THE CONTROL OF RIVERBED GROWTH

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Since the 1950 National Weeds Conference, the Board has sprayed many miles of riverbed growth consisting mainly of willows and broom, and as a result of observations, some slight amendments to the spraying quantities given in my previous paper in 1950 have been made.

Willow and Broom Spraying:

During the 1951/52 spraying season, 3lb. acid equivalent 2,4-D per acre was used with 100 to 150 gallons of water in place of 2lb. per acre recommended in 1950 for spraying willow sucker growth and broom.

Generally, for growth up to 3ft. high, 100 gallons per acre was sufficient for a reasonably even distribution of spray, and above this height, 150 gallons per acre was used.

Where possible, to ensure a more even distribution, the sprayer first travelled up and down the treated area, and then back and forth over it, using half the required quantity each time. While the results have been generally good, it has been found that sometimes kills have been patchy. On the taller growth particularly, it was found that although the top foliage died, the sheltered undergrowth survived and sent out shoots some months later.

Spraying—Optimum Coverage and Quantity:

During the forthcoming season, extensive investigations into this problem are being made, to determine:

- (1) The optimum amount of 2,4-D acid equivalent required when applied **uniformly over the foliage** to give a 100 per cent. control.
- (2) The amount of water per acre necessary to give as near as possible a "100 per cent. coverage" of the growth when large areas are being sprayed, (so that the condition of uniformity in (1) can be satisfied). Obviously, the two conditions are complementary.

It is not a sufficient guide to determining a "100 per cent. coverage," for the foliage to shed hormone spray in the form of drips from the outer leaf tips, as in many cases, considerable areas of the inner and underside branches and twigs have not been moistened before this run-off occurs, unless very high pressure nozzle discharges are employed to penetrate through the masking outer growth at the extended operating range of the spray stream.

Spraying a stream of hormone spray up to 40ft. from the sprayer makes it difficult thoroughly to cover the growth at the extended range of the spray stream. The growth nearer the spraying machine is more than adequately covered while the further growth is not so well done.

The ideal "100 per cent. coverage" which is highly desirable but practically impossible to obtain in dense growth, in normal field practice can be described in the following analagous manner:—

"Uproot the bush from the ground and plunge all the above-ground foliage into a tub of hormone mixture, withdraw and shake the bush, and then replace in the ground."

It is believed that quantities approaching 300 to 400 gallons per acre coupled with high pressure nozzle discharges up to 600lb. per square inch

are necessary to give this ideal "100 per cent. coverage" in dense growth above 4ft. in height with a spraying range of 40ft.

It is also necessary to consider the normal translocation and absorption characteristics of the growth when determining the optimum coverage. Willow growth possesses strong translocation properties but broom varies considerably according to age.

On plants possessing strong translocation properties, a comparatively strong hormone concentration on a local portion of the plant will kill it without 100 per cent. coverage being necessary but the amount required is indeterminate, and the coverage is haphazard.

On plants having little or no translocation properties, a 100 per cent. coverage is necessary, such as in gorse, and in this case the hormone concentration can be much weaker than in the previous group, as the hormone is placed exactly where required and where it will do the greatest good.

The reconciliation of the two above opposite conditions in field spraying is important, as while water is cheap and usually readily available in riverbed work, the cost of 2,4-D makes excess use of the material extravagant when treating large blocks of riverbed growth. It is essential therefore that these large-scale practical trials be made so that eventually the elements of uncertainty of results may be eliminated and the degree of control guaranteed for all stages and types of scrub growth control normally encountered in riverbeds and elsewhere. Intelligent workmanship is naturally a further important factor.

Willow Tree Spraying:

In the summer 1950/51 some willow trees ranging from 18in. to 3ft. in diameter and approximately 30ft. high were completely killed in 4 weeks by spraying with high pressure high volume equipment using 2,4-D.

The concentration used was 9lb. of 2,4-D acid equivalent in 375 gallons of water and the trees were completely sprayed from top to ground level. This method is not recommended for general use as it is costly and should therefore be used only when all other methods are impracticable.

Stump Treatment:

When trees which have been stump frilled in winter give rise to sucker growth about the trunk in the spring, a complete kill can be obtained by spraying the sucker growth before the end of February.

The regrowth can be caused by inefficient frill or where it was impossible to frill completely round the stump due to the contortions of the stump preventing the axemen from cutting right through to the cambium layer or through part of the trunk being inaccessible, as sometimes occurs when the tree grows over deep water.

Frilling:

The strength and quantities of hormone weedkiller given in the 1950 paper for willow tree frilling can be further extended to provide for large "old man" willow trees ranging from 5ft. and above in diameter.

Generally, trees under 5ft. diameter die completely within a month, but the very large trees take considerably longer with the quantities given. If a quicker kill of these trees is required, the best method is to use 2 frills for trees above 5ft. in diameter.

However, the frill will hold only twice as much 2,4-D in a 6ft. tree compared with a 3ft. tree, so that either 2 frills may be employed or else a double or triple concentration of the formulation is required.

Frilling Quantities:

The standard quantities, 1/6 pint of 1lb. acid to a gallon for a 1ft. diameter tree and 1/3 pint of 3½lb. acid to a gallon for a 3ft. diameter tree are approximately the quantities retained on the lower frill nick when this frill is full. There is no necessity to measure out the quantities required for each tree.

Spraying Machines for Riverbed Growth:

For this brush control work, it is absolutely essential that high volume-high pressure equipment is used. In general, nozzle pressures in the region of 500 to 800 p.s.i. are desirable.

The adaptation of agricultural crop-spraying machinery with pressure ranges between 30 to 40lb. p.s.i. is not recommended as neither the thrust of the spray stream nor the delivery is sufficient to penetrate the outer foliage of the bushes.

DISCUSSION

Q. In using his method of frilling Mr. Jones mentioned that he had to spray re-growths the following spring or February. Our trials have shown that only where the cambium is cut is a follow-up spray necessary. What purpose does Mr. Jones' method of frilling serve?

A. In ring barking it is necessary to scrape off the cambium for about 1ft. or else cut about 4in. into the sap wood otherwise the cambium layer and the inner bark is capable of growing right over the cut. In frilling we axe a 30 degree off vertical cut and use the 2,4-D mixture to kill the cambium layer.

Q. Do you notice any difference in treatment of crack and weeping willows with hormones?

A. It is chiefly crack willow in South Canterbury but we have sprayed pussy willow and black willow very satisfactorily, but have done no specific work on pussy willow frilling.