

THE ERADICATION AND REPLACEMENT OF RATSTAIL

By D. A. NEWMAN, Department of Agriculture, Dargaville

SUMMARY

RATSTAIL (*Sporobolus capensis*) is a grass weed of considerable importance on coastal and scattered inland areas throughout the North Island and also on the West Coast of the South Island. It is tough, abrasive, fibrous, extremely hard on animals' teeth and quite unpalatable to stock. Heaviest infestations of ratstail appear typically on sunny faces.

Though ploughing, cropping, and resowing have proved satisfactory there are extensive areas where cultivation is very difficult. Indeed almost all of the infestations are on such country.

For these reasons a simpler and if possible cheaper method of control was sought and I believe has been found.

PREVIOUS ATTEMPTS AT CONTROL

Before the advent of dalapon no economic chemical control was possible and farm advisors were frequently embarrassed when asked for control measures. Topdressing and management with cattle were frequently referred to by farm advisors, but only limited success has been achieved, and where the ratstail is very thick eradication by this means has proved impracticable.

Some farmers in desperation have resorted to purchasing numbers of horses and grazing them in a similar manner to a herd of beef cattle. This resulted in some measure of control, but was very temporary.

Ploughing, cropping, and resowing to new pasture gave quite good results, but as much of the infested country is difficult to cultivate not all farmers have the skill or finance for such operations.

EXPERIMENTS

Of the many trials conducted not one has resulted in a failure when rates of dalapon of 2 lb or more per acre have been used. Oversown species have always struck, some better than others, but in many cases gross overstocking induced by selective grazing of stock of unfenced trial areas has resulted in the loss of oversown species, opening of pasture, and reinfestation of the sward by seedling ratstail plants.

Because ratstail can be economically killed with low rates of dalapon as established in our trial work and because a wealth of supporting experimental data is available, I intend using only three trials to illustrate the factors which have been considered and some which must be considered when attempting to replace ratstail with higher producing species and maintain the improved sward.

TRIAL A—PAEROA-THAMES VALLEY

This trial was laid down on an area of rolling to steep land in March 1959. The pasture was average for the area apart from the 40 to 50 per cent of ratstail it contained in addition to paspalum (*Paspalum dilatatum*), perennial ryegrass (*Lolium perenne*), white clover (*Trifolium repens*), and crested dogstail (*Cynosurus cretatus*). The trial area was pegged out and half each plot mown off to simulate hard grazing prior to spraying, while the other half plots were left with ratstail foliage up to 6 in. in height and seed heads 12 in. to 18 in. in height.

TREATMENTS

The following treatments in duplicate were applied in 80 gallons of water per acre through a knapsack spray unit and 46 M.L.A. nozzles:

1. 5 lb of dalapon + 1 lb of amitrol
2. 7½ lb of dalapon + 1 lb of amitrol

3. 5 lb of dalapon + 2 lb of amitrol
4. 7½ lb of dalapon + 2 lb of amitrol

OVERSOWING

Oversowing of 25 lb of perennial ryegrass, 3 lb of white clover, and 2 lb of subterranean clover per acre was carried out two weeks after spraying and the area topdressed with 2 cwt of superphosphate and 1 cwt of muriate of potash per acre.

RESULTS

Ratstail was eliminated from all treatments and there was no apparent benefit derived from the hard grazing as simulated by mowing of plots. White clovers grew quite well after the destruction of ratstail and the ryegrass content improved slightly as a result of the oversowing also; subterranean clovers (*Trifolium subterraneum*) did not strike and grow well in competition with other species. Scotch thistles (*Cirsium lanceolatum*) established well in the first season, but the pasture subsequently tightened up and very few thistles were apparent in the autumn of 1960.

DISCUSSION

With the rates of application of dalapon and amitrol and the timing of spraying the eradication of ratstail was inevitable. However, prior hard grazing in no way affected the results. The rates of dalapon may have been too heavy to determine the value of close grazing. With lighter rates such as 1 or 2 lb, differences favourable to one or other type of grazing might have become evident. The pasture on the trial area was better than most areas where ratstail occurs and for this reason stock did not damage the trial by overgrazing, there being good feed available over the paddock as a whole. The oversowing was probably not as successful as it would have been on a lower fertility area because of the competition presented by grasses and clovers already established on the area and which were only slightly affected by the dalapon and amitrol treatments. In my opinion a low seeding rate of white clover in conjunction with a heavy dressing of phosphate and potash following the spray treatments would have produced outstanding results.

TRIAL B—KOHEKOHE, PUKEKOHE

This trial was laid down in March 1959 on an area of consolidated sand, the area selected being on a steep face with a northerly aspect. Soil sampling prior to laying down the trial indicated a fairly severe phosphate deficiency. The pasture consisted of dominant ratstail with some paspalum, white clover, and lotus species present.

TREATMENTS

The following treatments in triplicate were applied in 30 gallons of water per acre through a knapsack spray pump and 32 nozzles:

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|------------------|------------------------------------|
| 1. Control | 4. Dalapon 5 lb + 2 lb of amitrol |
| 2. Dalapon 2½ lb | 5. Dalapon 10 lb + 2 lb of amitrol |
| 3. Dalapon 5 lb | 6. Amitrol 5 lb |

Light rain fell within 24 hours of spraying.

OVERSOWING AND TOPDRESSING

These operations were carried out on the same day as spraying at the following rates per acre:

- 15 lb of perennial ryegrass
- 5 lb of short-rotation ryegrass
- 2 lb of white clover
- 1 lb of Mt. Barker subterranean clover

Total 23 lb per acre

Three hundredweight of superphosphate was applied together with 1 cwt of muriate of potash per acre.

RESULTS

Initial inspections showed that the high rate of chemicals was eradicating the ratstail rapidly but also resulting in the influx of many flat weeds, especially plantain (*Plantago* spp.) and also resulted in a poor strike of oversown grasses and clovers. The 2½ lb of dalapon and 5 lb of amitrol treatments were giving a slow kill but also a better strike of the oversown species.

On 17 June 1959 some three months after treatment the Instructor reported that generally the strike of oversown species was poor and so far no treatment appeared promising. However, in December 1959 he reported that ratstail had been eliminated by all treatments of dalapon and/or amitrol and that clovers and ryegrasses had established strongly despite heavy set stocking with sheep which preferentially overgrazed the plots. Flat weeds were no longer present and Scotch thistles had previously been eradicated by spot treatments of a phosphate-2,4-D proprietary mix.

All rates of weedicide used proved effective and by the autumn of 1960 no differences could be determined visually between treatments.

DISCUSSION

Once again the chemical eradication of ratstail proved successful even at the low rate of 2½ lb of dalapon per acre; several other trials have supported the efficiency of this low rate of dalapon.

Despite fairly severe grazing of plots the oversowing has proved to be a success and I am sure that areas of ratstail treated with dalapon by farmers would not be subjected to such severe grazing following oversowing, and it is reasonable to assume that results would be more rapid and pasture establishment better as a result of controlled grazing similar in timing and intensity to that applied on areas of new grass sown in the conventional manner.

As in trial A I am of the opinion that results from this trial would have been improved with further attention to the fertility of the area and a capital topdressing allowed for.

TRIAL C—POUTO, DARGAVILLE

Ratstail is the dominant pasture species on a large area of potentially high producing fat lamb country at Pouto and indeed on some areas other pasture species are completely absent from the sward. An area of ½ acre was fenced off on the crest of a small hill lying to the sun. The soil type was a consolidated sand which soil tests indicated to be phosphate deficient.

The normal application of 2½ lb per acre was doubled in an endeavour to obtain a quick kill of the ratstail so that summer forage crops could be sown in the spring. Spraying with a knapsack unit was carried out in early July 1959 with 5 lb of dalapon in 30 gallons of water per acre.

ACTION OF DALAPON

The ratstail died off at a slow rate as is usual following spraying. However, it was not thought desirable to interrupt this process until December 1959 when it was considered that the ratstail had disintegrated sufficiently, leaving a heavy mat of dead foliage.

CROPS

The heavy mat of dead ratstail made it impossible to drill in the crops and for this reason the area was fired and crops sown broadcast in duplicate on areas of 1/10 acre as follows:

Green Glove turnips, 12 oz per acre

Medium-stemmed chou moellier, 3 lb per acre

B.L.E. rape, 3 lb + 1 bushel of bitter blue lupins

Three hundredweight of superphosphate per acre was broadcast with the crops and light harrows used to cover the seed.

RESULTS OF CROPS

Fortunately this late sowing was assisted by frequent showers in December and a good strike resulted.

The turnips bulbed to 4 to 6 in. in diameter and the rape and lupins provided a good bulk of feed, being thick and growing to 2 ft in height. The seeding rate of lupins was far too high; $\frac{1}{2}$ bushel would have been adequate and being a bitter variety they proved to be fairly unpalatable to stock. The chou moellier grew to 2 ft 6 in. on the average with quite a good proportion of leaf to stem and an even ground cover.

Six hundred ewes spent two days on the area in late February, in which time they cleaned up all crops apart from the lupins, which they crushed and trampled but did not eat.

REGRASSING

On areas where the turnips were grown and also where other crops were thin seedling ratstail plants were appearing and 2 lb of dalapon in 16 gallons of water per acre was applied on 10 March 1960 to eliminate the plants.

The following seed mixture was drilled directly into the aftermath with $2\frac{1}{2}$ cwt of superphosphate per acre on 17 March:

20 lb of perennial ryegrass
5 lb of short-rotation ryegrass
6 lb of cocksfoot
3 lb of white clover
2 lb of broad red clover

Total 35 lb per acre

DISCUSSION

Despite the fairly satisfactory crops which were grown on the area ratstail seedlings invaded the bare patches and for this reason attempts at cropping following the chemical kill appear undesirable.

The sown pasture gave excellent cover and was grazed within four weeks of sowing, being generally superior to the farmer's grass sown following cultivation.

The 5 lb per acre treatment of dalapon on this trial is too high for everyday use and is not necessary normally.

CONCLUSIONS

As ratstail is a weed grass adapted to dry faces, soils of low fertility, and low organic matter and preferring a semi tropical climate, the practice of spraying with dalapon and oversowing or drilling in new species is a method to which most farmers can resort cheaply and effectively. It is cheaper than ploughing, working down to a seedbed, and regrassing.

The method can and should be applied to pastures in the process of reversion to ratstail without fear of damaging higher producing species such as ryegrasses and clovers. It is essential to correct fertility deficiencies completely when endeavouring to replace ratstail, to obtain a quick ground cover following sowing of new pasture, and to manage the grazing of the new pasture to such a degree that the pasture forms a tight sward which discourages the influx of seedling ratstail plants.

RECOMMENDATIONS

1. Topdress adequately.
2. Spray area with $2\frac{1}{2}$ to 3 lb of dalapon per acre in 15 to 20 gallons of water.
3. Topdress and oversow or undersow the area within a fortnight of spraying. Drilling seed in is preferable to oversowing where practicable.
4. Graze the resulting new pasture in a manner which encourages quick establishment and cover.

ACKNOWLEDGMENTS

Assistance was given by other officers of the Farm Advisory Division, Department of Agriculture, especially Messrs Merry and Janett, Pukekohe, and Messrs Banfield and Batten, Thames. Mr R. W. Cooper provided photographic material.

DISCUSSION

Q.—Could the speaker repeat the optimum time of oversowing?

A.—The most satisfactory period is autumn.

Q.—Considering that the ratstail was growing in low fertility country would not, say, 4 cwt of superphosphate be better than 2 cwt dressing in conjunction with oversowing?

A.—Yes, higher rates of superphosphate give much better results.

Comment: We have found grazing more important than fertility. We have had ratstail spreading on high fertility country.

Q.—Is the rate of 2 lb of dalapon sufficient to give a kill of ratstail under all conditions? Would it be sufficient under moderate to high fertility?

A.—Probably higher rates would be needed.

Q.—We still have sceptics in the Department of Agriculture who consider that ratstail could be grazed out if sufficient fertiliser is used.

A.—This method does not seem to be giving the results expected.

Q.—Would reinfestation of paddocks come from fencelines or from the soil?

A.—We have done no work on longevity of ratstail seed in the soil. The trials were all small areas and reinfestation was mainly from edges.

Q.—Did you find the amount of water critical at any stage?

A.—The water used does not appear to be critical. Low volume application gives good results.

Q.—What was the degree of reinfestation?

A.—Trials have been going only two years. Trial areas generally grazed hard and on one trial seedling ratstail is coming in. This aspect of the work is to be further studied and further treatments of 2 lb of dalapon may be sufficient. Grazing management is a factor in reinfestation; set grazing will apparently encourage ratstail.

Q.—Were stock given access to sprayed material?

A.—No fencing around trials and stock had access. Did not appear to preferentially graze the sprayed ratstail.