

GORSE - CHEMICAL CONTROL TRIALS

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Although this is the first of a series of three papers to be given on the control of gorse (*Ulex europaeus*) at this Conference it is not proposed to spend any time on describing the plant which is too well known to need a description, nor to discuss in any detail the introduction and spread of this weed throughout the country. It was introduced in the first place to some districts as a fodder crop and used also in many other districts as a hedge plant. Because of its free seeding and early protection of the young plants with its spines, gorse soon spread onto farm lands and wherever it was neglected or got into areas which could not be cultivated it rapidly occupied the land to the exclusion of all other growth. While it found most congenial conditions on our light lands, and was considered a weed of such lands only, in England, gorse soon showed that it was capable of spreading over all sorts of soils including our heaviest clays in this country. Throughout the history of farming in New Zealand the fight against gorse to prevent it usurping vast areas of farming land has been continuous and expensive. In most districts it has been cleared from land which could be cultivated and is now relegated to inaccessible and non-cultivated areas, but in others it occupies considerable areas of as yet undeveloped land and in other areas again, it has invaded and is spreading at an alarming rate on our steeper hill country where it is a most serious problem.

Since the introduction of hormone weedicides the Department of Agriculture has been interested in the possibilities of this type of weedicide in the control of gorse since no other chemical had found practical application in the control of this plant. Trials on gorse with the first of these new weedicides, namely, M.C.P. and 2.4-D formulations were disappointing and proved not to be effective except on young seedling growth. During the past eighteen months further trials with the new formulations of 2.4.5-T have been carried out, details of which are as follows:-

Location of Trials: The main trials have been carried out at Flock House, Bulls, where treatments have been applied monthly to all types of gorse growth from February 1950 to March 1951. Other trials have been conducted at Redvale, Waitemata County, Warkworth, Kaitia, Tauranga, Pukekohe, Greymouth, Mataura and a series at Invermay, Otago.

Materials and Treatments used:

Weedone Special:	Butoxy ethanol ester 2.4.5-T.	3.6 lb. and 7.2 lb. per acre.
	Butyl ethyl ester 2.4.5-T.	3.6 lb. per acre.
Trioxone:	Butyl ester 2.4.5-T.)	2.0 lb.)
	Ethyl ester 2.4-D.)	2.0 lb.) " "
	Triethanolamine Salt 2.4.5-T.	3.6 lb. " "
	Butyl ester 2.4.5-T.	1.0 and 3.6 lb. per acre.
Brushkiller 32:	Ethyl ester 2.4.5-T.	1.0 and 3.6 lb. " "
	Isopropyl ester 2.4.5-T.	1.0 and 3.6 lb. " "
	Butoxy ethanol ester 2.4.5-T.)	1.2 lb.)
	Butoxy ethanol ester 2.4-D.)	2.4 lb.) per acre.

Brushkiller 32 was applied at the rate of $1\frac{1}{2}$ gallons water in 100 gallons water per acre, $1\frac{1}{2}$ gallons plus $8\frac{1}{2}$ gallons dieselene in 90 gallons water and $1\frac{1}{2}$ gallons plus 50 gallons dieselene per acre.

Results of Trials:

The trials have shown conclusively that gorse in various stages of growth can be killed with the 2.4.5-T formulations, but that there are some limitations to the effectiveness of this type of weedicide and some variations in efficiency. The results of the trials which must be treated as interim

only, in the meantime, can be summarised as follows:-

Coverage of Plants:

A complete coverage of all green parts of the gorse plants with the weedicide appears to be essential to kill gorse. Higher rates of application incompletely applied are not effective. It is suggested that to ensure a good coverage low volume nozzles with a high pressure and a big volume of water should be used.

Time of Application:

The trials indicated that best results are obtained from applications of 2.4.5-T formulations from November to February or early March to growing gorse. Heavy flowering at the time of application appears to reduce the effectiveness of the spraying while high temperatures during application to moderately growing gorse appear more effective than the same application of weedicides to strongly growing gorse when the temperature is lower. This effect is especially apparent when volatile formulations are used.

Stage of Growth:

The trials have included applications to gorse at all stages of growth and the results show a considerable variation, summarised as follows:-

- (a) Seedling Gorse: Quite susceptible to all oil based ester formulations of 2.4.5-T up to flowering stage. Complete foliage cover is essential to kill all plants. Under good conditions seedling gorse past the seed leaf stage can be killed by 1.0 lb. of acid equivalent per acre the best months for spraying being November to middle of February, though in the North Island spraying is equally effective later into the autumn.
- (b) Re-growth from cut-over or burnt Old Man gorse: Best results were obtained when the regrowth was 9-12 months old, spraying too soon after cutting or burning giving a much less effective kill of the old root stocks. A heavier rate of application of acid equivalent than with seedling gorse is necessary, up to 2 lb. of acid equivalent per acre giving best results.
- (c) Sub-mature Gorse: Seedling or regrowth gorse up to the stage when the bark on the stems is still green can be satisfactorily controlled with esters of 2.4.5-T though rates of up to 3-4 lb. of acid equivalent per acre are necessary on gorse where the stems are commencing to turn brown. Once the bark has turned brown to any extent spraying with 2.4.5-T may give disappointing results particularly if the plants are in heavy flower. Complete spray cover is difficult to obtain in heavy brakes of gorse at this stage and the flowers take up a lot of the spray and drop off before the spray ingredients have penetrated into the plants.
- (d) Old Man Gorse: Trials have shown generally poor control with 2.4.5-T formulations applied to Old Man gorse where most of the bark on the stems is brown and corky and there is a minimum of active new growth on the plants. The plants are checked and the foliage killed, but regrowths come away even where the spray is applied thoroughly to all parts of the plant - a most difficult operation in any extensive stand of Old Man gorse.
- (e) Cut Stump Treatment: Trials included the treatment of cut stumps. Satisfactory kills of cut stumps were obtained only where the plants were cut close to the ground and the bark peeled back to ground level and a mixture of 1:20 of an ester of 2.4.5-T with diesolene was applied to the tops and sides of the stumps.

Types of Weed Killer:

The trials under consideration have included treatments of gorse at all stages of growth with two types of 2.4.5-T formulations, non-volatile and volatile forms. Observations have indicated that the volatile forms are more effective than the non-volatile - this difference in effectiveness being due it is considered to the better and more complete spray cover obtainable with the volatile form. The difference in effectiveness becomes more apparent as the gorse being treated increases in age and density of growth.

Mixtures of 2.4-D plus 2.4.5-T compared with 2.4.5-T alone:

These trials have shown that the mixtures of esters of 2.4-D and 2.4.5-T are not as efficient in killing gorse as straight 2.4.5-T formulations when used on an acid equivalent basis per acre. This is understandable since 2.4-D alone has proved to be generally ineffective by itself and it is the 2.4.5-T content that does the killing.

Some General Considerations in the Chemical Control of Gorse:

The trials under review were designed to test the efficiency in control of gorse of the then available formulations of 2.4.5-T or mixtures containing 2.4.5-T under varying conditions as to stage and type of growth, time of application, efficiency of application, rates of application on an acid equivalent basis per acre and were not, therefore, concerned with the economics of gorse control by such weedicides, nor with the practical problems of getting the materials applied to the plants. It may not be out of place, however, at this stage to briefly have a look at the practical possibilities in effective gorse control, provided by the fact that formulations of the new hormone weedicide 2.4.5-T will kill gorse under certain specific conditions as indicated by these trials.

Seedling Gorse:

There are many conditions under which seedling gorse can be a problem. On cultivated land broken in from Old Man gorse and eventually sown to pasture it is seldom that the breaking in process will eliminate the invasion of the pasture by seedling gorse. At times such seedlings may be quite thick in places and in other cases relatively scattered. In either case such re-invasion of pastures can readily be dealt with by spraying with 2.4.5-T at any stage up to 3-ft. in height and this method of control is likely to supersede grubbing. On cut-over and burnt gorse areas sown to grass, the usual practice has been to endeavour to control the seedling gorse by heavy stocking with sheep if available and to deal with the regeneration of the gorse from old root stocks and from seedlings which escape the stock by repeated grubblings over the years of establishment of the pasture. Here again where mechanical equipment can be used for the spraying, both the seedlings, which are generally much thicker than after cultivation, and the old roots, can be dealt with by treatment with 2.4.5-T formulations. The seedlings can be knocked back in the early stages of growth before doing much damage to the young pasture while the regrowth from old stumps is better left for later treatment when 9-12 months old. On dairy farms especially where sheep are not available to control the seedlings and regrowth, this method of dealing with gorse in gullies and steep sidings has distinct possibilities. Where effective treatment can be obtained with up to 1 lb. of acid equivalent per acre of gorse, the materials would cost from £2. 0. Od. up to £3. 0. Od. per acre at present prices according to the weedicide used. Then there is the cost of application. This expenditure would apply to the treatment of the seedlings, but the second spraying to deal with the regrowth from old stumps requiring up to 2 lb. of acid equivalent per acre would cost from £4. 0. Od. to £6. 0. Od. per acre for materials plus the cost of application.

These costs pose a problem of economics or, perhaps, of manpower, because in the case of Old Man gorse in uncultivable land, we have the cost of cutting, the cost of spraying seedlings to prevent smother of the young pasture and the cost of respraying the regrowth from stumps. On sheep farms stock can be used to help the pasture to compete with the seedlings and it may be possible to reduce the spraying to that required to control regrowths from root stocks and the odd seedlings which escape grazing, but this is not the position on the dairy farm.

Seedling gorse is again a continual problem in the neighbourhood of gorse hedges particularly along roadsides and in the vicinity of gorse brakes and on the site of gorse patches and areas which have been developed to pastures from gorse. Here again it does look as though the suppression of seedlings as they establish will be done by spraying rather than with the grubber which latter method has the distinct disadvantage of often leaving bare pieces of ground where gorse seeds can germinate.

Semi-mature Stands of Gorse:

Because of the higher concentration of acid equivalent per acre

required to kill gorse after it has reached the flowering stage the cost of treatment of such areas can be very high with 2.4.5-T formulations, 3-4 lbs. of acid equivalent per acre running into £6. 0. 0d. to £9. 0. 0d. per acre. There is also the problem presented by such areas of getting the spray applied to give a full cover of the plants - an essential to a good kill.

Old Man Gorse:

Wherever land can be cultivated whether by the plough or by giant discs, Old Man gorse presents no real problem in eradication, though it is interesting to note the many variations in the methods adopted in dealing with gorse on cultivated land. No matter how carefully the preparation of the land for pasture is done or how long the land is kept under cultivation seedling gorse is likely to appear later and it is then that the new hormone weedicides can be expected to be of assistance.

Where, however, cultivation equipment cannot be used it does appear that the difficulties of proper application of hormone weedicides will prevent the wholesale use of them on Old Man gorse areas in such positions, while other considerations including the cost of materials and the fact that a satisfactory kill is not possible with any of the materials available, will necessitate the tackling of such areas in the first instance either by fire to induce regrowths which can be dealt with later, or by cutting and burning. In either case, some competitive cover either by way of trees or grass is an essential to keeping such areas under control when once cleared up.

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DISCUSSION

MR. OWENS: What nozzles were used at the high pressures?

MR. HAMBLYN: The 32M was used for fairly high pressures.

MR. NEILL: With pressures of 80 to 100 lb. per sq. in. was plastic or garden hose used?

MR. HAMBLYN: Ordinary hose. The plastic hose is not satisfactory with pressures over 30 lbs. per sq. in.

MR. TUCKETT: I would like your opinion on volatility and non-volatility of 2.4.5T on gorse.

MR. HAMBLYN: If large areas are sprayed on a good hot day the volatile form will normally show to advantage.

MR. BARRON: Can you give any indication of the time of spray when the gorse is in flower and when it is not. You mentioned that when the gorse was sprayed in flower the results were not so good.

MR. HAMBLYN: I think I mentioned the words "heavy flowering". Gorse has two main flowering periods - in the Spring and in the Autumn.

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