THE PROGRESS OF CHEMICAL WEED CONTROL IN HAWKE'S BAY

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SUMMARY

THE great potential of chemical weed control was quickly recognised in Hawke's Bay and the wise use of these chemicals as an adjunct to recognised farming practices has proved their worth over the years. The addition of dalapon, 2,4-DB, and MCPB has opened up new avenues and with the accent on increased production these chemicals will play an even greater part in the years to come.

For those not familiar with Hawke's Bay it requires only a moment's study to show that by far the greatest percentage of our farming land is devoted to the production of meat and wool. In fact of the 2,800,000 acres farmed 20,000 only are utilised for mixed farming with 7000 of this in orchard. It is obvious then that the production and maintenance of high producing pastures are our first considerations and it is only natural that weeds upsetting the balance of these pastures are a main concern.

The rainfall map shows that the monthly distribution of rain is fairly even. However, the "below 35in." area can suffer considerably through lack of rain during the summer months, and it is following such seasons that we expect widespread infestations of winged, nodding, and scotch thistle.

Whereas pasture maintenance is of prime importance, the extensive and extending mixed farming on our rich flats make it essential for us to keep abreast of all aspects of weed control and with the new chemicals being produced.

We are fortunate that these well-balanced pastures are highly valued by our primary producers and it was for this reason that they so eagerly accepted the introduction of plant hormones in 1948. This ready acceptance of course helped considerably with our early trial work, which came at a time when what was then considered one of our worst pasture weeds was really flourishing on some of our best hill country in areas throughout Hawke's Bay. We refer to variegated thistle, which by the nature of its prolific growth totally excludes all desirable pasture species and prevents the movement of stock in the area. It is unfortunate that photographic evidence is not available to show the position as it existed in those days, to give some idea of its potential danger.

VARIEGATED THISTLE (*Silybum marianum*)

Before the introduction of hormones the laborious and hopeless task of chipping and mowing was resorted to, but in seasons following drought conditions these methods proved totally inadequate, and it would have been only a relatively short time before larger areas would have been dominated by this weed.

The first attempt at chemical control was with sodium chlorate at 20lb. per acre. With this material some progress was made, but apart from the danger to the operator, it was far from selective, there being almost 100 per cent. mortality of pasture species on the treated areas. We were therefore not saving our pastures, but merely preventing seeding.

The early work was done by the Hawke's Bay County Council under the able supervision of Mr. S. A. Neill, and it was in 1948 that the sodium salt

of MCPA was introduced and used to handle the problem. On the areas concerned there was some reasonably steep country and in the absence of the present-day methods of application long weary hours were spent traversing the areas with knapsacks. The subsequent development of the low-volume spraying equipment ensured a more accurate application of the 2,4-D and MCPA and allowed a far greater area to be effectively covered in the one season.

In more difficult coastal areas variegated thistle abounded and experimental work was done with an aircraft as the spray vehicle; though our methods of loading, etc., were crude compared with today's standards, the principles of spraying were the same and the initial work done on most difficult country was certainly a credit to the pilots, who were then inexperienced in that type of work. With the experienced and skilled aerial operators available at present we have the means of dealing effectively and economically with widespread infestations which would certainly be beyond the means of ground spraying equipment. The position today then with variegated thistle in Hawke's Bay is that it is no longer a menace to our production figures, because it is dealt with early in the season before it has had an opportunity to smother the desirable species.

NODDING THISTLE (*Carduus nutans*)

This thistle is probably going to prove one of our most difficult pasture weeds to control. It is generally looked on as a new arrival, having come into prominence only over the last 4 or 5 years, but records show that it was established many years before that.

It is a high-fertility weed and has been quick to react to the widespread aerial topdressing of recent years with the result that where dry seasonal conditions have opened up the pastures nodding thistle has encroached and in some cases has completely taken charge. It has been our experience that to effect economic effective control of nodding thistle it is essential to apply the 2,4-D at the early rosette stage of growth, which occurs in the main about April, May, or June, according to the season. This point cannot be stressed too strongly if aerial spraying is contemplated. In areas where considerable seeding has previously taken place it may be necessary to respray in the spring, in fact, this is invariably the case when badly infested areas are being tackled for the first time.

Again I cannot stress too strongly the need to deal with this most tenacious and prolific thistle. Its powers of recuperation are considerable and unless it is treated in the early stages, it requires a weight of 2,4-D which would cause considerable clover suppression and so further add to our pasture problems. While it is at the moment confined to the Hawke's Bay County area it is practically certain to spread to other districts and farmers are advised to accept this thistle as a potential menace to farming economy.

WINGED THISTLE (*Carduus tenuiflorus*) AND SCOTCH THISTLE (*Cirsium lanceolatum*)

I shall bracket together as weeds of seasonal importance those which in the days before selective control measures were available proved to be a big factor in reducing our carrying capacity. It is quite accepted practice that 4lb. acid equivalent per acre of 2,4-D is all that is required to eliminate these thistles in the early stages and so increase the grazing range of the pasture.

CALIFORNIAN THISTLE (*Cirsium arvense*)

This is more a problem of our cropping lands, though in the Dannevirke/Norsewood area it is taking up a lot of valuable room in the more permanent pastures. In our late crops of peas for processing, separation of the flower

heads from the peas is difficult and the processing firms ask for a high degree of control in crops. This control was seldom possible with dinoseb, but with the introduction of MCPB it is possible to get much nearer to the desired result.

BARLEY GRASS (*Hordeum murinum*)

Many papers have now been written of this most insidious of pasture weeds, so I am not going to dwell on its many objectionable features and habits. It is sufficient to say that it has developed into our most dangerous pasture weed and unless strict control measures are resorted to, it is only natural our losses must grow. This also is a high-fertility weed which takes advantage of the more widespread topdressing of recent years, flourishing where our more desirable species will not, on the dry ridges and sheep camps.

The high volume of water required to ensure optimum results when using TCA limited this material to use on flat to easy rolling country only, and in the main our nucleus area remained untouched. The introduction of dalapon with its systemic action did give us some hope of dealing with this problem chemically and results of field work to date have proved in most cases very satisfactory. We have adopted the recommended practice of applying the dalapon at 1½ to 2lb. per acre in 12 to 15 gallons of water in the autumn when it is considered that the rains have germinated the bulk of the barley grass seed lying in the ground. To obtain the full benefit of the expenditure of time and money it is essential to oversow to minimise subsequent germinations.

If then we can establish dalapon as the means of giving us selective control in our pastures, the non-selective materials such as Atlacide, monuron, or TCA at higher rates could be used for our fencelines, gateways, etc. We could then with a concerted effort reduce this problem from one of severe economic importance to one of nuisance value only.

RAGWORT (*Senecio jacobaea*)

This is seldom a problem on our well-managed sheep grazing properties. Our greatest danger is in the heavily infested areas in the foothills of the western ranges. From these nucleus areas it invades our dairy country throughout the province, and it is only by constant vigilance and prompt action that it is kept out of our lower country.

For treating the odd scattered plant in the more inaccessible areas I feel that a pinch of sodium chlorate or Atlacide per plant is still the most effective method of control, but for over-all spraying the esters of 2,4-D up to 2lb. acid equivalent per acre have proved effective.

In cleared bush country which is normally difficult of access to wheeled vehicles aerial spraying has been carried out, but results in most cases have not been sufficiently encouraging to make a firm recommendation at this stage. There are so many contributing factors governing the success of aerial application that farmers are advised to seek proper advice before undertaking any work.

WILLOWS (*Salix* spp)

In some of our low-lying areas willows are proving to be a menace to our drainage system. With the rising cost of manual labour for maintenance work their clearance by spraying is being carried out. Small areas were attempted 2 years ago by use of a fixed-wing aircraft applying 6 gallons of mixture per acre on regrowth willows. A follow-up spraying was necessary, but the end result was satisfactory.

Larger areas have been treated this year, the helicopter which was able to increase the gallonage to 60 per acre being used. Whether this increase is necessary remains to be seen. The amount of regrowth in spring will indicate whether the additional cost is warranted.

HOREHOUND (*Marrubium vulgare*)

During our field trip on Wednesday a visit will be made to the Lagoon Farm, where will be seen a very real problem—extensive areas of horehound.

Normally this weed is confined to small areas surrounding yards and dips and on our dry outcrops. It is when it is in such areas that control measures should be taken. The esters of 2,4-D or preferably a mixture of 2,4-D and 2,4,5-T (2/1) at 1/100 sprayed in spring gives good control. However, when horehound is left undisturbed rapid spread can take place and the area at the lagoon provides a good example. From a small nucleus area it has extended to cover over 200 acres; accordingly the amount involved in ridding the area of this weed is a considerable one.

GORSE (*Ulex europaeus*)

I should think that Hawke's Bay could claim to have a smaller acreage under gorse than any other area in New Zealand, and it is because of this that even more effort should be put into its clearance than has been done in the past.

Much has been written about the clearing of large gorse areas both by aerial methods and with ground spraying equipment. There is no doubt that there is a place for both methods. It has been obvious that whether the 2,4,5-T is applied by gun or by aircraft the follow up is really the vital part of control. In these days of relative plenty it has been the tendency to engage a contractor to spray over-all regardless of area.

It has been obvious in many cases that far too great an area has been tackled in the initial stage and I can see no virtue in spraying large areas of gorse unless that same area can be dealt with in the second stage of development within, say, 12 months. That second stage of development may vary with the type of country, but the aim must be to establish a pasture with due regard to good farming practice in the shortest possible time to entice the stock on to the area to deal with any regrowth that will appear.

At the latter end of this season areas were sprayed with recognised concentrations of 2,4,5-T to which were added either spraying oils or spreading agents. A recent inspection of one area sprayed by helicopter using an additive shows at the present a far greater measure of control than any other area in this district sprayed from the air. The discovery of the suitable additive may make possible the total clearance of gorse-infested areas.

BLACKBERRY (*Rubus* spp)

Our greatest concentration of blackberry is in the Wairoa district, where there are still extensive areas to be dealt with. The recognised method of control in the past has been the farming of large numbers of goats, and this method has been effective in preventing the canes from totally covering large areas. However, I do feel that the suppression of the plant by goats has made the spraying programme a more difficult one by reducing the catchment area of each bush. It is found that a virgin bush is a much better spraying proposition than one that has been continually suppressed by stock, fire, or cutting. Again, I feel that the treatment that follows the initial spraying is the vital step, and the shortest step to grass establishment provided it is sound farming practice.

Following our February spraying it is becoming practice to fire the bushes in the following October/November, but not before a good hot burn is ensured. This burn normally takes care of any regrowth that is likely that season. This, of course, is followed by oversowing and, if necessary, subdivision. Any subsequent regrowth is dealt with by stock management or spot treatment.

During the past season areas have been sprayed both with helicopter and fixed-wing plane and results to date appear to be most promising, but it will be next spring before a true comparison can be made. If this method of application proves as successful as it looks in the initial stages, many areas which are inaccessible to orthodox spray equipment will be cleared of this very definite stock hazard.

LUCERNE

The value of lucerne as a fodder crop is well recognised in Hawke's Bay, but in spite of this the area sown is only a fraction of what it should be. It is possible one restricting factor is the difficulty of establishing this crop in the face of strong weed competition. It is recognised, too, that the first cut is seldom sufficiently free of weeds to be capable of producing a good hay sample.

For established crops both dalapon and TCA have given satisfactory results where grassy weeds have been the problem. Dalapon at the rate of 5 to 7lb. per acre is proving to be the better material for two reasons:—

1. If applied just before the lucerne breaks dormancy, there is no check to the crop.
2. Dalapon is more stable under a wider range of conditions and can be applied with low-volume equipment.

For new stands and ones established MCPB at 3lb. acid equivalent in 15 gallons of water per acre over a limited area has proved to be most satisfactory in controlling annual weeds. 2,4-DB with its greater margin of safety is now available commercially and with this we have a material which is possibly going to fill a long-felt need.

PEAS

The acreage sown in crops for canning and deep freezing on the Heretaunga Plains is steadily increasing each year; land now being utilised extends to areas which in the past would have been by-passed because of high weed population. Cultivation still maintains its place of importance in producing clean and healthy crops, but it is the weed control chemicals which have made possible the extension of the original area.

Of crops grown for processing peas occupy by far the greatest area; therefore it is natural that it is with this crop the greatest volume of work has been done. The use of DNOC quickly followed by dinoseb with its attendant hazards and limitations is well known to all growers. It was found after a great deal of disappointing work using the recognised fan-type tips on the spray boom that a change to the solid cone-type tips gave a much more even distribution of spray liquid on to the weeds which of course, resulted in a much better over-all job. On the fan tips being checked, it was found that though there was no appreciable variation of the rated gallons-per-hour capacity, the uneven distribution of the liquid in the fan pattern was reflected in the uneven result on the weeds.

MCPA has been very much less widely used here than in the pea growing areas of the South Island mainly I think because we are almost entirely concerned with harvesting green peas and that their tenderness at the time of harvest is of prime importance. Crops sprayed with MCPA have generally shown a higher tenderometer reading than dinoseb sprayed peas at an equal stage of maturity.

A number of pre-emergence materials have been used experimentally, the main aim being to find something to give positive control of Prince of Wales Feather (*Amaranthus retroflexus*) which even at the 2-leaf stage can prove resistant to dinoseb. The lack of moisture in the soil surface during our normal summer conditions makes the use of present pre-emergence materials too uncertain for commercial use.

After two seasons' study on the behaviour of MCPB it appears now that this material will be fairly extensively used in the future; its acceptance will possibly mean that growers will spray their own peas rather than wait for contractors. This should lead to the production of cleaner crops, which are so necessary for the successful operation of the harvesting machinery.

DRAINS

There has always been a demand for a soil sterilant material which could be applied without having to scalp the area concerned before application. In our experience, if applied when the plant is growing actively, the mixture of ATA/monuron is proving to be most satisfactory. The fact that it is applied with low volume rates appeals to the operator and tends to lower the cost of application. During the course of our field trip on Wednesday an inspection will be made of an area treated with this mixture last August.

In conclusion, the advances made in this very important field of weed control have played no small part in the drive for greater world production. In New Zealand, and Hawke's Bay in particular, the primary producer is well aware of his responsibility in this direction and his ready co-operation in the past has made possible these rapid advances. With his continued support and the constant search for new chemicals and application methods New Zealand must continue to gain recognition as a primary producer.