LOCAL WEED PROBLEMS

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In the past the farmer in Hawkes Bay regarded weeds as a natural hazard. As such he accepted them. With the development of selective weedkillers there is at least a straw for him to clutch at. In a 1954 survey the most important problems listed for Hawkes Bay were the pasture weeds, barley grass, thistles, blackberry and gorse, and the crop weeds in lucerne, red clover, brassicas, small seed crops and peas. The list also included over 20 other prevalent weeds, docks, weeds in drains, etc. In this paper I intend discussing the more important problems for which chemical weedkillers are of value.

BARLEY CRASS

This species has many of the undesirable chacteristics of a weed. It is damaging to stock, it is unpalatable and hence reduces the productivity and quality of the sward it invades. It thrives under a wide range of soil and climatic conditions and it takes advantage of the build up in soil fertility whether by topdressing or by the accumulation of dung and urine. It is also increasing with the build up of fertility in the hill country and with the replacement of brown top–*Danthonia* swards by higher fertility demanding species, which in a dry summer die out leaving bare ground. Normal practices of taking hay or seed crops or hard grazing in dry periods create conditions, that enable barley grass to establish freely and readily so that weedkillers offer possibly the best means of control.

The chemicals most promising for barley grass control are TCA, IPC, CIPC and Dalapon. None of these chemicals is ideal. All are detrimental to associated grass species and TCA and Dalapon check associated clover so that possibly the use of these chemicals should be confined to small areas which form the nucleus of further infestations.

To be effective TCA must be applied to moist soil and rainfall should follow the application. The soil type, the stage of growth of the barley grass and the above conditions will determine the rate of TCA

needed. In order to increase the selectivity of the TCA the application should be made when the barley grass is in the seedling stage of growth. A rate of 10lb. per acre has proved quite toxic under local conditions. In conjunction with oversowing 'this rate has reduced a stand of barley grass from nearly 50% ground cover to less than 5% a' year later. Rates of 10lb to 151b per acre have little detrimental effect on established species such as cocksfoot, ryegrass and clover. This chemical would be of greater value if it were not so dependent on moisture conditions.

Both IPC and CIPC kill barley grass seedlings at low rates of application. Both chemicals, particularly CIPC, persist in the 'soil for much longer periods than TCA, and CIPC in particular is not so dependent on moisture as TCA. Their chief disadvantage is that both chemicals slow up the growth of associated grasses for a period of several months. Both in New Zealand and England a balanced sward has been changed into a clover dominant sward. With the loss of residual toxicity the sward has again reverted to a suitable balance. Whether this is a reasonable price to pay for barley grass control is not known. This treatment would certainly be practical on dry knolls where the soil temperature is so high in summer that the ordinary pasture grasses cannot exist, and in sheep camps where clovers rather than grasses survive, due possibly to the high nitrogen content of the soil.

Dalapon at rates of 1 to 2 lb has shown great promise for the control of barley grass. This material at rates of 1 to 2 lb has probably little effect on established grasses or established clovers. It has little residual toxicity in the soil so that areas may be oversown immediately after use and has the advantage that it is absorbed through the foliage of leaves and not through the soil as with TCA and will, therefore, not be dependent on moisture conditions. It also acts slowly giving the oversown species time to replace the dying barley grass. For optimum results it should be applied in a minimum amount of water so that its use on hill country is practicable.

THISTLES

The periodical summer droughts experienced in Hawkes Bay favour the establishment and spread of winged, variegated and nodding thistles. Last year there were 30,000 acres sprayed from the air for the control of thistles. Spray applied just when thistles are in the seedling rosette stage kill the thistles before

they smother the autumn germinated pasture species. In this way large areas of thistle infested country has been brought back to productive pasture.

GORSE and BLACKBERRY'

Over 300,000 gallons of 2,4,5-T has been sold to date. This figure is conservative to allow for the 2,4,5-T sold but not used to date. It also does not take 'into account -the large quantities that have been sold as mixed 2,4-D-2,4,5-T concentrates. If the Department of Agriculture's recommendations of using a quarter to one gallon of 2,4,5-T per acre, depending on the growth stage of the gorse, and from ½ to one gallon for blackberry have been followed very little gorse or blackberry should be evident in the country to date. These figures only indicate that there has been a scandalous waste of money spent on 2,4,5-T incorrectly applied. This in part can be attributed to a large number of recommendations of employing one gallon in a fixed ratio of water rather using water in variable amounts as a carrier to spread a recommended amount of 2,4,5-T evenly over an area.

The main use of 2,4,5-T should be for the control of gorse and blackberry on hill country too steep for crawler operation. Depending on the stages of the gorse growth 2,4,5-T could be used in several ways ; if the gorse is young regrowth up to several feet high the practice should be spray to kill and then follow up with correct management. If beyond this growth stage the gorse should be burnt, the correct management practices applied and the regrowth gorse spot treated about one year later. A light spraying of 2,4,5-T could be employed to assist the burning of the gorse. If 2,4,5-T is applied in spring and the area is burnt several months later the gorse has often dried out sufficiently to allow a clean burn.

In the Wairoa area the local instructor estimates that there are 100,000 acres of blackberry, and for every acre of blackberry there is at least one goat. In the same area there are 600,000 sheep. If farmers are going to persist with goats as a means of control of blackberry then they should not also employ 2,4,5-T. Goats and 2,4,5-T are largely incompatible. Where goats are doing their job well there is not enough leaf area for the 2,4,5-T to be effective.

It would be my recommendation to dispense with the goats, allow the blackberry to recover for several years and then apply 2,4,5-T in the summer and early autumn months and a year later to burn and oversow the areas. Goats, to be really effective, should be mob

stocked, but there is little evidence of this being practiced in the Wairoa area. The goats are allowed to wander ad lib on to new pastures and old pastures alike. I am sure that the carrying capacity could be increased with the proper use of 2,4,5-T and the gradual replacement of the 100,000 goats as areas are brought. into production.

LUCERNE

Any perennial crop that has a winter dormant period and that cannot be cultivated fully is usually very susceptible to weed invasion. Lucerne in this area does not establish rapidly due largely to weed competition and it is not until the second season that, hay cuts are really profitable. In lucerne there are two problems (a) keeping a newly sown 'stand weed free, and, (b) renovating weedy stands. It is possible to keep a newly sown stand weed free provided the area is free of perennial species establishing from root suckers. Both IPC and CIPC may be used as pre-emergence applications, DNBP as a post emergence treatment as soon as the lucerne has reached the 2-3 leaf stage and, once established, MH may be employed. There is a possibility that the preparations MCPB and 2,4-DB will be of value. Once lucerne has reached a dormant stage TCA, Dalapon and one or other of the urea compounds as spot treatments or blanket applications have distinct possibilities.

The treatments that have to be employed to renovate old lucerne stands where the weeds are established usually damage lucerne. Browntop for instance is quite susceptible to TCA but the rates required for control usually suppress the lucerne up to the first cut.

Special problems in lucerne occur where various grasses have been sown with the lucerne. The grasses once established are usually too aggressive in the spring. The slowing up of the grass growth in the spring is being attempted. Docks both in lucerne and red clover are becoming more prevalent. Sufficient work has been done with MH to show that this chemical can be used to advantage. Its effect on lucerne and red clover at rates sufficiently high to control seedling and young regrowth docks is negligible.

At the moment weed control in lucerne requires a sound knowledge of weed control chemicals and weed and crop tolerance. Further. work may show that the urea compounds applied in the dormant season, and supplemented by MCPB or 2,4-DB for the control of flat weeds that show high resistance to the urea com-

pounds, may keep lucerne stands weed free comparatively easily.

FIELD BRASSICAS

No safe post-emergence treatment is available for weed control in these crops. The pre-emergence applications given in this paper must be regarded only as stop gap treatments. The most promising chemical is Oktone. If this chemical is applied to a stale seed bed, i.e. one in which the weed seeds have already germinated, in a suitable carrier a day or so before crop emergence then sufficient weed control is achieved to swing the balance in favour of the crop. Under normal moisture conditions this chemical gives only a temporary control of weeds and hence is more suitable for weed control in rape and chou moellier than slower establishing crops such as swedes and turnips. Under dry conditions the control has been more permanent and turnips and swedes have been successfully weeded. The main drawback to this chemical is that the seed must be drilled. It is unsuitable for using with broadcast seed.

TCA under suitable moisture conditions has also given excellent weed control. All main weeds that, infest brassica crops such as fathen, spurry, redshank, ***Amaranthus spp,*** etc. have been controlled success' fully in brassica crops with TCA. If the soil is dry at the time of sowing TCA should not be used. The crop should be sown when the soil is moist and the TCA applied immediately. This should be when there are good prospects of rain falling shortly after application.

SMALL SEED CROPS

The control of many broad-leaved weeds in ryegrass seed crops is a sound practice locally. Weeds such as the annual thistles, Californian thistle, buttercups, shepherd's purse, hedge mustard and even docks can be controlled successfully to allow a clean harvest. The practice of grazing hard, spraying the weeds and closing the area for seed is practical. Weed clovers such as burr clover can also be killed by the ordinary MCP and 2,4-D preparations.

One unsound practice is that clover is not sown in many areas, the reason being that the clover quickly competes and smothers the ryegrass seed crop. By the third or fourth year there is often sufficient volunteer clover to smother the ryegrass. The clover comes in because the ryegrass weakens through lack of nitrogen. The clover is harvested but. a high percentage of it is rejected because of low purity. The fact that no clover

is sown also allows a. rapid increase of barley grass which is spread widely by the header. I consider clover should be sown with the ryegrass and if management practices fail to keep it in check weedkillers should be employed. Chemicals are available to check the clover slightly or suppress it to varying degrees, even to an outright kill. Water soluble preparations of MCP at rates sufficient to control most annual thistles and buttercups would not harm white clover, or at most will check it slightly. Oil soluble esters of 2,4-D cause some suppression, water soluble esters severe suppression and preparations of 2,4,5-T can cause death, depending on the rate of application. By the use of such chemicals then it should be practical to keep the clover suppressed until such time as the ryegrass runs out, when. a clover crop could be taken.

Provided hormone weedkillers are employed for weed control in ryegrass seed crops prior to the flower head emerging these chemicals appear to cause no reduction in yield or affect germination in any way. Some reduction in yield could be expected if these chemicals were applied after flower head emergence. Once the seed is partially ripe then a further application can be made if desired without affecting yield. No work has been done on the control of goose grass or other weed grasses in ryegrass seed crop areas. This would be difficult in ryegrass areas but quite practicable in clover seed production areas.

CONCLUSIONS

Many of the -treatments outlined for the control of weeds in specific areas are possibly too complex for the average farmer to adopt and execute efficiently. The use of Oktone for brassica weed control may be taken as an example. In detail the steps would be, prepare a seed bed conducive to weed infestation, allow the weeds to strike, drill in the brassica seed, wait a day or so before brassica germination and then apply the Oktone. This pre-emergence treatment is more complicated that a simple post-emergence application and may be regarded as a stop gap treatment until such time as more suitable chemicals are available.

The control of gorse and blackberry with 2,4,5-T is effective enough if applied correctly. This chemical has the disadvantage though that it is more difficult to-use than MCP or 2,4-D, for in gorse it is very doubtful if 2,4,5-T translocates to any degree. In blackberry an overdose or an application made in the wrong season leads to failure. I am sure that only a small percentage of the 300,000 gallons of 2,4,5-T that has been

employed-in New Zealand to date has been used efficiently and correctly. In some pastures, where the clover is weak due to pasture management, and as a result of this the area is very prone to weed invasion, the continued use of weedkillers has retarded the clover to such an extent that the balance has swung more in favour of weed establishment. The use of weed-killers under these conditions is not a sound practice and this clearly illustrates that the reliance on weedkillers by a poor farmer only leads him into further trouble. The weedkiller industry cost the consumer last year a figure approaching £2,000,000. Again I consider only a small percentage of this amount was applied to the best advantage.

Very little critical work has been done on the use of weedkillers in New Zealand or elsewhere. For example, to give sound recommendations for the use of TCA the effect of various soil types on TCA should be known, in conjunction with the water holding capacity of the various soil types. At the same time progress with new chemicals is so rapid that it is very doubtful if such detailed work should be carried out at present. It is too easy to-day if one chemical fails due to improper advice to produce another one out of the hat with a more complex name or charming properties. My plea is that weed control with chemicals is a complex subject and sound advice should be obtained before it is undertaken.

DISCUSSION

Q. Can the use of weedkillers for the control of gorse on steep hill country. be recommended, and are there any difficulties involved in applying the materials?

A. Aerial application for gorse cannot be recommended. as it is not easy to control gorse with 2,4,5-T, unless a complete cover of the plants with the chemical is obtained. 'Blackberry does not require a complete coverage, and therefore the helicopter or aeroplane may be used. The use of goats has been mentioned, but there are few examples of blackberry being eradicated by goats. Mob stocking would be required. If 2,4,5-T is used correctly, it is quite effective on both weeds.

Q. 2,4,5-T has been recommended for the control of blackberry. However there is a firm advertising a powder for the control of blackberry. I have used this powder, which is applied to the crowns of the plants. Although the plants were apparently controlled for a while, shoots are now coming away again. What chemical do you consider to be the most effective ?

A. 2,4,5-T is not the only chemical available, but I recommend it in preference to other types such as the soil, sterilant which you have used. The control of blackberry is difficult, because it is essential that the correct amount of weedkiller is applied. If more than is necessary is put on the less effective is the control. The farmer should *try* to de-

termine the minimum lethal dose per acre or per area. Half a gallon per acre of 2,4,5-T would be ample for the Wairoa area.. This is the equivalent of applying 2 lb. a.e. of the material, instead of 20-30 lb a.e. of material that is sometimes applied. The faster the canes and foliage of the plants are killed the greater the amount of regrowth that can be expected to occur the following spring.

L. Corkill:—I do not entirely agree with the speaker's approach to the problem of controlling clover in perennial ryegrass seed crops. A more practical and constructive approach would be to sow the clover, and then use a nitrogenous manure. This would encourage the perennial ryegrass but check the clover.

Q. Could you give in more detail how barley grass can be controlled in a pasture?

A. Insufficient experimental work has been done as yet, and a completely satisfactory chemical has not been found to date. -However, Dalapon is proving to be a promising chemical. One lb per acre of Dalapon should be applied in the minimum amount of water. This mixture can be applied by aeroplane. A wetting agent has not yet been used, but the use of one should improve the efficiency of Dalapon. As for hormone weedkillers, Dalapon should be applied when weeds are growing vigorously. A blanket application could not be recommended at this stage, and only nucleus areas should be treated.

Q. How can Strathmore weed *(Pimelea prostrata)* be controlled?

a. There is no suitable chemical available. Seedling plants are killed by 2,4,5-T.

Q. The quantity of 2.4.5-T to control blackberry has been given on an -acre basis. Could the amount of 2,4,5-T per 40 or 100 gallons of liquid be given ?

A. Many types of spray equipment are employed, and the amount of water required will deuend on the type of equipment used, the pressure employed, the type of nozzle and the varieties of vegetation to be treated. This means that the amount of material per 100 gallons cannot be quoted, but a known amount of active principle per given area is recommended instead. Water is used as" a spreader, and provided there is no run-off, it does not matter how much water is used. It should be possible to make up a mixture with a suitable dilution of water to not allow any run-off. Farmers should test their equipment to determine their capacity, and then use the appropriate amount of water to apply the recommended amount of active principle over a given area. For example, one gallon of material per acre is e uivalent to one fluid ounce for an area 25 x 25 links. I a ave seen cases where twenty times as much chemical as was needed was applied, because a fixed ratio of chemical to water had been used.

Q. Has the helicopter been used to spray gorse 8-10 feet high?

A. I do not recommend the helicopter for spraying gorse of this height. If the area was flat, the helicopter could fly below its coning speed, and young gorse could be killed. But on hill country it is forced to fly above its coning speed, and is no better than a fixed wing plane. The use: of a helicopter should be quite practicable for spraying blackberry, where a. complete cover is not required. The only way a helicopter could be used to aid the control of old gorse is to apply a light concentration of 2,4,5-T (preferably, in diesel oil) in the spring. After the gorse has browned off, burn and oversow. This has an advantage of burning the sticks off to ground level.