BRASSICA WEED CONTROL IN SOUTHLAND

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EACH year New Zealand grows 760,000 acres of brassicas. Of this area 164,000 acres are grown in Southland. A total of 49,000 acres is sown with pastures either as rape and grass or turnips and grass and the remaining 115,000 acres is sown in swedes, turnips, or chou moellier for feed without grass.

This represents almost one-seventh of the total brassica crops grown in New Zealand and gives some indication of their importance as winter feed. All farmers grow them and nearly all have trouble with weeds, namely fat-hen (*Chenopodium album*) and to a less extent spurrey (*Spergula arvensis*).

In Southland under its cool, moist climate swedes, turnips, and chou moellier are usually sown through a ridger. Turnips and rape are sometimes sown on their own in flat drills 14in. apart, but the majority of farmers prefer to sow in ridges. For this purpose a four-row 24in. ridger is commonly used. It enables heavy concentrations of fertiliser to be placed near the seed and also allows intercultivation of crops for weed control. Furthermore, the heavy concentration of fertiliser is able to be utilised by the plants during the long growing season. Sowing crops in ridges also allows the bulbs to be fed off more easily in wet conditions which prevail in the Southland winter. The soil tends to fall away from the bulbs leaving them more accessible to stock. Crops are usually spring sown in November or December after winter ploughing and spring cultivation. They are sown with from 3cwt. to 5cwt. of phosphatic fertiliser on a rolled seed-bed. Prior to sowing and during the last stages of cultivation lime at the rate of 1 or 2 tons is applied and worked in. Seed usually germinates in a week and about a month to 6 weeks later when the small plants are visible in the ridges scuffling is carried out to control weeds. The scuffler is designed to cut the weeds away from the sides of the ridges and to cultivate the furrows between the ridges. There still remains 2in. to 4in. at the top of the ridge in which weeds continue to grow along with the crop. After another month to 6 weeks more weeds have grown and a further stroke with the scuffler is given. By this time the shaws of the crop will be growing larger and meeting between the ridges. Further scuffling may cause damage to the shaws and to the developing bulbs. Shade produced by the shaws reduces the growth of weeds.

Scuffling necessarily must be done when the weeds are small. If for some reason it is left too long and weeds are allowed to grow tall, they cannot be controlled by scuffling. This occurred in Southland this year. Owing to drought conditions the germination of swede and turnip crops was delayed for a month to 6 weeks. When rain did fall fat-hen germinated also and grew extremely rapidly. The farmers concerned were occupied with other jobs and in a number of instances noticed that fat-hen had germinated, but when they returned to scuffle them found that weeds had grown so vigorously that they were unable to control them. Where scuffling had been done early the 2in. left at the top of the ridges was full of fat-hen seedlings which grew vigorously and tended to compete with brassica seedlings for growth and moisture.

Most chou moellier crops are sown in early to mid-November and most swede crops are sown in the latter half of November-early December. If germination is delayed, it will coincide with the germination and growth of fat-hen seedlings, which can choke the crop.

Where crops are flat drilled in 14in. drills no scuffling or weed control is practised. Under these conditions weeds are tolerated, as there is no attempt to control them by agricultural means.

ATTEMPTS AT WEED CONTROL

Attempts at weed control with chemical weedicides have been made with varying success.

In the 1952-53 season Mr. Reid, at Gore, conducted two trials with IPC and TCA applied as pre-emergence sprays on ridged rape and swedes. In both instances IPC was applied at 1lb., 2lb., and 4lb. per acre in 80 gallons of water and TCA at 5lb., 10lb., and 20lb. per acre also in 80 gallons of water. Good control of spurrey was obtained with 4lb. of IPC. At the 2lb. rate there was only partial control. TCA at 20lb. per acre caused only slight depression of the growth of spurrey. There was no depression in the growth of either rape or swedes.

During the 1955-56 season trials were laid down as pre-emergence sprays on swedes and rape to control fat-hen. In the first one the treatments were emulsifiable Oktone at 2lb. and 4lb. in 125 gallons of water per acre, Oktone at 2lb. and 4lb. in 125 gallons of dieselene, and Oktone at 2lb. and 4lb. with 125 gallons of petrol per acre. Unfortunately dry conditions were experienced at the time of laying down and subsequently. Also the infestation of fat-hen in the paddock was somewhat patchy. Initially it appeared that emulsifiable Oktone and water at the 2lb. rate gave some measure of control. However this trial was replicated and in the second replication no control was observed. Some 2 months after the trial was laid down there was fat-hen 3ft. to 4ft. high among the turnips.

In the western districts of Southland a trial was laid down with CIPC, Oktone, and TCA at varying rates; however, no control resulted this season due apparently to dry conditions.

Another trial laid down by Mr. Denize on rape on the Five Rivers Plain gave some interesting results. There were three materials used: TCA at 10, 20, and 30lb. per acre, Oktone at 2 and 4lb. per acre, and CIPC at 1lb. and 2lb. per acre. Eighty gallons of water per acre were used for each treatment. The trial was laid down 7 days after the crop had been sown, but owing to very dry conditions no germination of the crop had occurred. Immediately after the trial had been laid down light rain fell and rape germinated in the damper hollows in 7 days. The results show that TCA tended to depress the growth of rape, but resulted in reducing the growth of fat-hen with a 10 to 20 per cent. kill on the 10lb. treatment, 70 per cent. kill on the 20lb. treatment, and 80 per cent. kill on the 30lb. treatment. The growth of rape was slightly depressed in all three treatments. Oktone at 4lb. gave a 30 per cent. control of fat-hen, but 2lb. gave a negligible control. Retarding of the growth of rape was severe at the 4lb. rate, but slight at the 2lb. rate. CIPC at 1lb. did not affect rape and caused only slight reduction in fat-hen. At the 2lb. rate the rape was unaffected, but the fat-hen was reduced by 20 per cent. It was observed later that stock did not favour the plots treated with TCA, but were eating rape to ground level on those plots treated with Oktone and CIPC.

Several farmers have used TCA for the control of fat-hen. The farmer concerned in the above trial on rape used 15lb. over his whole paddock and was well satisfied with the result even under the dry conditions that prevailed. A most successful attempt was made in 1954/55 season on a chou moellier crop in a heavily weed-infested area on the banks of the Mataura. The crop was sown in late November 1954. Two days later 20lb. of TCA was applied in 30 gallons of water per acre. A

good rain fell 4 to 6 days after treatment. The control was excellent. There were virtually no seedling plants of fat-hen and very little spurrey throughout the whole crop except where misses occurred. A portion of the crop was left for comparison. At maturity weighings were taken and it was found that on both the treated and untreated areas approximately the same quantity of fodder had been grown; 26 tons being the recorded weight in both places. However, the farmer concerned sowed the chou moellier thickly so that the crop would have thin stems suitable for feeding sheep. On the untreated area of the crop plants were sparse and heavy stems developed. The farmer was well satisfied with the result. He pointed out that he had previously had a crop failure owing to heavy weed infestation.

There were two other attempts to control fat-hen this season 1955/56, but although 20lb. of TCA was applied immediately after ridging and in both instances light rain fell immediately after treatment no effective result occurred and both farmers had to resort to scuffling for weed control. It would appear that the conditions governing the effectiveness of TCA are somewhat critical and must be associated with a good shower of rain shortly after application.

DISCUSSION

What then is the place of weedkillers for the control of weeds in brassica crops in Southland? It was observed earlier that most farmers like to intercultivate their crops, whether or not weeds are present. There are places in eastern Southland where weeds are no problem and good crops are grown without scuffling in any shape or form, but these soils are for the most part free-draining yellow-brown earths. However, on the heavier yellow-grey earth groups and on some of the heavy river silt land scuffling for intercultivation as well as for weed control is giving satisfactory results. I believe that weedkillers in brassicas can play an important part as an adjunct to scuffling. It was observed this year that in a dry season where the germination of the crops was delayed fat-hen was particularly troublesome. It was troublesome too along the tops of ridges which were inaccessible to ordinary mechanical methods of weed control. However, there is the prospect of weed control with chemicals in association with scuffling. In this regard an attempt has already been made to spray the crowns of the ridges with a narrow band to control weeds actually among the turnips. Furthermore, scuffling can be carried out between the ridges to allow for intercultivation as well as weed control.

On a cost basis 20lb. of TCA at 3s. per lb. plus 5s. application charge is £3 5s. per acre. Scuffling on the other hand costs approximately 11s. per scuffling. The difference in price is considerable. Thus it would appear that until such time as a reliable weedkiller is found and the price is reduced scuffling will continue to be the main form of weed control in ridged brassica crops.

TCA and some of the newer weedkillers may still have a valuable place where the ground is particularly weedy or on flat drilled crops where intercultivation is not normally practised.

Finally, it appears that the moisture conditions which are necessary to promote the activity of TCA and to carry it into the ground for root absorption are a very critical factor in the effectiveness of this material. It was shown this year that scuffling was necessary where TCA had failed; therefore on the grounds of reliability and effectiveness it seems that it will be some time before scuffling is replaced by weedkillers as the principal method of weed control in brassicas in Southland.

SUMMARY

1. Most brassica crops in Southland are sown with a ridger.
2. Scuffling is the main method of weed control.
3. Trials have shown that IPC at 4lb. per acre will give satisfactory control of spurrey in ridged rape and swedes.
4. Drought conditions spoilt most trials in Southland during 1955/56.
5. The most effective treatment used up to the present is TCA at 20lb. per acre sown pre-emergence immediately after ridging.
6. At present scuffling is cheaper than treatment with TCA and more reliable.
7. Rainfall appears to be the critical factor in the effectiveness of TCA.
8. Scuffling is likely to remain as the principal method of weed control in brassicas in Southland for some time, because crops are ridged. Scuffling intercultivates as well as controls weeds and is $\frac{1}{6}$ to $\frac{1}{3}$ the cost of selective weedkillers.

DISCUSSION

Q.—In Southland are weather conditions reliable enough to give ideal conditions for pre-emergence spraying?

A.—Pre-emergence spraying was tried in last two widely differing seasons and in neither year were good results obtained.

Q.—Would you consider applying TCA a few days before sowing?

A.—This has possibilities. Likewise band spraying has also possibilities.

Q.—Have any yield trials been done where no weeds have been present comparing scuffling and no scuffling?

A.—No actual trials, but local experience tends to this belief.

Q.—Is not the use of petroleum as a carrier dangerous?

A.—Yes.