EXPERIMENTS IN BRUSH CONTROL.

By - Mr. L.J. Matthews, of the
Department of Agriculture.

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An extensive series of trials has been laid down with 2,4,5 - T, incorporating different formulations, and times and rates of application.

Trials on blackberry and gorse have mainly been laid down at Flock House for the months of January - July inclusive. Confirmatory evidence is also available from Extension Division trials conducted on a smaller scale over the past twelve months or so.

Although 2,4,5-T was originally introduced into N.Z. for black berry control, today it is used very widely for gorse control and as better control has been obtained for gorse, I will deal with gorse and a few other members of the family Papilionaceae to begin with.

GORSE (ULEX EUROPAEUS) - As indicated by previous trial work sodium chlorate and allied compounds, D.N.O.C., M.C.P. and D.C.P.A (2,4-D) compounds diluted with water and/or kerosene have not given any satisfactory measure of control. A temporary foliage check, especially with kerosene or other aromatic oils as a diluent, was usually followed by complete recovery.

On the other hand the 2,4,5-T formulations have proved very effective, some more so than others.

Factors influencing the control of gorse with 2,4,5-T formulations are as follows:-

(1) A complete cover of all green parts is essential. A suggested method to ensure this is to employ low volume nozzles, a high pressure, and a high volume of water. Perhaps an ideal lance for gorse spraying would be "T" shaped with a 28 M. fan-shaped nozzle and a 39 M. solid cone coupled together at each end of the cross-arm.

With a pressure of 80 p.s.i., the fan-shaped nozzles would deliver a highly atomised spray for surface foliage cover and the cone-shaped nozzles would deliver a driving cone of water into the inner stems and branches.

Volume of water should not be less than 100 gallons per acre, especially for gorse over 2 - 3 feet.

(2) Time of application. November to February inclusive are the optimum times, provided drought conditions do not follow spraying. Indications are that high temperatures and fair growing conditions are more important than moderate temperatures plus good growing conditions especially with volatile formulations.

(3) Stage of Growth. Gorse becomes increasingly resistant with age, young seedlings being the most susceptible. Trials show that 2,4,5-T formulations fail to control cut or damaged plants, which would tend to limit the control of gorse on tracks cut to facilitate the spraying of large areas of mature dense gorse.

(4) Control is more difficult if gorse is flowering profusely; the flowers absorb most of the spray and then drop off a few days later.

(5) Regrowth gorse from old, cut, or burnt rootstocks, should not be sprayed under 9 - 12 months, otherwise the area of foliage would be too small to absorb enough spray for root control. Dormant protected shoots tend to grow if the spraying is performed too soon after burning or cutting.

(6) The less volatile the formulation, the more essential is complete cover, and a higher rate of acid equivalent is probably required.

(7) Kerosene, dieselene or aromatic oils tend to minimise the control if used as a diluent - these oils have a phytotoxic effect on the plant tissue impeding the entry of the hormone into the damaged cell.

(8) With cold weather and cold soils, higher rates of application are required, and complete coverage is correspondingly more important. Spraying is not generally recommended under these conditions, particularly of overmature gorse in flower.

(9) Application to cut out stumps of hormone diluted 1-4 with kerosene has failed to give any control.

(10) Translocation appears to be very slight, mainly downwards; lateral and upwards translocation appears to be very limited, especially upwards.

(11) 2,4,5-T plus 2,4-D combinations have proved less efficient than 2,4,5-T formulations alone, the efficiency depending on the 2,4,5-T content. The non-volatile combinations appear less efficient than the volatile combinations, this being probably due to the fact that complete coverage is more easily obtained with the volatile mix.

(12) The tri-ethanolmine salt of 2,4,5-T has proved to be of little value.

As gorse varies in resistance at various growth stages, these are dealt with separately below.

(a) SEEDLING GORSE TO THREE FEET - Of the formulations considered, butyl ethyl ester has given the best results. This formulation contains 35.7% butyl ester and 6.3% ethyl ester of 2,4,5-T; it is volatile, and secures an excellent kill of seedling gorse to three feet. Under optimum spraying conditions $\frac{1}{4}$ to $\frac{1}{2}$ gallon per acre will probably give the desired control.

Butoxy - ethanol ester of 2,4,5-T, a non-volatile product, certainly gives the desired control but cover is very difficult to obtain with this product. A second follow-up spray is probably warranted. The advantages of a non-volatile spray are not to be overlooked for use in enclosed areas or adjacent to susceptible crops.

(b) GORSE REGROWTH TO TWO FEET. - Excellent control was again secured with the volatile formulation butyl ethyl ester at rates up to one gallon per acre. The non-volatile butoxy - ethanol ester applied at 1 - 2 gallons per acre will give excellent control provided the necessary cover is obtained.

(c) GORSE STILL MAKING GROWTH - Butyl ethyl ester gives effective control at one gallon per acre, only under optimum conditions. The non-volatile butoxy ethanol ester is comparable at two gallons per acre.

The combinations of 2,4,5-T and 2,4-D are probably unsatisfactory under adverse conditions, particularly the non-volatile mix.

(d) MATURE GORSE - Results for all formulations are more doubtful, but the best control has been secured by the volatile formulation of 2,4,5-T.

Further trials with methyl, isopropyl, and butyl esters of 2,4,5-T will be carried out to test further the importance of volatility in securing cover. The efficiency of the butyl ethyl ester is probably due to the killing power of the butyl ester (of relatively low volatility) in conjunction with the covering ability of the more volatile ethyl ester. Further trials will also be conducted on 2,4,5-T water mixture and oil mixture.

BROOM (CYTISUS SPP) - Both *Cytisus scoparius* (Scotch broom) and *C. monspessulanus* appear to be more susceptible to 2,4,5-T formulations than gorse, particularly the younger plants.

TREE LUPIN (LUPINUS ARBOREUS) - It is probably more satisfactory to use a volatile formulation of 2,4,5-T at 1/10 gallon per acre on lupin past the twelve-inch stage than to use an oil-based ester of 2,4-D at 1 to 2 lbs acid equivalent per acre.

GOATS-RUE (GALEGA OFFICINALIS) - This plant is quite susceptible to 2,4,5-T, particularly before the flowering stage.

BLACKBERRY (RUBUS FRUTICOSUS) - Many Extension Division trials have now been conducted on blackberry but the D.N.O.C., M.C.P.A. and D.C.P.A (2,4-D) have not proved effective.

The 2,4,5-T formulations are quite promising, although further work is required, especially on spraying regrowths.

The conditions that affect blackberry are similar to those for gorse, although indications are that cover is not as important as for gorse. The 2,4,5-T hormones are certainly translocated to a greater degree in blackberry than in gorse.

The foliage and canes of blackberry are more susceptible to 2,4,5-T than gorse as indicated by the check given with the tri-ethanolamine salt of 2,4,5-T or 1 lb acid equivalent per acre of 2,4,5-T in a non-volatile 2,4,5-T, 2,4-D combination.

Kerosene and 2,4,5-T applied to freshly-cut stumps of blackberry has given no control - regrowths have been strong especially when treated in good growth conditions.

Under good spraying conditions (December to February inclusive) the tri-ethanolamine salt of 2,4,5-T gives the best results. Areas treated with one gallon per acre of the tri-ethanolamine salt take up to three months to die off to ground level.

The esters on the other hand cause a very rapid foliage check to ground level (no difference observed between the volatile and non-volatile formulations) followed by vigorous regrowths, particularly at rates of over one gallon per acre; low rates gave a fairly slow check, followed by few regrowths.

The addition of aromatic oils, to 2,4,5-T esters, causes and even more rapid kill of foliage to ground level. Regrowths again occur.

Under adverse spraying conditions, when the blackberry is more resistant, the tri-ethanolamine salt has given no check. In the March application a slight foliage check occurred, in April and May applications no damage was apparent.

The esters under these conditions, particularly for the March application, have given a slow foliage check equivalent to the tri-ethanolamine salt under good growing conditions, resulting in no regrowth to date. In April and particularly May, the blackberry appeared quite resistant and it is doubtful if a complete foliage check will be obtained especially with non-volatile formulations of 2,4,5-T at one gallon per acre. The 2,4,5-T, 2,4,-D combinations have also proved less effective than the straight 2,4,5-T.

The good control secured with the tri-ethanolamine salt in N.Z. under good spraying conditions is in accordance with the success of this material under the hot humid conditions of some areas of Australia.

QUESTIONS AND DISCUSSION

MR.BROWN (New Plymouth): If you used a coarser nozzle would you not get a coarser spray to drive past the flower.

MR.MATTHEWS: I think that the flower is more profuse in November or December. I have used more than one spraying nozzle and have used them at various pressures. I have found that with the use of an aromatic oil the flowers just drop off, but this might have been due to more than one set of conditions.

MR.GREEN (Sydney): In New South Wales we have done quite a lot of work on blackberry, but not much on gorse, for all the gorse in New South Wales would cover but a few acres. Amine salt, which is not on the market, has given exceptionally good results. We have also had straight ester and a mixture of 2,4,5-T and 2,4D and I find it very hard to pick between them. We have had success in every month except June, but have found that the best period is between December and February. In general we expect a 10 per cent regrowth. We have found that it is most important to cover the canes with the spray. We have had outstanding results with blackberries that have been brushed or burnt previously, and I think that we can say that we have the blackberry under control in N.S.W.

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