GIANT BUTTERCUP

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SUMMARY

AFTER trials and observations from practical work carried out by farmers over the past five years, I consider MCPA and MCPB are the most satisfactory chemicals for control of giant buttercup (*Ranunculus acris*).

MCPA is superior as a chemical, but clover damage is much greater, whereas MCPB is more costly but does not damage clover, a very important point when spraying in the spring, particularly where large areas of the farm are infested. Also because there is no clover damage the density of the pasture enables it to maintain real competition to seedling giant buttercup.

Large areas of high-fertility land in Taranaki, Southern Hawke's Bay, Horowhenua, Wairarapa, South Waikato, and possibly other districts are invaded by giant buttercup (*Ranunculus acris*).

Giant buttercup is a perennial plant with fibrous roots. The stems are erect and generally hairy. The leaves are in three divisions, each division stalkless. The flowers are yellow.

Like the buttercup family, it grows freely under high rainfall conditions but not necessarily on swampy ground. Giant buttercup will grow freely on hill country provided the rainfall is high enough. It is a very vigorous plant and most unpalatable to cattle; therefore control by farm management is almost impossible under dairying. It can readily be controlled with sheep, provided close grazing is maintained. Any dirty corners or hay paddocks will give a continuous supply of seed.

The extremely heavy seeding of giant buttercup is a major factor in its establishment in many areas. One plant is capable of producing up to four or five thousand seeds in one year.

The seed is spread in many ways. Stock carry it in the cleft hoof, on the head, and in the hair of the body. As the seed ripens in December and January, the hay paddock is a problem, as hay is usually fed to stock during winter, when the paddocks are poached. Hay balers are a major source of spread from a badly infested farm to a clean one, as these usually carry two bales in the chute. Tractor wheels, farm boots, and bedding for stock in motor transport are other means of spread.

The seed load in the ground was examined and it is estimated there would be ten and a half million seeds per acre. There did not appear to be any below the first inch of the surface. A hundred plugs, each 1 in. in diameter, were taken at random in a reasonably heavily infested paddock, and an accurate estimate of the seed population per acre was obtained. The seed is black, about $\frac{1}{16}$ in. in diameter, nearly round in outline, but unsymmetrical with a wing-like margin. Both tip and scar are pointed and very prominent; the tip is generally hooked and dull from the roughened surface.

About 1950-51 giant buttercup, unlike other members of the buttercup family, was found to be resistant to 2,4-D. Thus the easy to kill plant was successfully controlled, and the hard to kill one became the major problem.

In 1953 trial plots were laid down in Hawera district in which were used the ester of 2,4-D, amine salt of 2,4-D, 2,4-D and 2,4,5-T in combination, and sodium salt of MCPA. The results of the trials were as follows:

1. Ester of 2,4-D at 3.6 lb a.i. per gallon at $\frac{1}{2}$, 1, and 2 lb a.i. per acre showed little or no effect on giant buttercup, but at 1 and 2 lb a.i. per acre gave excellent results on both creeping and celery leaf.
2. Amine salt of 2,4-D at 4.8 lb a.i. per gallon at the same rates as the

ester was slightly superior in that same distortion and defoliation took place, but not sufficient to warrant any further work.

3. 2,4-D/2,4,5-T combinations were of no value.
4. Sodium salts of MCPA at 3 lb a.i. per gallon at rates of $\frac{1}{2}$, 1, and 2 lb a.i. per acre showed real promise; $\frac{1}{2}$ and 1 lb a.i. per acre on seedling growth gave up to 80 per cent control, but on established plants up to 80 per cent of regrowth occurred. At 2 lb a.i. per acre the regrowth was very much reduced.

All work at this stage was sprayed with the conventional boom with 32M fan tips and geared pump mounted on a tractor at 11 gallons of water per acre at 35 lb pressure.

As MCPA was the only chemical that had shown any promise, further work was done with 2,4,-D.

We continued that year with monthly trials, at varying rates, of both chemicals and water, with the idea of obtaining an optimum time and the ideal water rate.

Owing to the hairy nature of the leaf and the size of the plant it was considered heavier rates of water could be of importance.

Treatment	lb a.i. per acre
MCPA ----	1 in 50 gallons of water
MCPA ----	2 in 50 gallons of water
MCPA ----	1 in 30 gallons of water
MCPA ----	2 in 30 gallons of water

The rates were applied in October, November, and December.

With regard to water rate and time of application 1 lb a.i. per acre in 50 gallons of water was superior to the low rate of 11 gallons in the original trials. There was less regrowth, but 30 to 40 per cent regrowth from old root stock.

Two pound a.i. per acre in 50 gallons of water was extremely good; all seedling growth completely killed and there was as low as 5 per cent regrowth from old established plants. However, clover damage at this rate was quite high and lasted into Autumn, particularly in the late November and December treatment. However, a very satisfactory control of giant buttercup was established. The 2 lb a.i. per acre treatment in 30 gallons of water gave equally as good results, but appeared less drastic on the clovers.

Time of treatment did not appear as critical as stage of growth. At full flower which was about mid November there was less regrowth.

At another set of trial plots we had used lower rates of water.

Treatment	lb a.i. per acre
MCPA ----	1 with 20 gallons of water
MCPA ----	1½ with 20 gallons of water
MCPA ----	2 with 20 gallons of water

The result with 1 lb was not good enough, but that with 1½ lb a.i. per acre with 20 gallons of water appeared satisfactory. The 2 lb a.i. per acre treatment was just as good as with 30 and 50 gallons of water, but both rates had given fairly extensive clover damage, except that the lower rate of 1½ lb a.i. per acre recovered much quicker than the 2 lb a.i. per acre rate.

Summing up from these trials 1½ lb a.i. per acre of MCPA in 20 gallons of water gave very satisfactory results.

In 1954 potassium salts of MCPA became available and trials with the new type at 1½ lb a.i. per acre in 20 gallons of water was superior to the sodium salts.

The 1 lb a.i. per acre treatment in 20 gallons of water sprayed in late October and harrowed five weeks later was most satisfactory, but was rather hard to evaluate; without the harrowing there was about 20 per cent regrowth.

The 1½ lb a.i. per acre rate appeared again the ideal, but there was still clover damage. By applying these rates in autumn, that is February and March, the damage to clover was less. The pasture was able to fill in over the winter months and allow a denser grass and clover cover.

In 1957-58 MCPB appeared on the market, and more work became necessary to evaluate MCPB. At first it did not look as good as hoped. Cost per acre had risen quite extensively, but spraying of the hay paddock at closing time became realistic as the first stage in preventing spread of buttercup seed.

Alongside MCPA at 1½ lb a.i. per acre in 20 gallons water MCPB looked good enough for more work to be done.

In 1959 a further series of plots at 1 to 1½ lb and 2 lb a.i. per acre were laid down. The 2 lb a.i. per acre gave equally as good results as MCPA at 1½ lb a.i. per acre.

MCPB at 1½ lb a.i. per acre gave control, with about 20 per cent regrowth from established plants.

The main advantage of MCPB was that it caused little or no damage to clover, and therefore maintained a dense sward and gave greater competition to giant buttercup.

MCPB at 1½ lb a.i. per acre costs 25s., whereas MCPA at 1½ lb a.i. per acre costs 21s., and MCPB lb for lb with MCPA is not quite as efficient.

In 1960 quite large areas have been sprayed with a combination of MCPB and MCPA at 1 lb a.i. per acre of MCPB to ½ lb a.i. per acre of MCPA. On observation only, the two appeared to be more selective than MCPA and more effective than MCPB.

Cultivation as a control is only partially successful, because of the large seed load in the ground and reinfestation from seed transported from other paddocks. Observations on a cultivation programme proved interesting. A winter crop of chou moellier, followed by a summer crop of soft turnips, and grassed out in autumn must be sprayed the following summer to maintain the advantage of cropping.

MCPB is the only material which maintains a buttercup-free sward. If the spraying is neglected for two or more years, often the paddock will revert to a heavy stand of giant buttercup, and then as a means of control it is very costly.

I consider we can offer the farmer chemicals capable of controlling giant buttercup, providing he is prepared to assist with good farm management to avoid excess poaching of paddocks and on no account to cut hay infested with giant buttercup. He must at all times endeavour to maintain a dense sward, use a spray programme which is intelligent and the most economical, and then in three or four years he should be in a position to maintain a buttercup-free farm by spot spraying.

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