed problem becomes evident near harvest. This may be due to bad weather conditions in the spring or due to a late strike of weeds which has not been noticed. In this case the cereals can be sprayed in the dough stage. The advantage of the removal of early competing weeds is lost and a yield increase may not actually be obtained. However, if spraying is not practised, harvesting may be very difficult and severe losses may occur. The esters or amines of 2,4-D at approximately $1\frac{1}{2}$ lb will give a twisting of the weeds so that they will normally turn down out of the heads of the crop and allow the header to pass through unimpeded. For this application to be successful, it must be made at least three weeks before harvest to allow sufficient time for the response to take place.

More recently, diquat has become available and has provided a useful desiccant spray at 6 to 8 oz for crops and weeds nearer harvest. This technique of late spraying cereals from the air should be regarded as only a salvage treatment and best results from cereal spraying are obtained by treating the crops during their vegetative stage in the spring.