WEED CONTROL IN NEW ZEALAND ORCHARDS

R. L. TAYLOR

*Fruitgrowers Chemical Co. Ltd.
Mapua, Nelson*

Summary

Weed control practices in New Zealand apple, pear and stone-fruit orchards are reviewed and recommendations made for control of some weeds commonly surviving in sprayed strips.

MOWING

Commercial orchards are either cultivated or in grass and/or clover and mown to conserve soil moisture. Mowing is no cheaper than discing. Grassing has recognised disadvantages in greater loss of soil moisture - important on some orchards in drought; poorer grip for tractor tyres; slightly colder air temperatures in frost; and more mealy bugs (*Phenacoccus* sp.) moving from the ground onto fruit. Mown grass is more convenient to workers on foot and is now much commoner than cultivation. The kind of grass which becomes dominant is determined largely by the height and frequency of mowing. Ryegrass is favoured by frequent low cutting at about 8 cm but the equally common narrow-leaved brome (*Bromus breviaristatus*) is favoured by a mowing height of about 11 cm. Browntop (*Agrostis* sp), cocksfoot (*Dactylis glomerata*) and ripgut brome (*Bromus diandrus*) are common in unmown orchards but die or become sparse with frequent mowing. Ryegrass has good strength against pulling out by tractor tyres but is the most slippery of grasses common in orchards. White clover is the most slippery of all, giving least grip to tractors when growing fast in humid weather.

SPRAYED STRIPS

Mowing or cultivation in two directions is practiced on fewer and fewer orchards and is impossible on many because of wires, irrigation pipes or close planting in the row. Cross working leaves a small area around each tree to be sprayed - about 8% of orchard area. With all mowing or cultivation in one direction a strip 1-2 m wide must be sprayed, covering typically 30% of the orchard area. Recent studies abroad suggest the cost of spraying strips is recovered in more fruit because of reduced loss of soil moisture and better use of fertiliser - the feeding roots of trees are most dense in the sprayed strips. Spraying the whole orchard bare is being studied - a practice not practical on steep ground.

SWING-ARM MOWERS

The high cost of spraying strips and unsatisfactory control of some important weeds has prompted the search for better means of mowing close to trees without damaging them, and for mowing between the trees within the row. Ride-on lawn-mowers have been used with some success, but on none is the driver seated low enough to go under low branches. Swing-arm cutters attached to big mowers were introduced many years ago with some success on flat ground, but have become less popular because of

Orchards

high maintenance costs and some damage to trees, especially small ones as the cutter assembly is forced back.

Some years ago an improvement to the swing-arm mower was developed by a Nelson orchardist, W. S. Robinson, in which the outer cutter assembly was pulled back by a hydraulic ram in response to movement of a light sensing rod as it contacted each tree trunk. A few mowers have been built or modified in the district incorporating this feature. A model of hydraulically retracted swing-arm mower is now made in a Hastings factory, and many are in use around Hastings. This mower works well on level or gently sloping ground smooth enough to conform to the cutters mounted on a rigid frame and extending over a width of 3.5 m. Swing-arm mowers cut almost to the tree trunks on all sides, and make perfect weed control unnecessary.

There is no doubt that reliance on chemical weed control in strips has encouraged the growth of difficult weeds. The new chemical glyphosate, however, has succeeded against many of these, and will restore confidence in spraying strips, with diminished interest in mowing closer to the trees.

SHOULD WHITE CLOVER BE ENCOURAGED?

The choice of herbicide must depend largely on whether white clover and other clovers should be encouraged in the sprayed strips, or whether these should be bare. Clover reduces the ingress of weeds but limits the choice of herbicides for overall application normally to paraquat, diquat and the infrequently used carbetamide, propyzamide, MCPB and 2,4-DB. Low rates of MCPA, 2,4-D, simazine, chlorthiamid or dichlobenil could possibly be used. Clover disappears with regular use of amitrole or terbacil. Advice to growers has favoured bare strips in the belief that this will reduce the number of red mites, mealy bugs and other insect pests in the trees, but there is still no evidence to support this belief.

STRIP-SPRAYING PRACTICE

Strips are usually sprayed in spring either with amitrole at about 2 kg/ha (max. 4.5 kg/ha) or with paraquat. The paraquat/diquat mixture is often used although its action can seldom be distinguished from that of paraquat. Orchardists have good water supplies and most have good spraying gear and apply a large volume of water which allows good control of weeds from amitrole diluted at 100 g/100 litres or paraquat at 50 g/100 litres. Results have been rather better from paraquat sprayed in the evening than in the morning, even when the concentration has been 25% greater in the morning.

Amitrole must be applied sooner than paraquat not only to avoid residues in fruit but also to check the growth of vigorous grass soon enough. Amitrole followed by paraquat perhaps 2 months later has long been recommended and still has much merit. A residual herbicide is commonly added to amitrole or paraquat in order to avoid one spraying in summer. Simazine is usually used on account of its well proven safety, but diuron or atrazine would sometimes perform better. Alternatively terbacil may be used alone to give both knock-down and residual action. Weed control from about 1.5 kg/ha is often incomplete, but higher rates used in earlier years sometimes damaged fruit trees even on heavy soils.

Weeds which survive routine spraying must occasionally be sprayed with a special herbicide which is effective. Various materials might be used, the most important of which appear below.

Orchards

WEEDS COMMONLY TROUBLESOME

Grasses

Most grasses common in orchards are adequately controlled by paraquat. These include barnyard grass (*Echinochloa crus-galli*), brown top, cocksfoot, danthonia (*Notodanthonia* spp), narrow-leaved brome, ripgut brome, phalaris (*Phalaris aquatica*), poa annua (*Poa annua*), summer grass (*Digitaria sanguinalis*), ryegrass, tall oat grass (*Arrhenatherum elatius*) and Yorkshire fog (*Holcus lanatus*). Couch (*Agropyron repens*) and forms of *Agrostis* spp. with vigorous runners recover but may be controlled with amitrole. Prairie grass (*Bromus catharticus*) which resists wetting, needs at least two applications of amitrole or paraquat for good control. Paspalum is insufficiently affected by amitrole and rapidly recovers from paraquat; it has been increasing in most sprayed strips without much hindrance to become the most important difficult weed. One persevering Nelson orchardist brought it under control by spraying with 2.2-DPA at 3 kg/ha every time the paspalum grew 8 cm long. Paspalum has been reliably and completely killed by glyphosate at 60 g/100 litres and glyphosate may become the only chemical used against paspalum, and possibly also against Indian doab (*Cynodon dactylon*) and Kikuyu grass (*Pennisetum clandestinum*).

Bracken (*Pteridium aquilinum* var. *esculentum*)

A very bad weed in places. It is checked by mowing or cutting, but poorly controlled by most chemicals. Infestations have been very gradually reduced by spraying paraquat at 100 g/100 litres every December, but not earlier. Complete control on clay soils has followed application as granules in early winter of either chlorthiamid or dichlobenil at 5 kg/ha. This rate gives appreciable yet acceptable damage to apple trees which is avoided at lower rates but with incomplete control of bracken. Apple trees around which bracken has been completely killed are liable to blow over 2-4 years later after the bracken rhizomes rot. Glyphosate is ineffective.

Gorse (*Ulex europaeus*) Broom (*Cytisus* spp.) and Wattle (*Acacia* spp.)

These and other susceptible woody weeds may be controlled with 2,4,5-T at 80 g/100 litres. Even first year trees are safe if spraying is carefully done with moderately low pressure in calm weather and with tall weeds trodden down, sprayed and prevented from springing up quickly.

Blackberry (*Rubus fruticosus*)

A disastrous weed if not controlled. It is continually introduced by birds and well protected in orchards from attack by insects and mites. Has been successfully controlled with 2,4,5-T. Spraying in January allows convenient coverage of canes and leads to less regrowth than earlier spraying. The addition of dicamba reduces regrowth. Fairly small plants with new canes have been well controlled with mecoprop/MCPA/dicamba in the course of treating cleavers.

Black nightshade (*Solanum nigrum* complex)

Constantly introduced by birds and common beneath fruit trees. A perennial surviving mild frosts sometimes poisoning sheep grazing orchards. Germination occurs mainly October-December often allowing useful control with simazine or by paraquat applied to very young plants. Control by amitrole or 2,4-D is unreliable, especially of larger plants, but is improved by dicamba.

Hawksbeard (*Crepis capillaris*)

Checked less by sheep than catsear (*Hypochoeris radicata*) and probably the commonest of the dandelion group in orchards; an autumn

Orchards

germinator avoiding herbicides at its young stage. Hawksbeard is common in both the mown sward and sprayed areas of many orchards. Tall plants cause severe russetting of apples where they touch. Half-grown plants are killed by mecoprop/MCPA/dicamba but not by MCPA, 2,4-D or paraquat.

Groundsel (*Senecio vulgaris*)

Common, occasionally abundant, in sprayed strips, causing concern but not a serious weed because it matures fast and can be checked when half grown with diquat at moderately high rates. It responds to simazine (some proven resistance abroad) and other residual herbicides but many germinate early in spring before strips are sprayed. Once past the seedling stage groundsel is very hard to kill.

Cleavers (*Galium aparine*)

A weed able to climb fruit trees, of increasing abundance, poorly controlled by all herbicides in common use in orchards. It is controlled by spraying in spring, after most germination has occurred but before many plants attain 20 cm, with mecoprop or dichlorprop at 200 g/100 litres. Even better control has been obtained rather surprisingly, with a mixture of mecoprop (330 g/litre racemic mixture), MCPA (84 g/litre) and dicamba (14 g/litre). This mixture is much used on cereal crops.

Musky storksbill (*Erodium moschatum*)

A very common weed in orchards cultivated occasionally and for several years after grassing down, which may persist in the mown sward. Along with the related *Geranium* spp it appears resistant to low rates of simazine, and can spread into sprayed strips where it can grow large in the absence of competition. It can be controlled with paraquat when very small only. Half-grown plants are hard to kill.

Large-flowered mallow (*Malva sylvestris*)

A problem weed in some orchards, difficult to control with normal herbicides. In trials good control was obtained with 2,4,5-T spot sprayed, better than with 2,4-D, MCPA, mecoprop or dichlorprop, all at 150 g/100 litres.

Buttercups (*Ranunculus* spp.)

Abundant in some orchards especially under irrigation. Creeping buttercup (*R. repens*) is very difficult to kill but can be kept low by spraying with MCPA at 2 kg/ha. Annual buttercups, occasionally dense in sprayed strips and able to grow through terbacil residues can be killed with MCPA.

Docks and sheep's sorrel (*Rumex* spp)

Sheep's sorrel and small docks are controlled by amitrole at 2 kg/ha plus dicamba at 300 g/ha. Dicamba at this rate does no apparent harm but the effect on fruit should be studied if treatments towards harvest become common. The addition of dicamba to amitrole at this rate will improve the control of black nightshade, wireweed (*Polygonum aviculare*) and hawksbeard. Large docks are best allowed to grow in spring until treated with asulam at the recommended stage of growth. Usually about 80% are killed, the others stunted. Mecoprop/MCPA/dicamba has given better control than 2,4-D.

Californian thistle (*Cirsium arvense*)

Amitrole must be used before fruit forms and therefore before shoots emerge. Patches of thistle are kept confined by spraying in summer with MCPA or among clover, with MCPB. At best this treatment reduces infestations very slowly and growers may change to glyphosate if it performs well.