WEED PROBLEMS OF THE WAIKATO

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THE matter in this paper is mainly based on the large numbers of trials carried out by Instructors in Agriculture in South Auckland. Some of the rates recommended may appear to be rather low and if you wish to make certain of killing plants at one fell swoop, with little concern for cost per acre or damage to clovers, then the rates should be considerably increased.

LOW FERTILITY PASTURE FLAT WEEDS

In this category I have placed catsear, cudweed, daisy, dandelion, ribgrass, and many others, not exactly flatweeds, could be included such as sorrel and mouse-eared chickweed. Some are susceptible and some are not to hormones. The best method of attack is through pasture management; generally through improvement in fertility by topdressing and allowing the pasture to grow to a reasonable height between grazings.

Hormone treatments should be confined to those plants other than those mentioned above and which cannot be easily suppressed or killed by good farm husbandry or where the correct husbandry methods to control them are not yet known. Some of these will now be dealt with in this paper.

ANNUAL BUTTERCUP

Annual buttercup invades pastures under dairying where the fertility is at a high level. It is particularly bad on rather wet land and drained swamps, but can be troublesome also on rolling country where the fertility is high and the land is subject to high concentration of stock. Night paddocks are commonly very badly infested. Cows will not eat it and it replaces much valuable feed every spring. It has been so bad in one season on individual farms in the Hauraki Plains that cows did not get enough to eat in the flush spring months. In absence of sheep grazing, not easily organised on most dairy farms, the area should be sprayed or dusted about September after the pasture has been well grazed. If the weather is fine for about a day after application, the water based products are satisfactory. Many trials have shown that $\frac{3}{8}$ lb. acid equivalent per acre of sodium salt of 2,4-D as a spray and $\frac{3}{4}$ lb. acid equivalent upwards as a dust is effective as was 1 lb. acid equivalent MCP as spray or dust and $\frac{1}{2}$ lb. acid equivalent of ethyl ester of 2,4-D. If wet weather follows soon after the application the ethyl ester is still about 100 per cent. effective, whereas MCP and sodium salt 2,4-D as spray or dust are much less effective; in trials giving a 65 to 75 per cent. kill.

If an area infested with buttercups is treated again in the following year, the area becomes almost free of buttercups. Persisting with hormones and the pen-knife should rid dairy farms of this weed. The water based products, though less reliable, are not so likely to damage clovers.

PENNYROYAL (*Mentha pulegium*)

Pennyroyal is much less prevalent than buttercup and comes in under high fertility where the pasture becomes bare through stock trampling and is particularly evident on wet soils but by no means confined to them. It is killed with 1 lb. acid equivalent of sodium salt or ethyl ester of 2,4-D. MCP was much less effective. The spraying should be

carried out well before the flowering stage. This weed, however, is one that can be controlled by better farm management and particularly the maintenance of a good cover of grass and clover over summer. This also helps to keep buttercup infestations from becoming too great. To enable this improvement in management to take place it may be necessary to improve drainage or destroy insects attacking pasture. Destruction of insects such as crickets or grass-grub often ultimately results in control of some weeds and should be the first thing attempted. Weeds are often the symptom of some omission or fault in pasture management.

SCOTCH THISTLE (*Cirsium lanceolatum*)

Scotch thistle is a troublesome weed particularly on sheep farms where it is the counterpart of buttercup on dairy farms and comes in under high fertility. It is easily killed with $\frac{1}{2}$ lb. acid equivalent of 2,4-D and, probably because of the hairy nature of the leaves, dusts have given as good results as sprays. In one trial at Waitakaruru 90 per cent. control was secured with $\frac{1}{2}$ lb. acid equivalent sodium salt of 2,4-D sprayed on. In another trial 1lb. acid equivalent MCP sprayed in December to thistles up to seeding stage was almost 100 per cent. effective. I would recommend $\frac{1}{2}$ lb. at an early stage; say, September, when the grass is usually hard grazed. Water based products are less liable to cause clover damage, but the results are liable to be upset by rain following shortly after use. Contractors would be advised usually to apply heavier rates than what can be expected to kill, because they must please their clients and always be successful. Farmers with their own equipment can afford to take a risk with the possible saving to their pocket and, what is more important, to the pasture.

WINGED THISTLE (*Carduus tenuiflorus*)

Winged thistle is prevalent on hill country near gateways on sheep camps and along sheep tracks and can grow to a dense mass, making farming operations and moving of stock difficult. It is very easily killed with $\frac{1}{2}$ lb. acid equivalent sprayed or 1lb. acid equivalent dusted with 2,4-D or MCP, but the area becomes reinfested either from old seed or seed blown on to the area from neighbouring unsprayed patches. To combat this the hormone treatment should be followed by surface cultivation and oversowing with grass and clover and the hormone treatment continued in the following seasons until the pasture closes up.

CALIFORNIAN THISTLE (*Cirsium arvense*)

All MCP and 2,4-D preparations appear equally effective for Californian thistle under fine weather conditions. Spraying, however, is a little more efficient than dusting. Generally one or two follow up treatments in the following seasons are required to eradicate this weed. One pound acid equivalent seems as effective as 2lb., and possibly $\frac{1}{2}$ lb. acid equivalent is as effective as 1lb. Hard grazing by sheep results in a decrease in this weed, which appears to thrive under lax grazing by cattle. The effectiveness of the time of application appears to be controlled by the weather. If a dry summer occurs, October and November applications are better than December or January applications; otherwise January and March applications give better results than September or October or, possibly, December.

Since we cannot foretell the weather, I suggest December application of $\frac{1}{2}$ lb. acid equivalent of the cheapest 2,4-D or MCP preparations available, in fine weather avoiding oil based products, and follow this up annually and concentrate stock on the area. This can be assisted by feeding supplementary crops and silage on the infested areas in the summer

after the hormone has done its worst. Small applications of hormones cost less and should do less damage to clovers. Using the farmer's own equipment they are not more costly than mowing, which is not effective and often has to be repeated in the same season merely to keep the weed from suppressing pasture growth.

Sowing infested areas down in lucerne is an effective method of control of the weed, which is very prevalent in South Auckland and causes much loss of grazing.

More experimental work is intended and should be carried out on the effect of spraying following cultivation. Matthews hopes that the Californian thistle will be more easily destroyed once the rhizomes are broken up and mentions this in his most valuable new bulletin.

BARLEY GRASS (Hordeum murinum)

Barley grass is troublesome on high fertility fat lamb farms. It establishes alongside hedges and shelter belts and spreads from there over the paddock. Matthews recommends that the worst areas should be treated in May when the seedlings have established with 10 to 15lb. TCA per acre. Remaining areas can be spot treated in the spring at much higher rates. White clover will re-establish in the infested areas. Constant vigilance will be needed to prevent reinfestation.

RAGWORT (Senecio jacobaea)

Ragwort was once considered the worst weed of South Auckland. Sheep, although they do not kill it, keep it from growing or flowering and it is not noticeable at a casual glance in sheep country. In the past many farmers in the King Country, Bay of Plenty, and Rotorua districts were unable to carry sheep because of cobalt deficiency (then not discovered as the cause of bush sickness) and for economic reasons. Under dairying farms were constantly menaced by this weed, which was controlled by pulling by hand, which was fairly effective, and dusting with sodium chlorate-lime mixtures. With better times and the use of cobalt topdressing sheep could be grazed and ragwort has not in recent years hit the headlines in the way it once did and the farmers of Northland do not tremble so much in fear of its spread to that area.

Ragwort advertises itself in summer by its brilliant yellow flower, but so much has it been subdued by sheep and pasture improvement that the advertisement is not so prominent now-a-days and the yellow peril flaunts its flag mainly in waste places and neglected corners. Sodium chlorate with its attendant dangers in storage to the operator and stock has now been replaced by hormones.

Two trials at Tauranga in 1952 showed that excellent control can be obtained by ethyl ester of 2,4-D at 2lb. in October with plants 3in. to 24in. high on the regrowths and the seedlings. Amine and sodium salt of 2,4-D was not quite as effective in one trial and MCP was very ineffective. The only seed could be obtained from the MCP treated plants and this had 5 per cent. germination.

A trial at Hamilton laid down by Mr. Ward in mid-December, 1948, showed ethyl ester of 2,4-D to be the best form to use, with sodium salt slightly behind, and then MCP, confirming the Tauranga results. Three pounds acid equivalent was used twice to give an apparent 95 per cent. kill with the ethyl ester. One and a half pounds acid equivalent of sodium salt of 2,4-D applied twice was very ineffective.

From these trials it would appear that the ethyl ester should be used at 2lb. acid equivalent at the advanced rosette stage.

GORSE (Ulex europaeus)

Gorse is more prevalent outside the Waikato, but we have neglected areas where it has been allowed to run riot. Our trials show that it is more economical to make two applications of $\frac{1}{4}$ gallon of 2,4,5-T or about 1lb. acid equivalent per acre, the first one in October and the second one in summer; that is provided that the farmer has his own equipment. The contractor has to use 1 gallon to satisfy his customers. The amount of water used appears to be such that the bushes are well covered with a minimum of run-off. For boom spraying this can be controlled most easily by the speed of driving of the tractor; when you come to a thick clump you slow down. According to Mr. Abbott, Land Development Branch, Lands and Survey Department, who has had considerable experience with gorse spraying, high speeds when boom spraying should always be avoided. The reason is obscure.

Butoxy ethanol ester appears very slightly superior to butyl ester and polyethylene glycol ester of 2,4,5-T. Avoid spraying when there is a dense new growth of soft young spines on the outside of dense bushes. Apparently these have the same effect as a dense mass of flowers in absorbing the spray and preventing penetration and being killed too quickly, stopping translocation.

Our experience indicates the use of a mixture of 1 to 400 for most areas and use of 1lb. acid equivalent of 2,4,5-T with 100 gallons water to the acre for the initial spraying of gorse up to 3ft. high. We do not advocate the spraying of tall, dense gorse where this can be avoided. Such gorse should be crushed, burnt, cultivated, cropped, or fallowed and sown to grass. Spraying should not commence until the grass is well established and the gorse is of sufficient growth to take a fair dose of the spray.

Besides trying out new specifics such as Oktone, all sorts of trials can be carried out, such as burning tall gorse, sowing pasture on the burn, and spraying the regrowth; also cultivating and preparing a seed-bed, allowing the gorse to germinate and grow, sowing the pasture seeds, disturbing the soil as little as possible and spraying before pasture emergence.

BLACKBERRY (Rubus fruticosus)

We have not eradicated blackberry in the few trials (6) conducted in South Auckland. Where 2,4,5-T was mixed with kerosene or possibly dieselene the results were less effective. Amine salt was much less effective and slower than butyl ester, butoxy ethanol ester, and polyethylene glycol ester of 2,4,5-T. Heavier rates than 2 to 5 or 3 to 6lb. acid equivalent of the material did not give a noticeable improvement and I would be inclined to apply a 1lb. acid equivalent and attempt to kill the blackberry by persistent respraying as the blackberry recovered. Blackberry is nowadays a weed of waste corners, roadsides, and along-side drains. Elsewhere it can be eliminated by cultivation, cropping, and fallowing, followed by grassing. If the grass is well topdressed and the surviving blackberry bruised and lacerated by harrowing it will succumb. Mowing is not very effective against blackberry unless it is followed by these measures. Goats have been used in some areas very successfully in controlling blackberry, and sheep sufficiently concentrated are also effective.

BARBERRY (Berberis vulgaris)

Barberry has become a menace in outlying districts in hilly country particularly in Whakatane and Opotiki districts. Where infestation is great the most practical method and also a reliable one is the spraying

of the butts of bushes with one of 2,4,5-T to twenty of dieselene. CMU at 8 grams at the base of uncut plants is promising. The cost of the spray per plant is 5½d. and the CMU 8d.

RUSHES

Rushes infest many thousands of acres of varying types of country throughout Auckland Province. They are almost always a problem on badly drained soils, but are not confined to these.

The spraying of the amine salt or ethyl ester of 2,4-D on rushes cut at least 2 months previously may at times give a complete kill at the rate tried of 2lb. of acid equivalent per acre. Often the rushes recover after a considerable setback. If advantage is taken of this setback, rush control may be achieved by good pasture management, which should in any case be adopted in rush-infested country. The soft rush (*Juncus effusus*), more readily eaten by stock, is more easily killed by spraying with hormones than the hard and more wiry *J. polyanthemus*. More information is required concerning the relationship of time of cutting and time of application to the effectiveness of the treatment.

Rushes dislike mowing and grazing by stock and will not then easily withstand strong grass and clover competition. They extend outward by short underground stems or rhizomes and these can extend and enlarge the plant fairly easily where there is an open sward or where the pasture is kept closely grazed. To combat rushes it is therefore necessary to establish a vigorous growing sward which is permitted to grow.

Cattle assist in controlling rushes because they can deal better than sheep with the desirable fairly long pasture and will eat much of the regrowth after cutting. Because of the resultant cutting and smothering, haying of fields also lessens the amount of rushes in a pasture. The softer, less wiry stemmed species is more palatable and cattle readily eat the regrowth of soft rush after cutting. As most rushes prefer moist conditions, cutting after mid-summer is usually considered more effective than at other times. Cutting, however, should be persisted with to obtain the best and most speedy results.

In certain conditions it may be more economical to keep land wet and to grow water grasses than to drain it and establish perennial ryegrass—white clover pastures. Under flooding conditions rushes can be eliminated by the vigorous growth of suitable species such as *Glyceria maxima*, *Phalaris arundinacea*, and *Paspalum distichum*. If it is considered desirable to drain the land and make it suitable for all-year-round grazing and the growth of pasture species such as ryegrass and white clover, rushes will be eliminated only if the fertility of the soil is maintained at a level at which these pasture species grow vigorously.

The use of hormones on rushes aims at a faster and easier way of eradicating rushes than periodical cutting. To obtain permanent results and assist the hormones in doing their work it would appear necessary to follow the principles of pasture management outlined.

WILLOWS

Willows block canals and small rivers. They can be killed by sawing or chopping them down in July or August and painting the butts with neat butyl ester of 2,4,5-T or ethyl ester of 2,4-D at about 2½oz. per tree, the amount dependent on size. They can be ring-barked and the cut treated with the same materials at 1½ to 7oz. per tree. Not so certainly successful but more practical is the spraying of the boles to a height of twice the diameter with mixtures of the same substances with dieselene at 1:4½, at about 1 pint of the mixture per tree for

corky barked trees; more diluted rates may be successful with younger, smooth barked trees. These treatments were all applied in June, August, and September.

I understand that seedlings and suckers up to 5ft. high can be destroyed by spraying, giving a complete cover with the 2,4-D oil based ester in summer.

TALL FESCUE (*Festuca arundinacea*)

Tall fescue is a problem alongside drains and waste places and on areas subject to flooding, carrying tall fescue seed. Up to 200lb. of TCA 70 per cent. has been used in a wet area, and has given promising results for a period, but the plants recovered in the following season. Alongside drains and roadsides and in waste places where it chiefly causes concern, it can be easily completely eliminated by introducing *Phalaris tuberosa*, which will by its superior and more vigorous growth smother the tall fescue. *Phalaris* does not invade the grazed pastures and if it did it would not matter because it is palatable and highly productive.

CMU has given excellent results elsewhere and should be tried in the Waikato on tall fescue.

BRACKEN FERN (*Pteridium esculentum*)

The now time-honoured use of cattle is still the best method of control of bracken fern in hill country. The areas should be well fenced and crushed with large mobs of cattle, topdressing and oversowing applied, and the fern prevented from growing fresh fronds each spring by the further use of cattle or heavy concentrations of wethers.

HARD FERN

Hard fern is a problem on high-rainfall hill country and is difficult to control with stock, although progress is made with heavy cattle concentrations. Heaping of brushwood on to the patches and burning is helpful when followed by oversowing and topdressing. Arsenic pentoxide has been shown effective in the past, but farmers find it difficult to get water on to the job. Perhaps aerial spraying will overcome this. The reputed fern killer, 4-C, should undoubtedly be given a trial, but no trials of this nature have yet been laid down in the Auckland Province.

GLEN MURRAY TUSSOCK (*Carex lucida* and *C. dipsacea*)

Glen Murray tussock is prevalent in Raglan County, where it invades better-class hill country pastures. It is difficult to combat by good husbandry and it is not exactly known what sort of husbandry to use. A recent trial laid down indicates that it is susceptible to Dalapon.

DISCUSSION

Q.—Rushes were sprayed in September resulting in a good top kill, but regrowth occurred from old plants. Can you give any reasons?

A.—Poor results may have been due to dry weather. Earlier spraying may have been better.

Q.—What were the best times for spraying Californian thistles and had the system of two or three sprayings done within a short period at the rosette stage been tried?

A.—December sprayings gave the best over-all kill, though weather conditions were important, thus October sprayings were best in dry seasons. The only sprayings done were single applications, at one season, with follow up applications the following year.