RECENT ADVANCES IN SPRAYING PROCEDURE

C. H. BAIGENT, New Plymouth.

The outstanding development of the hormone type weedicides has been due in no small part to the advent of the low volume technique. In the late 1940's these low-volume techniques caught on and for a season or two we heard much of the economics of this new pattern. Great weight was placed in propaganda of the cheapness and speed of application. There seemed to be no lower limit to the volume of carrier liquid required, and, in fact, the speaker knows of no research which has clearly defined the limits below which control fails to be significant. Possibly such a limit cannot be defined because of the number of variables, but on pasture weeds the level is probably well under a gallon to the acre.

With the firm establishment of the selective hormone weedicides, the problem of making them commercially acceptable by providing inexpensive spray equipment and emphasising the economics in the labour-saving has become less pressing. At the present day, with the pasture weeds, a marked tendency has evolved to apply heavier gallonages. The 1947 recommendations of 5 gallons an acre are now superseded by those of 8 to 30. This may be due to the fact that the average operator in New Zealand is an owner-farmer, and as he cannot become a specialist in this class of work he must be given a recommendation that will deal with every possible adverse condition.

Successful aerial spraying is at times carried out at the 1 gallon level, and, provided wind speeds of over 5 to 8 m.p.h. are avoided and the air convection rate is under 100ft. a minute, gives high control.

Unfortunately, the convection rate on a fine still day rises above this speed by about 9 o'clock in the morning, and to avoid losses of spray by these up-draughts it is necessary to use an average droplet size of a greater weight. This in turn calls for more mix per acre to give reasonable coverage and aerial contractors are tending to apply greater quantities. Between 2 and 3 gallons of diesel oil appears a wise minimum for aircraft unless spraying is confined to the 2 or 3 hours after first light.

In the brush spraying field there has been a swing to the use of high-pressure equipment of the orchard type. The emphasis is still, however, on equipment that is designed for hormone application. The guns must not be extravagant in the use of water.

For hormone sprays penetration and coverage are essential still, but orchard type guns tend to produce undue fogging and uneven droplet size. The ideal hormone spray gun will be one which will maintain penetration and coverage but give a large even droplet size and also maintain economy in the use of water. The high-pressure equipment must be versatile and easily adaptable from low-pressure high volume performance for refilling purposes to high pressure medium volume for gun spraying, and to high volume high pressure for transfer of water to higher levels, and on occasion to medium pressure low volume for the use of hand equipment with small jets where water is precious. It must handle, if possible, slightly abrasive (that is, badly filtered) water, and above all it must be transportable at a pinch by hand. Gun pressures of 250 to 400 p.s.i. appear desirable. Application rates of 300 to 400 gallons to the acre enable great saving in labour costs because of the speed in which workmen can cover the areas.

With this swing to high volume common to pasture work, aerial work and brush, it would appear that more development must take place to cover the problem that occurs where the shortage of water is so great as to restrict activities in brush weed control. It seems likely to me that there will be further developments in mechanical appliances for the application of much lower volumes of total spray mix with a view to obtaining a satisfactory control of brush weeds in difficult country. Improved forms of brush wands and nozzles are becoming available and may prove the answer. Also there is the additional problem that the brush control season with contact sprays is becoming sharply defined into the late spring and summer months. Reports from overseas emphasise the advantages of basal spraying during the off-season and equipment manufacturers have on hand sound designs for basal application when such sprays are placed on the New Zealand commercial market. It could be that the total mix requirements are so low as to create a place during all seasons for this new technique.

In the pasture and crop spraying field, the trend overseas has been towards the more expensive units and there seems a distinct likelihood that the next few years will see self-contained trailer units becoming common because of the very definite advantages they can offer. One of the most important aspects will be that such implements will have built into them efficient agitators. These trailer units will also have quick refilling devices, high and low pressure pumps, and will give the farmer service because of the inter-changeability and ease of mounting as compared with the common direct mounted tractor unit.

Another possible development will be the use of nozzles of the wide angle type, some of which cover more than 20ft. width of swath from a single tip, giving reasonably even coverage in still air conditions. Overseas reports are to the effect that these are still gaining popularity and the only modification that seems to have been applied has been the mounting of such tips in units of 3 to provide varying characteristics. These wide angle nozzles are used in the place of the common boom and while they lack in some part the necessary exactness of performance, they will undoubtedly have their place in roadside sprayers and other local body spray rigs. If the multiple wide angle type nozzle can do a really effective job without too much drift hazard, it may well cause booms to be abandoned. They are being evaluated at the research and experimental division of at least one commercial organisation.

Nozzle drip has been a matter of considerable concern, particularly in crop spraying and both check valves and suck-back systems have been used extensively. Check valves are really effective only with the higher volumes while the suck-back system gives spectacular results with small diameter booms such as $\frac{3}{8}$ in. brass or copper, but with 1 in. piping or larger the filling and emptying lag is too long for convenience.

The problem of building an economical and durable sprayer is still unsolved. Corrosion of tanks and other connected parts is difficult to control.

To conclude this talk, the speaker would like to bring out his own personal hobby-horse in an endeavour to offer some constructive thoughts to deal with New Zealand's immense brush weed problem. It does not appear that the solution to economical control on the marginal or even second-class land has yet become clear to us. It seems that we require something in the region of 100 gallons of total mix to give a measure of control of these types of weeds and in the steep country the costs of applying the chemical under these conditions becomes exorbitant where large areas are tackled. Extensive experiments in aerial spraying of 2,4,5-T

of the various compositions have been carried out near New Plymouth in conjunction with a New Plymouth aerial contractor, and we are in hopes that at some future date we will arrive at the necessary technique to make this a sound commercial proposition and one attractive to farmers.

However, the problem of applying large volumes from the air, if not insuperable, is most difficult to solve from the economic point of view. I personally have endeavoured to encourage the formation of a helicopter spraying company in New Zealand. Contacts have been made with helicopter spray operators overseas and the problem of pilotage and maintenance has been fully discussed with experienced pilots here in New Zealand, and it seems reasonable to expect that the use of these rotor craft is likely to have distinct advantages.

I would like to place before those interested in weed control the following short summary that would indicate possibilities:—

- (1) With a helicopter it is possible to park and fly alongside the area to be sprayed.
- (2) Water can be sprayed on to brush in the same manner as fertiliser is applied to hill country. With a charge of 9d to 1/- a gallon of total mix applied then on the average operating figures of helicopter companies overseas there would be a return to the operator of something in the nature of £40 to £50 per hour of flying time. This should pay for the most expensive type of machine.
- (3) At the 1951 Weeds Conference Mr. Adams mentioned that he obtained good kills with 30 to 50 gallons of material per acre.
- (4) At slow speeds the down draught of the machine is violent and there is reason to believe that coverage complete enough to give good control could be achieved even on gorse and manuka.

The only difficulty met is that of money to try the idea out—machines are expensive and the training of pilot and personnel would need to be carried out overseas. Perhaps it may be possible that some American concern, if not a British one, can be encouraged to send at least one machine out here in order that the possibilities may be tested and a new sphere of activity made in the world of weed control.