Weed Control Practices

in New Zealand Pipfruit Orchards

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ABSTRACT

A survey of 77 growers, mainly in Hawkes Bay and Nelson, was undertaken during the summer of 1989/90. Personal interviews were conducted on each property. All growers were found to use herbicides for weed control, and all but one established herbicide strips with mown grass between. The major herbicide application period was spring. Three-quarters of growers relied on four herbicide formulations, amitrole, glyphosate, simazine and terbuthylazine/terbumeton. Of the residual herbicides used, 70% were triazines. Grower knowledge about herbicides was found to be lacking.

Grass species from the sub-family Paniceae were found to be the most problematic weeds, along with mallows, black nightshade, Californian thistle, tall willow herb and docks. These weeds were not adequately controlled by current weed control practices. Off-label use and herbicide damage to crop trees was noted.

Growers were found to be applying herbicides through a wide array of equipment, through fan and off-centre nozzles with one to four nozzles on each boom.

Only 37% of sprayers were calibrated at least annually. During the survey 41 sprayers were calibrated, with only 17% being correct within ± 5% of intended application rate. Of those sprayers with errors over ±5% two-thirds were underapplying at mean error of 37%, and one-third were overapplying at a mean error of 18.1%. Spray distribution patterns were found to be unacceptably uneven across the herbicide strip in most cases.

Over 40% of growers were not able to relate the actual amount of herbicide used to a target application rate per hectare.

A lack of training in both chemical use for weed control and sprayer calibration was apparent, and 80% of growers saw a need for a field manual.

ADDITIONAL KEYWORDS

New Zealand; pipfruit; weed control practices; herbicide use; sprayer calibration; accuracy of application; portable spray patternator.

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Common names for plants have been sourced from Healy, (1984).

apple	Malus domestica Borkh.
amaranthus	Amaranthus spp.
asparagus	Asparagus officinale L.
barnyard grass	Echinochloa crus-galli (L). Beauv.
black nightshade	Solanum nigrum L.
bracken fern	Pteridium esculentum (Forst.f.) Ckn.
brambles	Rubus spp.
bristle grass	Setaria spp.
broad leaved plantain	Plantago major L.
Californian thistle	Cirsium arvense (L.) Scop.
catsear	Hyphochaeris radicata L.
cocksfoot	Dactylis glomerata L.
cornbind	Polygonum convolvulus L.
couch	Agropyron repens (L.) Beauv.
creeping buttercup	Ranunclulus repens L.
creeping mallow	Modiola caroliniana (L.) G. Don.
creeping yellow cress	Rorippa sylvestris (L.) Besser.
docks	Rumex spp.
dwarf mallow	Malva neglecta Wallr.
fathen	Chenopodium album agg.
fennel	Foeniculum vulgare Mill.
field bindweed	Convolvulus arvensis L.
fleabane	Conyza spp.
French mallow	Malva nicaeensis All.
gorse	Ulex europaeus L.
greater bindweed	Calystegia silvatica (Kit.) Griseb.
groundsel	Senecio vulgaris L.
hawksbeard	Crepis capillaris (L.) Wallr.
hedge mustard	Sisymbrium officinale (L.) Scop.
Indian doab	Cynodon dactylon (L.) Pers.
Jersey cudweed	Gnaphalium luteo-album L.

large flowered mallow	Malva sylvestris L.
mercer grass	Paspalum distichum L.
narrow leaved plantain	Plantago lanceolata L.
nashi	Pryus pyrifolia (Burm.f.) Nakai var. culta (Makino) Nakai.
nectarine	Prunus persica (L.) Batsch var. nectarina (Ait) Maxim.
oxalis	Oxalis spp.
oxtongue	Picris echioides L.
paspalum	Paspalum dilatatum Poir.
penny royal	Mentha pulegium L.
phalaris	Phalaris aquatica L.
praire grass	Bromus willdenowii Kunth.
ryegrass	Lolium spp.
scrambling speedwell	Veronica persica Poir.
sheeps sorrel	Rumex acetosella L.
small flowered mallow	Malva parviflora L.
summergrass	Digitaria sanguinalis (L.) Scop.
sweet gum	Liquidamber styraciflua L.
tall willow herb	Epilobium cillatum Rat.
thorn apple	Datura stramonium L.
white clover	Trifolium repens L.
wild carrot	Daucus carota L.
wireweed	Polygonum aviculare agg.
yarrow	Achillea millefolium L.
yorkshire fog	Holcus lanatus L.

LIST OF CHEMICALS

Chemical names (IUPAC) have been sourced from Worthing and Walker (1987).

amitrole	1H-1,2,4-triazol-3ylamine
asulam	methylsulphanilylcarbamate
clopyralid	3,6-dichloropyridine-2-carboxylic acid
diazanon	O,O-diethyl O-2-isopropyl-6-methyl pyrimidin-4-yl phosphorothioate
dicamba	3,6-dichloro-o-anisic acid
diquat	9,10-dihydro-8a, 10a-diazoniaphenanthrene
diuron	3-(3,4-dichlorophenyl)-1,1-dimethylurea
fluazifop-P-butyl	(R)-2-[4-(5-trifluoromethyl-2-pyridyloxy)phenoxy] propionic acid.
glufosinate	4-[hydroxy(methyl)phosphinoyl]-DL-homoalanine
glyphosate	N-(phosphonomethyl) glycine
haloxyfop	(RS)-2-[4-(3-chloro-5-trifluoromethyl-2-pyridyloxy-phenoxyl] propionic acid
linuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea
methabenzthiazuron	1-benzothiazol-2-yl-1,3-dimethylurea
metolachlor	2-chloro-6'-ethyl-N-(2-methoxy-1-methyl-1-methylethyl)acet-o-toluidide
metsulfuron	2-[3-(4-methylxy-6-methyl-1,3,5-triazin-2yl)ureidosulphonyl] benzoic acid
norflurazon	4-chloro-5-methylamino-2(α,α,α-trifluro-m-tolyl) pyridazin-3(2H)-one
oryzalin	3,5-dinitro-N^4,N^4-dipropylsulphahilamide
oxadiazon	5-*tert*-butyl-3-(2,4-dichloro-5-isopropoxyphenyl)-1,3,4-oxadiazol-2(3H)-one
oxyfluorfen	2-chloro-α,α,α-trifluoro-p-tolyl-3-ethoxy-4-nitrophenyl ether
paraquat	1,1-dimethyl-4,4-bipyridium
pendimethalin	N-(1-ethyl propyl)-2,6-dinitro-3,4 xylidine

picloram	4-amino-3,5,6-trichloropyridine-2-carboxylic acid
simazine	6-chloro-N^2,N^4-diethyl-1,3,5-triazine-2,4-diamine
terbacil	3-*tert*-butyl-5-chloro-6-methyluracil
terbumeton	N^2-*tert*-butyl-N^4-ethyl-6-methoxy-1,3,5 triazine-2,4-diamine
terbuthylazine	N^2-*tert*-butyl-6-chloro-N^4-ethyl-1,3,5-triazine-2,4-diamine
2,4-D	(2,4-dichlorophenoxy) acetic acid
2,4,5-T	(2,4,5-trichlorophenoxy) acetic acid

EXECUTIVE SUMMARY

In the summer of 1989/90 77 pipfruit growers were surveyed to ascertain their weed control practices and accuracy of herbicide application.

In regions visited all 77 growers used herbicides to control weeds. All but one of these growers had established herbicide strips beneath the trees with grass growing between the rows. All growers used mowers, and some also grazed their orchards in autumn. Over 80% of the growers aimed to keep their herbicide strips free from all weeds.

The common application period for herbicides was spring, with most growers using a combination of knockdown and residual herbicides. Over 90% of orchardists used herbicides during the summer.

Glyphosate was the most popular herbicide being used on two-thirds of the orchards surveyed. Seventy-five percent of growers relied on four herbicide formulations, glyphosate, simazine, amitrole and terbuthylazine/terbumeton. Knockdown herbicides, used by all growers, ranged from one to five applications per annum, with 70% of growers applying two or three. Residual herbicides were used by 87% growers, with applications ranging from one to three per annum, one being applied by two-thirds of the growers. Herbicides from the triazine group were used by 70% of growers.

Two-thirds of the growers were unhappy with their weed control programmes, as they failed to control their problem weeds. A lack of understanding and knowledge of herbicides was found to be common. At least a quarter of growers anticipated increasing their herbicide use next season (1990/91).

Paspalum, Indian doab, couch, mallows, black nightshade, summergrass, Californian thistle, tall willow herb, docks and barnyard grass were found to be the ten most problematic weeds, although convolvulus was a particular problem in Hawkes Bay. These weeds were not adequately controlled the current herbicides utilised at the rates applied. This led growers to use non-registered herbicides on some of these species. Current and past use of herbicides used in a manner not according to label

recommendations was recorded on 45% of orchards. However most of it was during innocuous careful spot spraying, and unlikely to lead to residue problems.

Herbicide damage to crop trees past and present, was recorded on 71% of orchards in 79 cases. Two-thirds of this was caused by glyphosate and most damage was isolated to single branches or young trees. Translocation through root grafting from poisoned crop and shelter trees was recorded. Most herbicide damage occurred because growers took no action if low foliage was accidentally sprayed or drift was seen to occur. Use of unregistered herbicides was not causing problems.

Commercially made herbicide spray equipment was used by 55% of orchardists, although most had been modified, particularly the spray booms. Growers used only fan or off-centre nozzles manufactured predominantly from brass. One to four nozzles were installed on booms with 60% using two nozzles. Nozzle assemblies and filters were rarely cleaned and less often replaced.

With regards to sprayer calibration 17% of sprayers had never been calibrated, 37% calibrated at least annually, and 46% calibrated infrequently.

Of the 41 sprayers calibrated during the survey 12% were within ±5% of the intended application rate, 17% were within ± 5 to 10%, 14% within ± 10 to 20%, and 57% were over ± 20% and therefore unacceptable. Two-thirds of sprayers with errors over ± 5% were underapplying at a mean rate of 37% and one-third were overapplying at a mean error of 18%. Spray distribution patterns as monitored using a spray patternator were unacceptable in most cases.

Over 40% of growers were not able to relate the amount of herbicide used to a target rate per hectare, and were not able to accurately document use.

Only 25% of growers had formal training in chemical weed control and sprayer calibration. Eighty percent of growers saw a need for a field manual on herbicide spraying and calibration.

Overall the survey highlighted major concerns regarding the use and application of herbicides by pipfruit orchardists.

Further work should focus on developing a boom with a nozzle arrangement that will provide an even coverage across the spray width. In addition education about herbicide application and weed control is necessary and a field manual should be produced.