USE OF CHEMICAL WEED KILLERS IN CANTERBURY.

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During the past year considerable use has been made of chemical weed-killers in Canterbury. Much of this has been experimental. Much experimentation still requires to be done, but the general picture of the place of chemical weed-killers in farming practice is now somewhat clearer.

Before discussing the use of these weed-killers in Canterbury it may be as well to say a few words as to our system of farming on the plains area. Canterbury is not favoured with an ideal grassland climate. Hot dry summers and a fairly rigorous winter mean a deficiency of stock feed in these two seasons. Generally, this deficiency is met by the growing of supplementary feed crops. Further, pasture deterioration tends to be fairly rapid and there is frequent need for renewal.

To meet the expense of pasture renewal and supplementary feed cropping, one or more cash crops are usually grown. Thus we have a rotation of 3 - 6 years of grass followed by 2 - 5 years of cropping, depending on the soil fertility. During the grass years annual weeds are controlled and there is a big reduction in the weed-seed content of the soil. Twitches and other perennial weeds may increase greatly during this period, depending on the quality of the pasture.

During the crop years annual weeds increase at a tremendous rate and will eventually prevent cropping. Mr. Black gave us a figure for his soil last year of 700 million faden seeds per acre, or enough, so he estimated, to carpet the soil for two centuries. A similar count on a field at Lincoln College gave a figure of 843 million faden seeds per acre. The spread of twitches and other perennial weeds during the crop years depends on the rotation and the cultivation, but can be very rapid. The result is, our weed problems are by no means of a minor nature. The cost of cultivation for weed control in some districts may amount to £1 per acre per year over the whole farm. The losses sustained in increased difficulty of harvesting, of reduced crop yields, or of reduced pasture growth, can be an even more substantial figure. The Canterbury farmer under such conditions is therefore in a position to spend a considerable sum of money on weed control. If some measure of control can be obtained with chemicals for an expenditure of, say, 30/- per acre, the farmer is reimbursed by yield increases of 1 cwt linseed, 2 bushels of peas or 4 bushels of wheat. In some cases, considerably greater increases than these can be expected. Thus, financially, the use of chemical weed-killers is possible. Two Canterbury contractors last year in a short season sprayed 2,500 acres. This year they are already booked for 4000 acres. A number of farmers are now constructing their own machines, so that some considerable increase in acreage can be expected.

Last year at Lincoln College we decided that the hormone weed-killers justified their use commercially on the College farm. I think the use we have found for them gives a fair picture of the value they may be to the commercial farmer, so with your permission I intend to give you some account of our experiences.

First, we had to have a spraying machine. We started with a knapsack, but this is useless on a commercial basis. Then we borrowed a machine; this also has its drawbacks. A contract machine was not suitable for our purpose, so we were forced to make a machine. We made a simple one, driven by a petrol motor, costing us about £50. Recently I have

seen a very simple machine constructed by a farmer, at a cost of about £10. This machine is driven from the power take-off. Our machine is of the low-volume type and at 3 m.p.h. delivers 4 gallons per acre. This is very suitable for hormones, but not for D.N.O.C. However, the manufacturer now offers us nozzles with adjustable tips so that we can increase the delivery to 10 gallons per acre, thus enabling both substances to be applied with the one machine. Taking the weeds in order, we have:

1. Annual weeds in crops:

Our most troublesome weed is fathen. We aim to control it by cultivation, but after prolonged cropping or in an unfavourable season a crop may be beaten by it. Last season this occurred in a linseed crop. The application of $\frac{1}{2}$ lb. hormone weed-killer costing us about £1 per acre applied, resulted in an increase in yield of about 400 lb. of linseed. In addition we were saved a very severe infestation of fathen seed. If one year's seeding means seven years' weeding, we have saved ourselves much work in the future. There have been other instances of useful control of fathen in potatoes and cereals.

In peas, fathen is a constant worry, and we intend to use DNOC compounds. Wild turnip does not give us much trouble but in some districts it is very severe. Chemical control of this weed is easily obtained. The picture thus is: we aim to control fathen and wild turnip by cultivation. If they beat us, we use chemicals as a standby. We do not intend to substitute chemicals for good farming. Unfortunately, we have several other bad annuals, e.g., wild oats in cereals, spurrey in turnips, where chemical control is not possible.

2. Twiches in cropping land:

With old man twitch, creeping fog, onion-rooted twitch, and to a less extent browntop, we have a continual battle. Our present practice is to summer fallow about 10 per cent of the farm each year in preparation for grass. This is an expensive form of control costing £6 - £8 per acre. It is possible that chemical weed-killers can be used to reduce this expense.

3. Californian Thistle:

This is one of our bad weeds, affecting both crop and pasture. By means of the summer fallowing mentioned for twiches, by the use of smothering crops, by mowing and by spot treatment with chlorate we have been able to prevent the thistle from spreading. We look to the hormones to be of considerable assistance to us here, attacking it both in pasture and in crop.

4. Weeds of young pasture:

In an unfavourable season autumn-sown pastures may be very severely infested with annuals. Last season this occurred with chickweed in a timothy-white clover pasture. Hormones gave only moderate control here, whereas cattle-grazing proved successful. After 12 months the hormone strips are still visible by reason of the dearth of white clover. White clover in young swards is apparently fairly susceptible.

5. Weeds of old pastures:

Apart from thistle control, very little use will be made of chemicals in Canterbury. Weedy pastures do not regenerate in our climate and renewal is usual. In old pastures clover proved able to recover from light applications of water-based sprays.

6. Weeds of waste land:

Weeds with wind-dispersed seeds can multiply from such areas and could well be controlled by spraying. The poisonous hemlock frequently occupies such land and is fairly susceptible to hormones.

This, briefly, is the weed situation of the better cropping land. The main weeds are those affecting crops: the annuals fathen and wild turnip controllable by chemicals, with wild oats in cereals and spurrey in turnips not controlled; twitches - no control as yet; Californian thistle, the chemicals definitely of value.

The farm income justifies the expense of such weed control, and one would not hesitate to recommend to the farmers that a machine be purchased as an adjunct to their weed-control machinery.

On the lighter land of Canterbury the College has a property called Ashley Dene, carrying 2 ewes per acre on subterranean clover. Not a great deal of cropping is done. No use has been made of chemicals on this land, nor is such likely, due to the lower farm income. Expenditures of 30/- per acre on weed control are not justified on such land.

I have confined myself to the arable country. If we look briefly at the non-cultivated land of tussock grassland, hill and river bed, the weed picture changes. Gorse is probably No. 1, with sweet briar, bracken, manuka, thistles, broom, tutu and blackberry as lesser evils. Most of these are fairly resistant to chemicals, and low per-acre income does not justify large expenditures. Spot treatment with a low-volume knapsack sprayer may be of value in these areas, but, in general, good pasture management offers the only measure of control at the moment.

GENERAL DISCUSSION.

Mr. M. A. Black - What was the effect of the spray on red clover? A farmer used it successfully on Montgomery Red clover, which might be less affected than the Broad Red.

Mr. Iversen - I have had no experience on red clover.

Mr. R. K. Ward - There were strong differences in the varieties of red clover reactions.

Mr. G. C. Warren (North Canterbury) - I am glad to hear Mr. Iversen, because he has made a valuable contribution. The weed problem is getting more serious every year, due to the header harvester spreading seeds over the fields. We find in Canterbury that many farmers would like to treat red and white clover crops with sprays, but have been worried about the effect of these sprays on the bees. Have we no definite information as to whether spraying is injurious to bees? Men in North Canterbury have claimed that whole colonies have been wiped out.

Mr. Iversen - I'm afraid I don't know.

Mr. Ward - There has been some evidence or lack of evidence in America, but there is no evidence that it is toxic. Bees might be affected by D.D.T. in orchard work.

Dr. J. S. Yeates - The cost of a summer fallowing is about £6 an acre, but it is recouped in the following year by an increased crop?

Mr. Iversen - I think this is quite true, and we recommend it. I know officers of the Department of Agriculture in Canterbury recommend it. We sow a paddock down in a

certified crop

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of grass, and if we get a good crop we make a good profit. We certainly do get good crops after a fallow, but whether we are justified in keeping 10 per cent of the farm out of production I do not know.

Dr. Yeates - One farmer's yield of wheat went from 40 to 70 bushels through a fallow.

Mr. J. R. Johnston - Prior to 1930 Californian thistle was confined to the riverbeds. If we want to control these weeds we should see that the riverbeds are controlled.

Mr. D. W. Van Asch (Hawkes Bay) - I have finished six acres of Broad Red clover to eradicate docks, but did not damage my clover with one gallon of Agroxone to the acre. The paddock was in its third year.

A Member - A number of paddocks of red clover have been sprayed in this district and a considerable amount of damage has been done.