
RATES OF GRASS SEEDING AND TOPDRESSING OF NEW PASTURES SOWN DOWN UNDER VARYING CONDITIONS OF SOIL FERTILITY AND FARM MANAGEMENT

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In the past twenty or thirty years there have been many changes in farming techniques, brought about through increased knowledge of the science and practice of agriculture. The purpose of this paper is not so much to dogmatise on methods of pasture establishment as to throw the subject open to discussion from which all of us may benefit.

For many years the greater majority of farming opinion, particularly in the northern half of the North Island, has inclined to the belief that a pasture seeding rate of about 40lb. per acre is necessary where a new pasture is being sown down. In view of the cost of grass seed, and of land development in general, it was decided to design a series of experiments aimed at showing the optimum quantities of grass seed and fertiliser that are required in grassing down the volcanic ash country of the Bay of Plenty. The first of these trials was laid down in October 1953, in the Waihi district, on coastal rolling country, soil type 55H. The original cover of the land consisted of scrubby manuka 2 to 4ft. high, with some bracken fern. The seed was sown on cultivated land on a reasonably good seed-bed.

The trial was simple in layout, consisting of plots sown with 20, 30, and 40lb. of grass seed per acre, plus one of the farmer's sowing at 27lb. per acre. Across these plots were run strips top-dressed with superphosphate at 3, 6, and 9cwt. per acre. The grass seed mixture used was as follows:

Perennial ryegrass	1.5 parts
Crested dogtail		2 parts
Cocksfoot		3 parts
Paspalum	...	5 parts
Cowgrass		4 parts
White clover		2 parts
<i>Lotus uliginosus</i>	1 part

The 20, 30, and 40lb. seedings were drawn from a bulk mixture made up in the above proportions.

At the time the trial was laid down soil tests were taken and indicated that the pH was 5.8, with moderate potash and very low available phosphate.

The summer after seeding was very dry and establishment was slow, but a good recovery was made after the autumn rains. Results were quick to show up and at the end of a year were producing some extremely interesting information.

It would be fair to say that this trial indicated that where a block of virgin volcanic ash country low in phosphate is being developed, it is sound practice to sow from 20 to 30lb. of grass seed per acre (the actual seeding depending on local conditions) with a heavy dressing of phosphate, rather than to use a heavy rate of grass seeding with lighter phosphatic dressings. A further trial in the same paddock indicated that it was preferable to apply phosphate heavily at the time of sowing the seed rather than the same total quantity of phosphate spread over the first year in two or three dressings.

This trial opened up several interesting speculations, some of which were:

1. Would the same results be obtained from autumn sowings?
2. Did the summer drought of 1954 affect the position?
3. Would the same results be obtained on other soil types?
4. What is the position on older established country where grass is being sown after a crop or after grass?
5. What is the position with differing levels of soil fertility?

The only way to answer these questions was to lay down more trials, while, in addition, several farmers were encouraged to experiment for themselves.

In 1956 a series of 14 further trials was laid down to investigate the results of varying rates of seeding and manuring, and, mostly associated with these trials, a further series to investigate various rates and times of fertiliser application under different soil fertility conditions.

The basic layout of these experiments was altered somewhat from the Waihi trial. In the rates of grass seeding trials the same rate of clover seeding was used on all plots, the rates of grass seeding only being altered. In the rates of manuring trials double superphosphate was used with a basal dressing of gypsum in preference to superphosphate.

All the trials except one were sown down in the autumn of 1956, the exception going down in the following spring. Unfortunately, time does not permit detailed discussion of each

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trial, but the following general deductions can be made from the results obtained. These deductions are supported by the results farmers have had in the western Bay of Plenty when they have carried out these recommendations in the field.

(a) That in the development of virgin volcanic ash country, where the soil is low in phosphate, it is of greater importance to provide for adequate phosphates than to sow a heavy dressing of grass seed.

(b) That where soil phosphate levels are very low, heavy initial applications of phosphate are preferable to the application of the same quantity spread over two or three dressings.

(c) That provided the seed used has a satisfactory germination and the seed-bed is satisfactory, no useful purpose is served in sowing 40lb. of grass seed per acre. The slightly denser sward found on plots sown with this seeding rate is not maintained longer than 3 or 4 months, and, after 6 months or so, the more vigorous stooling out of the pasture species on the lighter sown plots offsets this advantage.

(d) In older farmed country being sown down either grass to grass, or grass after crop, the above generalisation applies at least in part.

(e) Under these conditions there appears to be no valid reason for sowing more than 20 to 30 lb. of seed per acre.

(f) Initial fertiliser applications on this class of country depend on soil type and soil fertility levels. It must be remembered that on older established farms potash deficiency can be an added factor jeopardising the establishment of newly sown pastures and is frequently the cause of the deterioration of the original sward. In grass after grass or grass after a crop, heavy initial applications of phosphate are warranted when levels of phosphates are low in the soil.

(g) Where soil fertility levels are in doubt soil analysis can often give useful information on which rates of fertiliser application can be based.

Rates of seeding had little or no effect on the density of weed infestation in any of the trials. In other words, in no trial has there been a sufficiently heavy weed infestation on the plots seeded at low rates to warrant the use of greater quantities of grass seed. It is a fact that the lower rates of seeding resulted in plots carrying a slightly stronger and denser clover growth, but this appeared to be of no detriment in so far as the final pasture establishment is concerned.

There is strong evidence to suggest that much of this clover dominance on newly established pastures is due to grass-grub

attack damaging the newly established ryegrass, while faulty management of the young sward can also lead to clover dominance.

In view of the generally high costs involved today in the establishment of new pastures, whether on old or virgin country, it is of importance to evaluate this work, as it affects the over-all pattern of pasture establishment. The major items of expenditure in pasture establishment are cultivation, seed, manure, fencing, water supply, and stocking. Of these, the last three are constant factors unaffected by the rates of seeding, methods of cultivation, and manuring. These are the items that must be considered from the view of financial benefits gained against expenditure incurred. When breaking in virgin volcanic ash country we have the normal pattern of reasonable levels of potash and low levels of phosphate. The difference in price between seeding rates of 25 and 40lb. per acre would vary between £2 10s. and £4 per acre, depending on the seeds mixture used. If the cost of superphosphate landed on the farm is £12 per ton, it can be seen that the saving in the cost of grass seed is actually worth between 3 and 4cwt. of superphosphate. This quantity of fertiliser, added to the normal 3cwt. that would be used in any case, gives a total fertiliser dressing of from 6 to 7cwt. of superphosphate per acre. Under the particular conditions in the western Bay of Plenty, one could virtually guarantee a better pasture establishment using these rates of application than would be obtained were the standard practice of sowing 40lb. of seed with 3cwt. of phosphate per acre adopted. Not only is pasture establishment more rapid, but the greater bulk of feed produced, leading to heavier rates of stocking, helps considerably in the control of second growth, fern, etc.

As far as cultivation is concerned, on the light volcanic ash soils of the western Bay of Plenty, where consolidation is essential to successful pasture establishment, we have found that much of our virgin scrub and fern country, particularly if it is hilly, will yield better pastures when surface sown after a burn rather than by destroying the consolidation by cultivation. While we cannot go into this subject fully in this paper, we are convinced that on much of the country under discussion this practice has much to commend it, from both the economic and practical point of view.

There is an even greater saving of money on older farmed country where heavy initial applications of phosphate may not be required. Here the lighter seeding rates represent a direct saving to the farmer as well as ultimately giving a sward at least as vigorous and healthy as would have been obtained from a heavier seeding.

So far we have confined discussion to the western Bay of Plenty. That interest in this matter has been roused in other parts of the country is evidenced by the experience of Mr A. C. Hurst, Papakaio, North Otago, who has experimented with light and heavy seedings of short-rotation ryegrass with considerable success. He found that he obtained an excellent establishment from seeding rates as low as 3½lb. of short-rotation ryegrass plus 2lb. of white clover per acre, as against the conventional 20lb. of short-rotation ryegrass plus 21b. of white clover.

Today we are finding farmers paying increasing attention to their costs, and if we can offer them information of the type referred to in this paper, we will find them willing listeners. We have no hesitation in saying that our suggestions are practicable on the volcanic ash soil types of the Bay of Plenty. They have been demonstrated both experimentally and in farm practice and would possibly be applicable to other areas of New Zealand with suitable modification to conform with local conditions.

DISCUSSION

Q. Was inoculated clover used on virgin country?

A. No, clover can be established easily if the potash is satisfactory so that there is no place for inoculation.

Mr Bell: A roller drill is necessary for sowing inoculated clover seed.

Much of the advantage of inoculation is lost if the seed is broadcast due to the harmful effect of sunlight on the bacteria. Would Mr Allo comment on his trials on non virgin country where he had got good grass swards?

A. The general pattern was that satisfactory grass establishment could be obtained at lower seeding rates.

Q. When was grass dominance obtained?

A. There was no strong clover dominance. Within six months there was a well balanced sward.

Q. Do the economics in the placement of the fertiliser offset the cost of the necessary machinery?

A. (Mr Jordan): My experience has been with undersowers and no advantage was shown in the trials by working the fertiliser into the ground-or at least only a small advantage in the initial stage. Greater benefit came from broadcasting the fertiliser later on.

Mr Rankin: The light seeding rates in Southland have given good results,