EXPERIMENTS IN WEED CONTROL IN CANTERBURY

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The purpose of this paper is to present facts and figures and results obtained from Weed Control Experiments carried out by the Department of Agriculture in Canterbury. Our experiments have been limited and I also feel our experience is limited. After hearing the contractors' story this morning, I believe their experiences are considerably broader than those of an Instructor in the Department of Agriculture.

What are our chief weeds in Canterbury in general practice? Leaving out the important larger types or brush weeds, they are, in some order of incidence:- Californian thistles, fathen, spurrey or yarr, yarrow, twitches, wild turnip, tarcs, cornbind, chickweed, sorrel. Others that should be mentioned are wild oats, nightshade, redshank, wireweed, fumitory.

In cropping or cultivable areas weeds are controlled by adequate cultivation and dense pastures. Even our most difficult weeds, Californian thistles, are stifled by vigorous pastures or lucerne, and twitches are got rid of by adequate cultivation either by digger ploughing or a summer fallow. However, despite improvement along these lines during the past decade, weeds still trouble us and here again causes are readily recognised by the practical farmer:-

- (1) Use of poorly-planned rotations (or no rotations at all).
- (2) Poor implements (including the header) and inadequate tillage.
- (3) Allowing weeds to seed (which is general carelessness).
- (4) Use of poor seed (to some extent overcome in recent years).

Apart from the intensive areas of farming, we have weeds associated with waste areas, neglected roadsides, riverbeds, railway reserves, irrigation races and ditches.

It cannot be too strongly emphasised that weed control through chemical methods is a poor substitute for the normal farm practices of dealing with weeds. The weedkillers can assist in certain circumstances, but to focus too much attention on chemical control, is, I fear, a grave mistake. Everything must be taken in its true perspective.

WHEAT: The first trial was in the 1948-49 season, when a spraying trial against wild turnips in X7 wheat at Leeston was attempted in winter, when the wheat was 3 - 4" in height. The date of spraying was July 5th. The wild turnip was just past the seed leaf stage. Soon after spraying the wheat was grazed with sheep as is a common practice in order to avoid lodging with autumn-sown wheat. Hormones made the sprayed plants more palatable by its action of turning starches into sugar, and the sprayed area was completely wiped out, turnips, wheat and all.

At Culverden a further trial was carried out on September 5th against storksbill, Californian thistle and docks in a X7 wheat crop. A 100% kill was obtained with storksbill and some control of thistle and docks was obtained. On harvesting, the various treatments both high volume and low volume gave an increased average of $3\frac{1}{2}$ bushels per acre over control, a payable proposition. In this trial a similar area of weed-free crop was sprayed with a depression of yield of 10 bushels. This seems contradictory, but no allowance was made for damage to the crop by the sprayer and that could account for the 10 bushel decrease. Sprayer damage is considerable and needs to be watched - in experiments an allowance must be made for it by running the sprayer empty through control strips.

Wild turnip is probably the most spectacular example of hormone weed control, and the first trial laid down at Lakeside was a spectacular one. On September 2nd when the X7 wheat was 6" high and wild turnip just above the ground, a full trial replicated and carefully laid down using Agroxone, Weedone and Weedar, resulted in a 99% kill of wild turnip. The yields upon harvesting were as follows:-

Control	52.7 bushels
Agroxone 1 lb.	93.9 "
Agroxone $\frac{1}{2}$ lb.	91.6 "
Weedone 0.7 lb.	89.5 "
Weedone 0.36 lb.	91 "
Weedar 77 0.88 lb.	86.9 "
Weedar 77 0.5 lb.	87.4 "

Average of all treatments was 37 bushels higher than control. Yellowing of the wheat took place with a high rate of Weedone (.7 lbs. acid equivalent) and after 3 weeks these plots were 3" shorter in height. One buffer plot was sprayed with Sulphuric Acid 12½% solution at 8 gals. acid per acre, and yielded 60 bushels. Within a few hours of spraying severe burning had occurred but both wild turnip and wheat eventually recovered. (Sulphuric Acid spraying is used in Great Britain for reducing lodging in wheat for similar purposes as sheep grazing in New Zealand).

The other wheat trial was in an X7 paddock similarly laid down at Scarborough in South Canterbury but here the wheat was 2' in height and wild turnip was in flower at the end of October. The spraying controlled the seeding of turnip but was too late for great yield differences. Here again wheel damage accounted for a negative factor but Agroxone at 1 lb. gave 26.5 bushels with control averaging 24.9 bushels.

Wheat was sprayed at Willowbridge against tares and pennycress; again at a fairly late stage (October 21st) when the wheat was 12" in height. Agroxone at 1 lb. and 1.7 lbs. acid equivalent and Weedone at 0.9 lbs. acid equivalent were used. Pennycress was resistant and some tares recovered from lighter applications of hormone spray. Increases in yields (not replicated) were:- Agroxone heavy - a 5.8 bushel increase; Agroxone light - a 2.7 bushel increase; Weedone and Control yielded 38 bushels per acre.

In a previous year, spraying Dreadnought wheat for Calis when wheat was in shot blade stage (i.e. 2' 6" high) affected germination seriously. After 14 days, germination figures for firsts, seconds, thirds were 56%, 50% and 55% respectively. Spraying in the shot blade stage is very dangerous and should be avoided at all costs in seed-wheat paddocks or seed crops when produce is going to be retained for re-sowing.

In wild turnip trials described, no differences in germination were obtained from tests. Baking quality was also assessed and no harm was done to quality, or for that matter detected in breads baked from sprayed wheat. Late spraying, however, is risky, and that applies to all crops.

BARLEY: At Templeton a late sown Golden Archer barley crop was sprayed with $\frac{3}{4}$, $\frac{1}{2}$ and $\frac{1}{4}$ lbs. 2,4-D as Agroxone, Weedar 77 and Stantox P44 on December 12th for fathen. A complete kill of fathen was obtained but the barley was a very poor crop - the farmer's paddock only yielding 12 bushels per acre.

The plot yields were improved by spraying and a low application of $\frac{1}{4}$ lb. 2,4-D gave highest crop yields as well as controlling fathen. The germination quality was not affected by spraying.

POTATOES: At Willowbridge Californian thistles were sprayed in Arran Chief potatoes on 22nd December with Agroxone and Weedar at $\frac{3}{4}$ pint and $1\frac{1}{4}$ pint (i.e. $\frac{3}{8}$ and $\frac{5}{8}$ lbs. acid equivalent). Agroxone was more effective on the thistles but Weedar at heavy rate achieved fair control. Yields obtained were erratic but were depressed, with more seed potatoes in the treated spots. Treatments caused earlier maturity.

At Kerrytown (South Canterbury) with Aucklanders on November 9th (potatoes 8-9" high) Weedar was used at 1 & 2 lbs. acid equivalent and potatoes suffered severely. Potatoes recovered and grew well and were delayed in maturing a fortnight. Weeds also recovered, and at maturity treated plots were no different from control. Weedar reduced yields, especially at heavy rates, and increased seed yields at expense of tables.

With tractor spraying, damage to plants is difficult to avoid unless spraying is carried out early.

In a further trial carried out on December 1st in the Christchurch district with Dakotas, considerably reduced yields were obtained with M.C.P.A. Phenoxylene at $\frac{1}{4}$, $\frac{3}{4}$ and 1 lb. acid equivalent per acre and even more severe with Weedar $\frac{1}{2}$, $\frac{3}{4}$ and 1 lb. acid equivalent per acre.

These trials show that the greatest caution should be taken if hormone weedkillers are applied to potatoes. As regards tainting, it seems definite that with late spraying tainting will occur. If potatoes are stored alongside volatile dusts, tainting will also occur.

LINSEED: One trial was carried out two years ago at Geraldine when fathen was treated with Agroxone on November 26th using $1\frac{1}{2}$ lb. and 1 lb. acid equivalent. Linseed was 6-9" high and both fathen and linseed were severely damaged, but control was not 100%.

It is recommended that hormone spraying should be used only in exceptional cases when linseed is from 4-6" high and only $\frac{1}{2}$ lb. acid equivalent be used per acre. The D.N.O.C. weedkillers can also be used, but additional care is required. Linen flax is even more difficult as damage to fibre is liable to occur with hormone spraying.

I would like to add a word regarding experiments with Nassella Tussock control, as I realise this is an important problem. No spectacular results have yet been achieved. So far the majority of the work has been in finding out that the new weedicides are of little value when dealing with a resistant plant like Nassella.

During 1948 the following weedicides were used in trials:-
2,4-D at 2, 4, 5 and 10 lbs. acid per acre, using the following methods -
(a) Root spraying after ploughing; (b) Spraying after mowing; (c) Spraying after burning; (d) Repeated spraying.
F.N. 122 at 2 gals. per acre.
Agroxone at 5 gals. per acre.
Pentachlorophenol (3% Boracure) at 66 gals. per acre.
I.N.P.C. at 2 lbs. per acre.
Sodium Chlorate at 10 cwt. per acre.

The last-named gave a total kill but that is considered impractical. Pentachlorophenol produced a dying-off effect of the tops but recovery took place from the crown. None of the others were satisfactory. Further work will tackle the problem with - (1) Further trials with 2,4,5-T and T.C.A.; (2) Surface sowing after grubbing; (3) Sward improvement; (4) Afforestation.

QUESTIONS AND DISCUSSION

MR. ALLAN (Crop Research Division): We have had some experience with linen flax and linseed. We have found it advisable to spray linseed when the crop is only about 2" in height and the weeds are at their smallest stage. $\frac{1}{2}$ lb. is sufficient to control fathen and spurry. It is impossible to spray linen flax as it affects the leaf.

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