

## VARIEGATED THISTLE - AERIAL SPRAYING IN HAWKE'S BAY

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Otane.

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Prior to the 28th April 1951 organised spraying of variegated thistles had not been attempted, and this is only the 8th August. Therefore, I ask you to excuse any indefinite points as there is quite a lot of work to be done yet. Also right from the start there has been a continual stream of people after information - to everybody interested I have given all the facts I can, most of which have been published and broadcast at various times. It is hard, under the circumstances, to cover much fresh ground, so to those of you who have followed this job through, I ask for your tolerance, and hope I may touch on some points that may be new to you.

The property on which I have variegated thistles is exceedingly rough. It has very poor access to the back, and is 3,600 acres in size, with approximately 500 acres infested with thistles. The thistles are at the back and front, the centre part being clean. During the war years, owing to the lack of labour, the variegated thistle was not given the attention it should have had, but I was not worried until we had a big drought four or five years ago, when they just went haywire. Hoeing of such a large area was hopeless. I realised that it was a case of either the variegateds or ourselves having the property.

In 1948 I got on to Lo-Volume nozzles. These were of American manufacture and the thread would not fit any New Zealand knapsack. Eventually I got the nozzles turned to fit the pumps, but with one nozzle per pump it was slow and hard work. The following year I got twin heads - this was much better, but the job was a real mankiller. It meant 1½ hours a day per man lost riding out to the back country, and as I had six men spraying, this meant over one man's time per day lost in travelling. We then had to fill jerry cans in the creeks, pack the water up steep faces and then carry the jerry cans ourselves when it got too steep for horses. Many times the packhorses slipped and rolled down into gorges. By starting early in March and spraying right through, only stopping for crutching, docking, etc., we finished a fortnight before Christmas. Except at lambing time no sheep were plucked and ordinary farm work was left undone. No farm can stand this for long.

It was sheer desperation that drove me to try the use of aircraft for spraying. I could get no definite information of any type to work on, so we planned a theoretical job which in practice worked very well, after a few minor alterations.

Firstly I will deal with airstrips. I have done this before and I intend doing it again today and every chance I get in the future. Any person who is intending to use an aircraft off their property would be well advised to get the advice on their airstrip from the chief pilot of the Company who is going to use the strip, and nobody else, because of his past practical experience. I know of several cases where over a four-figure sum has been spent and wasted - the strip was never used in some cases, and scrapped after trial in other cases.

After a lot of work we got the strip finished and the aircraft in. Our first job was to calibrate the aircraft. That is we required a given output at a given speed. We aimed at applying 3 gallons of the mixture to the acre, made up of 1 pint of aero-concentrate and dieselene. We calibrated the aircraft to 2.99 gallons which is near enough. Calibrating under the present set-up is not the easiest. The pump is driven by a propellor, which in turn is driven by the slip stream. This is not very satisfactory as any adjustments must be made on the ground, and checked by a stop watch while the aeroplane is in flight. No adjustment can be made to vary the pressure. Small compact gear-driven pumps driven directly from the aircraft motor are now being made, and these should be a distinct advantage. Calibrating the nozzles is a very delicate job as 1/16th of turn on the nozzle varies the output considerably. I am pleased to hear that one commercial firm is going to calibrate its nozzles at a given pressure before sending them out. I hope that they padlock the nozzle then to stop that bright cow who usually turns up and will try to fix something that is going perfectly well. He usually fixes it alright!

It was necessary then to plan the job so that there was the minimum amount of flying for the maximum coverage, also keeping in mind that the flagmen had to have time to ride from one area to another. It must be remembered that the aeroplane was travelling at 80 m.p.h. and the flagmen at 4 m.p.h. In rough country an aerial photograph is essential. The evening preceding the flying, complete briefing of flagmen and pilot takes place, and a general discussion of the day's work. If the conditions look as if they are going to be good, the flagmen must be in position at daylight, as this is the usual time for the wind to be from zero to 5 m.p.h., which is the maximum wind-strength spraying can be done at. To make the method of spraying as economical as possible, a good deal of thought and planning must go into the job before starting. I would like to say here that spraying from the air is economical, in fact it is the cheapest method of spraying at present. I know of one case where an area was sprayed for caterpillars seven miles from the aerodrome at a cost of 3/6d. an acre, and the quote by lorry was 12/6d. All the same it is not so cheap that the job can be taken lightly; in fact, in rough country the costs per acre soar, especially if the proper amount of planning does not go into the job.

The ground organisation is most important. I understand a technical sheet is being got out on this subject, but I will touch on a few points. Apart from the hormone and dieselene, you need such things as a drum opener (which can be made quite simply from a gate hinge), a broom handle for stirring, calibrated tins for measuring the hormone, flags made from white material approximately 1 yard square for the flagmen, spare nozzles - we had odd ones pack up, also tags to tie on drums so that there is no mistake between mixed and unmixed drums, funnels for pouring into drums and some sort of pump to move liquids from drum to drum.

In some cases it is cheaper and better to do a particular area completely, in preference to trying to do the patches of thistles. I had one paddock of 250 acres with approximately 50 acres of solid variegated thistles if they could have been concentrated in one area. There were solid patches one end and scattered ones the other end with odd ones in between. To save endless manoeuvring of the plane, I decided to do the whole paddock, and on figures this was the best thing to do. Only experience can teach you just where this would pay.

At the time and place arranged at the briefing, the flagmen line themselves up not more than 400 yards apart, because of drift, and one at each end of the patch of thistles. The pilot then lines the nose of the aeroplane up with the flagmen and makes his run through. The flagmen then watch for drift - if there is none they take 9 paces over and line themselves up for the next run. If there is drift, then they make the necessary allowance. The pilot then makes his second run and so on until the area is finished. The nine paces equals 27 ft. - the boom is 36 ft. long - this allows one-third overlap. We allowed this to make sure of complete coverage, and also, as the plane banks to turn, with the contour of the country, the boom does not give the 36 ft. coverage. With the experience now gained, I am of the opinion that this one-third overlap can be cut down considerably, in fact I would like to see a trial area done with no overlap. I am inclined to think that the slight drift and also the volatile nature of the hormone will kill the odd pieces that may be missed. In the event of these two factors not working, the small areas not killed could quite easily and cheaply be cleaned up with 2% dust. The saving in money by cutting out the one-third overlap, I feel, would more than pay for the odd cleaning up that may be necessary. This angle can only be proved or disproved by trial, which I will try in June 1952 if it is not tried by somebody else before.

Filling the aircraft at present is very crude, but so far it is the best practical method. The method is for the pilot to cut the motor, and two men to put the mixture in with tins and then swing the propellor. This, with two good men working at high pressure, can get the plane away in 2 minutes, but it is tough going. I think the best way would be by compressed air. The air pressure could be built up in a 44 gall. drum while waiting for the plane, and the compressor could be kept going, a safety valve in the drum stopping the pressure getting too high. The hose leading from the drum could have a tap at the end on the lines of the tap on a petrol bowser, and when the plane was full and the tap off, the safety valve would act again.

Owing to the very difficult flying conditions caused by the type

of country we were spraying, we varied the load of the plane from 22 to 35 gallons. The pilot also put in the minimum safe amount of petrol to increase the manoeuvrability of the plane. This usually led to the pilot putting petrol in while we put the hormone mixture in.

Costs varied considerably, depending entirely on the type of country being sprayed. Some of the country we were spraying is probably some of the most difficult that will ever be done, and this cost 25/- an acre for flying. The easier country was down to 8/- an acre. With the experience we now have the 25/- area could be done for £1. It was a very short run of spraying down a spur leading into a gorge running at right angles. The materials cost 19/3d. an acre - 15/9d. for aero-concentrate and 3/6d. for dieselene - we used dieselene for additional weight to minimise the drift. This makes a total average cost of £1.14. Od. per acre as against £6. 0. Od. by hand. With the experience we now have I am of the opinion that these costs can be lowered considerably by the following:-

1. Cutting out one-third overlap.
2. Using aero-concentrate at half-strength.
3. Changing from dieselene to water.

This would have the effect of reducing the average cost on very rough inaccessible country from £1.14. Od. to 17/9d.

To summarise costs:

By hand - £6. 0. Od. an acre. By air - £1.14. Od. an acre.

Anticipated costs	}	17/9d. an acre.
by future improved		
air-application.		

The results were perfect. It killed little ones under rank grass and also those under thick Karaka Berry trees where even rain does not penetrate. Another unforeseen result is that what I think could aptly be called secondary weeds - weeds that have been there for years and have not increased, mainly burr clover and hemlock, have been killed. It looks as if I am going to have a weed-free farm. It is my opinion, after seeing the results, that in time it will become good hill-country farm practice to spray a mixture of hormone (and trace elements if necessary) every few years, even if there is no major weed problem.

We had a trial area at half-strength. Although the action was not so quick or violent, its final result was just as good. Just at this stage I would like to see further areas tried at half-strength before recommending it, although I am certain in my own mind that it is alright. Slight drift and the volatile nature of this hormone from neighbouring full-strength areas just may have helped the trial area.

In conclusion, I would like to make a few suggestions:-

Firstly, ground-to-aircraft radio communication is very desirable, and I would suggest that the regulations should be amended so that the Company operating the aeroplane should be licensed in such a manner that, when spraying a given property, the employees helping are automatically licensed for the period the plane is operating there.

Secondly, as this spraying develops, it should be available on a contract basis to the farmer at so much per acre, the Company supplying aircraft, ground staff and hormone, with perhaps the farmer supplying two men as markers. This is how it is done in England and the U.S.A., and this method could be adapted to New Zealand conditions. Under the present set up six men are necessary - two teams of markers, two in each, and two filling the plane. With an improved method of filling one man could probably be saved on the filling.

Thirdly, I would like to suggest that instead of the aeroplane being adapted for spraying only, it should be made for the dual purpose of spraying and topdressing. Spraying could then be done in wind strength from zero to 5 m.p.h. and topdressing from 5 m.p.h. to 15 m.p.h. This should reduce the operating cost and, therefore, the cost to the farmer.