WEED CONTROL IN DRAINS

By J. N. FITZGERALD, J. H. Barbour and Son Ltd.,
Dunedin

THE elimination of weed and grass growth from open drains has always been a problem for the New Zealand farmer. It is a problem even in dry areas with water races and irrigation channels. The presence of a superfluous supply of water and a fertile soil type gives rise to a luxuriant growth of grasses, water weeds, and in some cases scrub weeds. The efficiency of an open drain depends largely on its fall and the freedom of movement of water in it. Strongly growing floating or submerged weeds rapidly reduce this efficiency and necessitate manual or mechanical cleaning at least annually.

MANUAL AND MECHANICAL CLEANING

In areas of reclaimed swamp-land such as are found in Southland and many parts of the Waikato drain cleaning is a large item in a farmer's annual budget. Due to the shortage of farm labour and the high wages offering most farmers are unable or reluctant to employ men for drain cleaning. Mechanical methods of cleaning are becoming popular, as they usually do a better job and in most cases are cheaper than using manual labour. Drag-lines and machines of that type are employed for excavating new drains and deepening existing ones. These machines are too expensive for use in cleaning and maintenance of open drains and there are very few of the smaller type available that can be used on a farm scale at a reasonable cost. They are designed for straight running and are difficult to work in conjunction with fences, culverts, hedges, etc. Also with each cleaning process they tend to remove soil and eventually the drain becomes too wide.

CHEMICAL CONTROL

Weed growth in drains can be divided into four main groups, the broad-leaved weeds, grassy-type weeds, rushes, and sedges. Broad-leaved weeds such as watercress (*Nasturtium officinale*), monkey musk (*Mimulus guttatus*), and the buttercups (*Ranunculus* spp.) are easily controlled with 2,4-D and MCP. Weeds such as floating sweet grass (*Glyceria fluitans*), reed sweet grass (*Glyceria maxima*), creeping bent (*Agrostis stolonifera*), tall fescue, Yorkshire fog, rushes (*Juncus* spp.), and the sedges (*Carex* spp.) are much more difficult to control and constitute the main weed growth in ditches. Chemical control of these weeds is not easy, but some of the newer growth regulating chemicals such as Dalapon and CMU are showing promise.

TECHNIQUE

The most economical method of using chemical weedkillers in drains is to reduce growth initially and then keep them clean with either annual or biennial applications of weedkiller, depending on the weeds involved and the persistence of the chemical in the soil. This can be done either by cleaning by mechanical means and applying the weedkiller as a soil steriliser or the heavy growth of foliage could be reduced by a heavy initial dose of a weedkiller followed by smaller maintenance applications. This would depend largely on the type of weed predominant and its response to chemical control.

WATER

Water is a major problem as there are no suitable chemicals available for the control of floating or submerged weed growth. Stagnant water of any depth causes excessive dilution of the weedkiller, making it largely inactive. Flowing water also does this and transports the chemical away from the weedy site. This can be dangerous; for example, arsenicals poisoning stock water races. Best results are obtained by applying the weedkiller at the driest period to avoid water losses. At that time the sides of ditches can be treated, and some root growth is exposed. In the South Island the autumn is the most suitable period for ditch spraying, though it is not always the best time for tissue absorption of the chemicals. However, the most efficient weedkilling is obtained when ditches are at their lowest level. It has been found that CMU is very persistent in soil despite regular flooding. Plots laid down in floating sweet grass with high rates of CMU showed no growth after 18 months. The area was regularly inundated with water, though it was completely dry when the treatments were applied.

RE-INFESTATION

Treated areas become re-infested by roots and rhizomes carried in by water, from seeds already present in the soil, and by seeds from overhanging vegetation.

EXPERIMENTAL WORK

Trials with new chemicals are usually carried out on particular weeds, usually in a specific locality. The range of weeds found growing in drains is very wide, but as many come into the category of grass weeds, control measures for one tend to give control of others.

1. Cutty Grass (*Carex ternaria* var. *gracilis*)

This member of the sedge family is a very common weed in drains, swamps, and poorly drained areas in the South Island. It is particularly serious in the higher-rainfall areas of Southland where drainage has been responsible for so much land improvement. It makes vigorous and prolific growth, starting in the ditches and spreading into paddocks, completely choking out the grasses and clovers. The root system consists of strong rhizomes, which grow to a depth of 1ft. to 2ft., making ploughing very difficult with medium horsepower tractors. It has been reported that the rhizomes grow into tile drains and block them, necessitating their lifting and relaying. Control measures carried out by farmers in the past have been ploughing of paddocks and affected areas before the sedge takes full control. This weed is spreading into high-producing farm land and is becoming a bigger problem every year. As it is a serious drain weed, trials were laid down to find a chemical control. Two trials were established, one in the Waikaka Valley near Gore in June 1955 and the other at Myross Bush near Invercargill in September 1955. Treatments were:—

TCA	at 20, 40, and 80lb. per acre.
Dalapon	at 20, 40, and 80lb. per acre.
CMU	at 5, 10, and 20lb. per acre.
PMU	at 5, 10, and 20lb. per acre.

Applied in 260 gallons of water per acre.

It was known that TCA gave some control of sedge growth when applied at very high rates, but in both trials the best kill was obtained with Dalapon. Six months after application there was no cutty grass in

any of the Dalapon-treated plots; all that was present was weed and clover growth with some annual grasses beginning to appear. Control obtained with the 20lb. per acre rate was 100 per cent. in the Invercargill trial and 90 per cent. in the Gore trial. This was probably due to the later time of application, when the cutty grass was then commencing its spring growth. Later inspections showed no further growth of cutty grass, the plots being covered with a vigorous growth of *Poa annua*, clover, and chickweed. It is too early at this stage to say whether Dalapon killed out the vigorous root growth. Observations next spring will show to what extent growth is coming away from roots present in the treated plots. It appears that 20lb. per acre of Dalapon will give good control of this weed, and it also offers a means of clearing ditches of it and other grassy weeds.

The next best control was obtained with TCA applied at 80lb. per acre, particularly in the early trial. Forty pounds per acre gave up to 80 per cent. control, but after 9 months new shoots were appearing in the treated plots. CMU and PMU were somewhat disappointing at the rates applied in these trials, the result being bare ground between the actively growing leaves and stems of the cutty grass. At the 20lb. rate of CMU control was only about 20 per cent. PMU was much less persistent than CMU and after 9 months no effect could be seen.

2. Floating Sweet Grass (*Glyceria fluitans*)

After the success achieved with the use of Dalapon a trial was laid down in a drain choked with floating sweet grass and other grasses. Floating sweet grass is widely distributed throughout New Zealand, occurring in ditches, watercourses, and swamp areas. It is classed as a weed because of its habit of spreading rapidly and in some cases making a bank to bank cover. This is frequently responsible for the slowing down and even complete stoppage of drains when the fall is slight.

Treatments were TCA at 40lb. and 80lb. per acre, Dalapon at 20lb. and 40lb. per acre, and CMU at 30lb. and 60lb. per acre, all applied in 600 gallons of water per acre. The growth of the grass was very dense and better results would have been obtained by spraying after cleaning. The treatments were purposely made heavy to see if it was practicable to clean up a drain with a heavy initial application of weedkiller. Good control resulted with Dalapon at 40lb. and 20lb. per acre. CMU was disappointing, but the very strong growth of the grass probably delayed its penetration to the soil. TCA at 80lb. gave very good control as would be expected. It is too early yet to decide if the heavy applications were warranted, due to the large amount of dead foliage remaining in the plots.

COSTS

The costs of chemical weed control in drains can be very reasonable. For example, Dalapon applied at a rate of 20lb. per acre gives good control of cutty grass and floating sweet grass, two common drain weeds. With a retail price of 13s. 6d. a pound at present an application rate of 20lb. per acre costs £13 10s. for material alone. This represents the cost of material for spraying 2420 yards (1½ miles approximately) of drain 2yds. wide or just under a mile of drain 3yds. wide. Rates of application of CMU at 20lb. to 30lb. per acre are more expensive, but as the results last up to 18 months or longer its use is warranted.

DISCUSSION

Q.—What technique was used when the TCA was applied to floating sweet grass?

A.—Floating sweet grass was not floating when the TCA was applied. The ditches were dry at this autumn application. If TCA is applied when ditches are dry, any amount of water after this will not affect the treatment.