CONTROL OF WEEDS IN DRAINS

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My paper is concerned chiefly with the control of *Poa grass* (*Glyceria aquatica*) and in the rather short time available I hope to outline our trial work as well as describe some of the problems this weed presents under various circumstances.

Poa grass was introduced early to New Zealand from a native home in Europe or Asia, and is now well established in many districts. Its spread has been encouraged because of its value as stock food, especially in the autumn, and for this reason it is highly valued by farmers in the Hauraki Plains, Lower Waikato, Manawatu and other districts. On the other hand it is a plague to maintenance staff on drainage schemes. Lesser drains become smothered in a dense growth of stems and runners, impeding flow and causing blockages. In larger water-ways and drainage canals, it forms large, mat-like colonies which float on the water and may be several feet thick. When torn loose by floods or by stock, masses of the growth collect in the straining grills at flood gates and pumping installations impeding flow or even causing blockages. The plant grows very rapidly and colonies expand by several feet in a season.

The drainage authorities in the Hauraki Plains became very alarmed at increased spread of the weed during the war years and asked the Department of Agriculture to commence investigations in chemical control methods. Early trials established the fact that moderate rates of arsenical applications were of no value. The first official trial commenced in February 1947 when 2,4-D, M.C.P. Dimitros, arsenicals and sodium chlorate were applied at very heavy rates. Various hormone formulations of up to 10 lbs. per acre, Dimitros and arsenicals at 10 times normal rates were useless. Sodium chlorate gave a high degree of control at 150 lbs. and 300 lbs. per acre where the treated *Glyceria* was growing above the high water mark. (The area selected for trial was slightly tidal).

A second trial was commenced in May 1947, and here sodium chlorate was applied to *Glyceria* which was growing on a low shelf or small terrace a couple of feet above the normal stream level. At 400 lb. per acre, an almost perfect kill was secured when applied as a spray, while the same amount applied dry gave a less complete kill, presumably because of inferior coverage. The addition of 200 lb. of borax to 400 lb. of chlorate did not increase the apparent toxicity. Even with the best treatments, *Glyceria* was able to persist along the bank, level with the water line.

Later still, in a willow trial, 1,000 lb. of Borax failed to give a satisfactory kill of incidental *Glyceria* under swampy conditions with no free water above the level of the soil. Under these conditions, also, an application of 400 lb. of chlorate per acre was ineffective. When 800 lb. of chlorate was applied, the willows were so damaged that the *Glyceria* was enabled to penetrate the area because of the destruction of the willow canopy.

Meanwhile attention was being paid to new types of material developed for aquatic weed control in the United States. These materials are chlorinated aromatic hydrocarbons - consisting largely of trichlorobenzene - known as Benoclor 3 and Benoclor 3-C, while later still it was found that aromatic naphthas derived either from distillation of coal or of petroleum were cheaper if less toxic than Benoclor. Emulsions of these materials are injected into a stream at given rates over a period of time, and thus water-weeds are surrounded by a dilution of the injected material for a certain time. Rates of application recommended, approximate up to 8 galls. per cubic foot of flow applied during the course of one hour or more. Booster applications are made at appropriate points below the location of the initial injection. The method lends itself to use in irrigation channels or in reservoirs where a boat can be employed to spread the injected material. Even under these comparatively perfect conditions for application, results are often unpredictable.

In a first small scale sighter trial carried out by me in 1949 Benoclor, fortified with 2,4-D, gave unpromising results when applied as an emulsion to floating sweet grass or when applied as a spray. It was observed that the treatment was fatal to eels. Later a larger scale trial was laid down in the Hauraki Plains area in a small lateral drain adjoining the main Te Awaiti canal. In this trial Benoclor was applied at a heavy rate as an emulsion treatment as well as by means of sprays. In addition, various sprays of hormone mixtures up to 5 lb. equivalent were applied with oils and water as carriers and with latex as a sticking agent. Sodium chlorate at heavy rates (200-800 lb. per acre) was also sprayed on to plots.

Again the hormones proved valueless, while sodium chlorate killed *Glyceria* above the water level, but not across the centre of the drain proper where stagnant water lay under the dense mat of *Glyceria*.

Benoclor as an aerial spray produced only a temporary scorching of foliage, later followed by vigorous regrowth. Applied as an emulsion to the water flowing slowly through the mass of *Glyceria*, it killed a narrow strip of the plants down the centre of the stream for a few yards only. This band corresponded to the path of the small flow of water that existed at the time of application. Under these conditions only those small portions of the plants which were surrounded by water were subjected to the treatment. If the level of water could have been raised, then a greater proportion of the weed would have been affected. Even had the material proved unusually toxic to *Glyceria*, the problem would still remain of how to get the emulsion to disperse through the thicket of runners and upright stems.

In order to test out Benoclor, Naphtha and a product submitted by Messrs. Imperial Chemical Industries Ltd., a modified technique was devised whereby accurate dosage could be attained by growing cultures in tanks.

The respective quantities of the weed killers were injected by means of a paint spray-gun and kept circulated for one hour, then the emulsion was syphoned off and replaced by fresh water. The I.C.I. material proved more toxic than Benoclor, which was slower acting, while Naphtha at 1 - 1,000 (compare 1 - 5,000 recommended) was useless. Incidental submerged weeds were mostly killed.

During the course of my investigations I have been impressed with abounding evidence that better maintenance of canal and drain sides is essential and that while the utilization of the grazing animal is invaluable, few attempts are made to put such knowledge into practice.

On the other hand there are some who observe and learn much, by their own efforts. An apparatus has been devised and demonstrated for several years by Mr. M. Carter of Netherton. It consists essentially of a triangular shaped grader, made of two heavy wooden beams converging to an apex in front and held apart at an angle of approximately 40° by rigid steel members across the middle and rear, and shod with steel plating along the edge of the lower member. This is capable of use in canal side maintenance, clearing of drains, and when used in drain formation produces the ideal type of drain side with a gradual batter, which makes it possible for animals to graze the water-weeds. We here find a man who, aided by this equipment, is convinced of the value of *Glyceria* for the fattening of bullocks. It is a matter for congratulation to find that the authorities are now putting his invention to extensive trial in the Hauraki Plains area. In interpolating this brief note on Mr. Carter's work, I hope merely to suggest that all is not lost because we have not yet discovered the ideal chemical for the control of *Glyceria* and other such aquatic weeds of drainage channels.

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D I S C U S S I O N
ON WEED CONTROL IN DRAINS

MR. MITCHELL: I would like to congratulate Mr. Saxby on his paper. With regard to water hyacinth I believe the aquariums utilise this particular plant as a spawning medium for goldfish etc. I suggest to the Department concerned that they notify the aquarium societies to publish the latest legal position regarding the sale and distribution of this plant. There is a plant called the Water Hawthorn and I would like to know if anything is being done about this plant?

MR. SAXBY: I do not think it matters as long as it is kept in the aquarium. The difficulty is, of course, to keep it in the aquarium. Regarding Water Hawthorn, I do not know much about it.

MR. RUTLIDGE: I would like to ask Mr. Gordon if he can give any information regarding T.C.A., particularly relating to the north of Auckland?

MR. GORDON: I can only quote from literature. I would say that I fully believe what we read, that T.C.A. will considerably check Couch to the extent of allowing the crop to get the better hand. When you get up to the rates mentioned of 200 to 250 lbs. per acre, the expense of the material is a matter for consideration.

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