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WEED CONTROL IN TARANAKI

By A. C. BURGESS, Department of Agriculture, New Plymouth.

No discussion of weed control methods in Taranaki would be complete without a few remarks about the progress which has been made in the past twenty or thirty years. Taranaki was originally covered with heavy bush, and after this was felled and burnt, stumps and logs offered an ideal refuge for weeds to establish, and blackberry and fern and other weeds thrived and spread rapidly on the light volcanic soils. The history of the development of dairying, in North Taranaki especially, follows closely the history of the control of these weeds. There are areas on some of the roads leading from the coast up towards Mount Egmont on which trading firms, fifteen to twenty years ago, would not advance one penny credit, because they were so badly weed-infested. Today, farmers in these areas are producing up to 200 lb. butterfat per acre and the areas are relatively clean.

Due credit must be given to the farmers of the district for the excellent work they have done.

The important point to realize is that, no matter what method of control was employed in the first place, good farm management (viz., ample topdressing and good grazing management) has played a most important part in keeping the land clean. There are occasional farms round the district even today infested with blackberry, ragwort or flatweeds. One can say, almost certainly, that on these pastures management is bad and little or no topdressing is used.

I am in complete agreement with the statement made in the "Agronomy Review" of September 1948: "It is abundantly clear that there is no substitute for good husbandry in keeping weeds under control - nor is there ever likely to be." While this point was well stressed at last year's conference, I feel that I should again stress it in relation to weed control in Taranaki; of which province it is often stated: "Weeds can't be controlled in Taranaki like they can in other districts because of our light soils and heavy rainfall." While I agree that the problem is more difficult, good farmers in all parts of the district, including areas up near Mt. Egmont, have proved that good farm management is the most important weapon in weed control. In the control of blackberry in creeks and gullies the possibility of growing trees should not be overlooked. Many farms are short of good shelter, and trees planted on the banks of dirty creeks have a double value.

USE OF CHEMICALS:

Until recently substances used in chemical control of weeds were mainly either sodium chlorate or arsenicals. A fair measure of success was obtained with both of these substances on weeds such as ragwort and blackberry. Since the introduction of hormone weedkillers to N.Z., a number of trials have been carried out in the North Island to discover their effect on the worst of our weeds.

Most work has been carried out on ragwort, Californian thistle or blackberry, and remarks will be confined to these, and to some observations of chemical control of flatweeds in pastures.

RAGWORT:

In November, 1946, an area heavily infested with ragwort was selected and treated with hormone dusts and

sprays and sodium chlorate. One, two and four gallons per acre of the hormone sprays were applied and sodium chlorate 5% and 10% at $2\frac{1}{2}$ cwt. per acre. Inspections were carried out over two years, when there was still considerable control being exerted by Agroxone and Weedone solutions at two gallons per acre. Sodium chlorate 5% and 10% dusts gave a good measure of control. Hormone dusts appeared relatively ineffective.

In November, 1947, another series of treatments was applied on another paddock on the same farm. Treatments were Weedone and Agroxone solutions at one, two and four gallons per acre; 1% Agroxone dust at 2 cwt. and 5 cwt. per acre; 5% solution of sodium chlorate at 100 gallons per acre; also 1% Agroxone dust at 1 cwt. per acre and twenty pounds of 5% 2,4-D dust, each with 3 cwt. super per acre.

The hormone sprays and 1% Agroxone dust at 2 cwt. and 5 cwt per acre were repeated on an adjacent area on January 14, 1948. It was soon apparent that there was a marked difference in effect between the same treatments applied within two months of each other.

In the first series the sprays were the most effective. Weedone appeared slightly more effective than Agroxone applied at the same rate. One gal/ac. of either was, however, much less effective than 2 gals/ac., while 4 gallons of Weedone appeared to open up the sward and allow more ragwort and flatweeds to come in after a few months. Dusts and sodium chlorate spray in this trial exerted little control.

In the second series the effect of all treatments was soon very marked. Clover was almost eliminated in some plots and considerably reduced in all. The pasture in all plots where sprays were applied has remained yellow and unthrifty until this spring.

Flatweeds were affected in a manner similar to clovers, being almost absent from some plots for a considerable time. Field daisy is now coming in, however. Ragwort has been better controlled on these plots than on the plot sprayed earlier, and it is interesting to note that the most effective treatment here was 1% Agroxone dust at 5 cwt. per acre. In looking for a reasonable explanation for the difference in effect, we were inclined first to think that it was the hot, dry weather which followed the second spraying. However, on checking notes made at time of spraying, we found that, whereas the spraying in November had been done in warm, fine weather, that done in February was on a damp, misty morning, followed by hot, dry weather for two to three months. I feel sure that that is the reason for the better effects obtained later, especially with the dust treatments.

It had by this time been established that the hormone sprays were the most efficient form of these materials, and that they were at least as effective as sodium chlorate.

Next we had to establish whether time of application had much effect on the degree of control exerted. Plots were sprayed in August, September, December 1948, and January, February and March, 1949. In all these treatments, as in the earlier trials, a knapsack sprayer with a high-volume nozzle was used, and in most treatments 100 gallons of mixed spray per acre was used.

It has been found that in all treatments except that applied in March 1949, good control has been exerted. In the areas sprayed in March, roots appear healthy within

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about one to two inches of the crown. At present ragwort growth on the area treated has not come away to any extent, and no difference between treatments applied at any other time can be seen.

A small-scale trial on this same area has not revealed any difference in effect between low-volume (6 gals/acre) and high-volume (100 gals/acre) spraying. A considerable area with plants not required for experiments was sprayed with two gals. per acre of Weedone with the low-volume nozzle (10 gals per acre) in January 1949, with very satisfactory results.

One point which has always interested me is whether the hormone weedkillers would, as was claimed of them, penetrate right to the tips of the roots of ragwort. It is generally recognised that, with sodium chlorate, considerable regrowth does take place after the crown of the plant has been killed. Plants were recently dug up from all plots in the trials mentioned above; and, even in the plots where most effective control was exerted, these plants appeared to be regrowths from small pieces of root, and not seedlings. Admittedly a second application to the small regrowth plant would probably finish it off, but the same is true with sodium chlorate; and in practice farmers would not go round searching for small plants to give them a second dose.

Summing up the work carried out, I would say that:

1. Hormone sprays at 2 lb. 2,4-D per acre will effect a good control. They are, in my opinion, more effective than sodium chlorate.
2. The sprays are more effective than dusts except under ideal conditions at time of spraying. These conditions are warm, humid conditions followed by hot, dry weather.
3. Either high or low-volume spraying appears effective provided a good cover of the plants is obtained.
4. Control has been equally good when plants were sprayed in August, September, December, January and February, but control of plants sprayed in March was much poorer.
5. In all trials there has been a considerable reduction in the amount of clover in the sward. This occurred with low-volume spraying also.

It should be mentioned that no work has been carried out on ragwort with the sodium salt of 2,4-D, the substance which is recommended by the manufacturers for this weed.

I am keen to hear what has been the experience of others with low-volume spraying on ragwort, because I feel that there is a practical reason for this method's being the best. Most farmers have only isolated plants in their farms, and if they could carry in one spray pump sufficient liquid to do most or all of the farm they would be more likely to use the hormone material instead of sodium chlorate, of which they probably carry a small tin to dust plants. There is also the possibility of increasing the efficiency of a hormone dust, in which case it would be as easy to apply as sodium chlorate.

CALIFORNIAN THISTLE:

Early trials on this weed were not encouraging, but two trials carried out in the past two years have given very hopeful results. On the first of these, spraying was done on January 22, 1948, when the plants were in flower. Weather was fine and warm at time of spraying and a dry autumn followed.

Treatments applied were Weedone, Agroxone solutions at one, two and four gallons per acre and 1% Agroxone dust at 2 cwt. and 5 cwt. per acre. After twelve months Weedone and Agroxone sprays at two and four gallons per acre had reduced the number of thistles from a dense mat to only eight to twelve on 1/100 acre plots. These plants were small and had not sent up seed-heads by January 17, 1949. On that date all treatments were repeated, to try to clean up the remaining thistles.

The plots treated with one gallon per acre of Weedone or Agroxone sprays reduced the growth of thistles considerably, but were much less effective than heavier applications. Dust treatments exerted little control.

Recently, patches in the two-gallons per acre Weedone and Agroxone plots were dug over to a depth of 15" and no live roots could be found. There may have been some present in parts of the plot not dug, and it will be necessary to wait and observe the plots when spring growth comes away again.

Another series of plots was laid down on January 18, 1949.

In this Weedone and Agroxone solutions at two gallons per acre were applied high-volume and low-volume. Chloroxone 10% solution applied at two gallons per acre and F.N. 122 at the same strength. A further plot, not treated with weedkiller, but which received a topdressing of 4 cwt. super and lowt. muriate of potash per acre, was included to observe the effect of heavy topdressing on the growth of Californian thistle. This plot was included because of the effect observed in a grass-strain trial laid down previously. Different strains of ryegrass were compared. In the first year a plot sown with a false perennial ryegrass produced a vigorous, dense sward which compared favourably with plots sown with Mother seed and Nucleus seed ryegrass. In the second year this plot thinned out considerably, and, as well as flatweeds, the plot became infested with Californian thistle. The other plots remained dense and were free of Californian thistle, although some came in outside the plot area. A similar example of the value of dense pasture in suppressing docks was provided in an earlier trial in which the object was the control of pennyroyal.

Two of the treatments applied were too drastic and the sward opened up considerably. Although the pennyroyal was controlled, these plots became a mass of docks, which were not very apparent anywhere else in the paddock. The question was whether topdressing of a sward infested with thistle would thicken it up sufficiently to reduce the infestation. It is yet too early to judge the effect of this treatment, but all spray treatments caused the thistles to disappear almost completely.

The success achieved in the first trial and the promise shown in the one laid down last year, leads me to the opinion that it is an economic proposition in this district for farmers to spray patches of Californian thistles with 2 lb. per acre of 2,4-D, and, even if a permanent kill is not obtained, at least the incidence of the weed will be considerably reduced.

BLACKBERRY:

Although, as I mentioned earlier, I consider that good farm management methods where they can be exerted, are most important in control of blackberry, the use of chemicals must play an important part in places such as roadsides or creek banks that cannot be planted.

Early trials with 2,4-D preparation mixed with water produced little permanent effect on blackberry, either in

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the young or mature stage, and in a later trial with 2,4-D and power kerosene there was no permanent injury caused to plants with any treatment.

I have had no personal experience with 2,4,5,T but I have recently inspected a number of trials laid down by Mr. J.F. Brown, of Messrs. Ivon Watkins Ltd, and I have been very impressed with the results obtained so far. Tall blackberry eight to ten feet high, sprayed in March 1949, has been completely defoliated, the stems are dry and brittle, and the deepest roots are apparently quite dead. We all realise the difficulty in killing a blackberry plant completely, but I have never seen an effect approaching what has been produced in these trials. The factor which seems to be the main one in preventing a 100% kill is the difficulty in getting a good coverage on bushes of this size.

CONTROL OF FLATWEEDS IN PASTURES:

No trials aimed specifically at killing flatweeds in pasture have been carried out by me in North Taranaki, but in all the trials carried out on other weeds complete coverage of a given area has been made, and therefore we have been able to observe the effects of various treatments on flatweeds present. Under most circumstances good control of such weeds as ribgrass (*Plantago lanceolata*) catsear (*Hypochaeris* spp.) and dandelion (*Taraxacum* spp.) are obtained. Field daisy (*Bellis perennis*) is more difficult to control and, though temporarily checked, it appears to recover to some extent. From the observations I have made on paddocks sprayed by contractors, I would say that, in general, at least 80% of the weeds in pasture had been killed. This would appear to be a most satisfactory state of affairs in a district in which the pastures are notoriously weedy. However, I cannot agree that this is the correct way of dealing with flatweeds in pastures, and I consider that the 30/- per acre spent to carry out the work could be much more profitably spent.

I think we must first try to find the reason for the weediness of our pastures, and then decide if weed killing is the correct line of attack. Weeds are present in large numbers for a number of reasons:

(a) In a Young Pasture

(1) Poor cultivation, especially of a paddock which has been cropped for a number of years, gives the sown grass little chance to compete with weeds.

(2) Low fertility results in poor pasture-establishment, with the same results as above.

(3) Hard grazing of a young pasture allows weeds to enter and damages young grass and clover.

With correct cultivation, ample and correct topdressing and proper grazing management, almost weed-free pastures can be established and maintained. Our best farmers have disproved the contention that "you can't get a good pasture in Taranaki in under five years."

(b) In established pastures

(1) Close and continuous grazing weakens pasture species and allows weeds to enter.

(2) Lack of topdressing results in high-producing grasses and clovers being replaced by weed grasses and poor clovers and flatweeds.

(3) Constant haying opens up the sward, reduces fertility and allows weeds ample scope for spreading.

Where rotational grazing is adopted and ample topdressing is applied, North Taranaki pastures have no more weeds in them than do those of any other district. It has been claimed that spraying with hormone weedkillers can increase the production of a pasture by 10%. If weeds are present because of too hard grazing, improvement in grazing methods alone may be many times more beneficial than spraying. Levy and Sears have shown that rotational grazing may increase the production of a pasture from 20 to 50%. In a series of potash topdressing trials recently laid down in North Taranaki it was found that pastures which had been topdressed with phosphate or phosphate and lime had an average clover content of only 10 - 15%, and a weed content of 25 - 35%. With one dressing of 1 cwt. of muriate of potash (costing 30/- per acre, the same price as weed spraying), the clover content was increased to 30%, weeds were reduced accordingly, and production of the sward was, according to farmers' estimates, increased by 50 - 100%.

Here, in my opinion, lies the answer to the problem of flatweeds in pastures.

Increase fertility by ample and correct topdressing, improve grazing management, and there will not be sufficient weed population to warrant spending money to kill them. A further argument against the treatment with weedkillers to control weeds is that, although all the flatweeds are eliminated, the pasture will probably still be a poor one; as it generally follows that, under any of the methods of mismanagement mentioned above, ryegrass, white clover and other high-producing species will be replaced by such species as sweet vernal, browntop, goose grass, hair grass, suckling clover and Lotus major; and when the other weeds have gone, their place will be taken by one of these low-producing grasses or clovers.

GENERAL DISCUSSION.

A member: Farmers and research workers and other people have been confused by the large numbers of materials on the market. One farmer had a 5% kill by using one pint instead of over one gallon to the acre. He thought he was using a concentrate.

Another member: Mr. Burgess's trials on Californian thistle are most interesting. Regarding flat weeds in pastures, how many Taranaki farmers own a plough and how many do plough? What is wrong with surface-sowing?

A. - There have been considerably more farmers re-sowing pastures in the last ten years. We should not encourage farmers to use anything that will allow them to get away with poor farming. With the recommendations of the Grasslands Division on pasture species, re-sowing is a much better way to get high production than leaving poor-producing species in the pastures. Anyone with experience of re-sowing will know it is a poor method, because the seed has to compete with what is already there. This might include a mass of browntop, sweet vernal, etc. Building of fertility is more important than getting rid of weeds. Potash has made all the difference to the clovers, which in a few years will play a very important part in the production of the sward.

Mr. Brown: You won't get Taranaki farmers to plough and put a paddock out of commission, as they say they cannot afford to do so. Therefore we must look to an alternative method. I feel that weed control has a definite place in pasture management, through spraying and then surface-sowing. Admittedly you will have Yorkshire fog, but a better pasture. The weeds have left a good bed of humus where seeds will germinate. The farm of Mr. Victor Foreman, of Tikirangi, was in a bad way with chickweed. He took off one ton of hay after spraying,

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and three tons the next time. Harrowing and re-sowing puts the paddock out for three months. The best method is to put on potash a few weeks before spraying, then harrow and re-sow. Messrs. Fraser (Waitara) and Armstrong will do anything rather than plough. Ploughing is admittedly the best thing.

Mr. J.W. Woodcock (Dept. of Agric.) - There is a good deal in what Mr. Burgess says. As a Department we are looking ahead and realise the enormous potentialities of Taranaki. We think the Grasslands strains should be spread far and wide, especially in old pastures of twenty years. Clovers are not good in Taranaki, and the plough is the best way to get production. There have been far too many names for weedkillers, and the Department is left in the dark as to formulation. We have about fifty different instructors throughout New Zealand to advise farmers. I appreciate the amount of information supplied by commercial firms and I would like a simplification.

Mr. Burgess: Mr. Foreman ploughed a paddock for the first time this year because he realises it is the best method.