VALUE OF PASTURE SPECIES IN CANTERBURY

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Over a long period it has been recognised that grass is one of our most valuable crops. In the past years its real importance has not always been recognised and it was not given very much attention because other crops appeared to be of more value. The advances that have been made in plant breeding and pasture management in recent years and these. advances applied to the grass species have resulted in its becoming almost our most important crop.

The maintenance of good pastures, which should mean a greater use of the grazing animal, is the most economic and profitable means of restoring and maintaining the lost fertility of the soil.

Experience has shown that a combination of these grass species with clovers is the best means we have of obtaining high quality pastures which give maximum production. It would be impossible to prescribe a universal mixture to suit all climatic conditions and variations in soil type throughout New Zealand.

The purpose of this paper, therefore, is to endeavour to give a picture of the value of the important pasture species in Canterbury.

As the Superintendency of Canterbury has as its boundary the Waitaki River in the south, the Tasman Sea in the west, the Pacific Ocean in the east, and Cook Strait in the north, a description of the number of classified soil types in this area would require considerable detail and repetition, and as members of this Association are drawn from all parts of New Zealand, it was considered that the position could best be met by giving a very broad soil classification in the following way:—

1. The heavy soils.
2. The medium soils.
3. The light plains soils.
4. The foothill country.

Naturally some or all of these classifications will

be found on some farms, but I think the important point is that we are restricted to certain grass species and unfortunately they are rather small in number, as Mr Corkill has told you, so that it is very necessary that the best use be made of them by combining them in the right way to suit the particular soil type. Those farming the heavy soils are fortunate in that almost a.11 the species will grow without a great deal of trouble, but with the lighter soils it is a very different matter. It is very important that the right combination be used on these soils if good results are to be obtained.

The compiling of a seed mixture is a relatively simple process, It is like making up a recipe for cooking; you can make up its ingredients, but it is the end result that counts, and so it is with seed mixtures. How many have sown perennial ryegrass, cocksfoot, timothy, white clover, red clover and crested dogstail, and at the end of the first season very little remains except ryegrass and white clover or perhaps only red clover, simply because an important management factor has not been carried out. Consideration must also be given to whether or not the mixture is to be used for grazing or seed production. If it is to be used for seed production, perennial ryegrass and short-rotation ryegrass cannot be used in combination, nor can white and red clover. In the first case the plants grow well in combination and can be harvested at the same time, but the resultant seed crop would have no value for seed purposes. In the second case the white and the red clovers do not combine, as one matures as the other is just beginning to grow, and unless conditions are particularly favourable it seems to work out in practice that neither crop is harvested.

For seed production, therefore, the seed mixtures are of a simple nature: Perennial ryegrass and white clover, or short-rotation ryegrass and white clover, or short-rotation ryegrass and red clover; with the latter care must be taken in the time of sowing if this combination, is used, particularly if it is desired to harvest short-rotation ryegrass in its first harvest. In the case of cocksfoot a combination of red clover and cocksfoot can work out very well, the red clover being harvested for hay and seed for 2 to 3 seasons, by which time the cocksfoot is well established and can continue producing cocksfoot for seed or grazing for several years.

These general remarks apply to any suitable seed

producing district, irrespective of soil type and climate, if seed production of the various species is to be successful.

In considering seed mixtures for permanent grazing swards the aim should be to include pasture species which are most likely to give the maximum production throughout the growing period. Theoretically it should work out that a mixture of perennial ryegrass, cocksfoot and timothy, with white clover and red clover, would give the maximum production, but unfortunately it is very difficult to get this in a practical way. The improved production of cocksfoot and timothy by way of more leafy types has made it possible to get nearer the goal. The other consideration must be: When is the important period that feed is required ? The concensus of opinion would be in the spring, as ryegrass makes its growth at that period, and cocksfoot and timothy being more or less dormant, and the fact that ryegrass does not tiller to any extent means a heavier seeding of perennial ryegrass. White clover tillers more than red clover, so that a smaller quantity of it is given. Perennial ryegrass is a very vigorous grower in its early stages. Unless the mixture is sown in the early summer, the chances are that a mixture with cocksfoot or timothy or both would have little chance of survival unless the resultant pasture were given lenient treatment in the first 6 months of its establishment. A mixture as outlined would take up to 2 (possibly 3) years to become well established and over this period careful management of the ryegrass would be necessary. If for example, the complex mixture were sown in March, unless very favourable conditions were experienced or particular care taken in its management-in the spring, there would be little chance of the timothy and cocksfoot surviving. A management whereby the perennial ryegrass was not grazed to bare would allow the other species to get established.. Once established, cocksfoot and timothy can hold their own under any reasonable treatment.

There are some who advodate the sowing of timothy alone, along with either white or red clover, and there is some merit in the idea if the pasture is required for a special purpose. But it would be slow to start in the spring and therefore it would be available only in one or possibly two paddocks on the average farm.

1. HEAVY SOILS

The seed mixture for these soils is approximately the same irrespective of the district. The same recommendation would be made for the Willowbridge district in South Canterbury as for the heavy, silty loams of Tuamarina in Blenheim. These soils are capable of giving maximum production and therefore the high fertility demanding grasses are included.

	lb.,		lb.
Perennial ryegrass	IO-15	Short-rotation	20-25
Short-rotation	10	Cocksfoot	5
White clover	3	White clover	3
Red Clover	3	Red Clover	3

In some cases cocksfoot at 51b. to the acre is included and more recently, with the introduction of the leafy strain of timothy, timothy at from 2 to 41b. Recommendations are for early autumn sowing where the rainfall is in the 25 to 30in. range and earlier autumn sowing if the range is in the 30 to 40in. category. Pastures sown with this mixture have an economic life of from 6 to 10 years, depending on the management and fertiliser treatment.

For seed production the mixture recommended for most districts is as follows:-

(a)

	lb.
Perennial ryegrass	20-25
White clover	3
Crested dogstail	1

(b)

	lb.
Short-rotation	20-25
White clover	3

(c)

	lb.
Italian ryegrass	25-30
White clover	3

Autumn sowing is recommended, as a spring sowing in most cases will give difficulty of harvest because of the presence of white clover.

2. MEDIUM SOILS

It is on these soils that mixed farming is practised, and therefore the necessity for a really permanent pasture does not arise. On these areas also one finds a good deal of attention being paid to seed production of both grasses and. clovers. The grass seed mixtures are mainly ryegrass and white clover, and the general recommendation is 20 to 25lb. of perennial ryegrass and 2 to 3lb. of white clover, and sometimes, but not always, llb. of crested dogstail. Where the soil is slightly better than medium, short-rotation rye-

grass 20 to 25lb. and white clover 2 to 3lb. The mixture is sown broadcast or drilled, depending on the location, but in general if seed production is the main aim, it is drilled in the late summer, generally about the beginning of February. In certain seasons, if sown under good conditions, these mixtures can provide a substantial amount of late autumn and early winter feed, or they can be utilised for winter-sawed pasture. These mixtures can provide good pastures for from 3 to 4 and sometimes up to 5 years, which is about the normal rotation that can be adopted on these soils. This mixture is of universal use in most areas north of the Waitaki River, the only difference being that as you proceed northward the sowing can be somewhat later and the harvest period earlier. On areas where seed production is not practised as a major farm operation, a mixture of perennial ryegrass, short-rotation ryegrass, white clover and red clover is recommended, the quantities being 10 to 15lb. of perennial ryegrass, 10lb. of short-rotation ryegrass, 3lb. of white clover, and 3lb. of broad red or Montgomery red clover. This mixture, if sown under good conditions and properly managed and receiving adequate fertiliser, can be maintained for approximately 6 to 8 years. Under suitable conditions it may be saved in its second year for a red clover seed crop.

Before the introduction of short-rotation ryegrass the combination of Italian ryegrass and red clover—either broad red or Montgomery-was used quite extensively, and it is considered that under certain conditions it might well be used again. The mixture is a very useful one for the production of red clover' seed. It provides excellent autumn, winter and spring feed and can be very useful for hay or silage and the aftermath used for summer grazing for lambs, or it can be closed for a seed crop. The quantities generally recommended are Italian ryegrass 25 to 30lb. and red clover 3 to 4lb. Under careful management this mixture will give 3 years of very useful production. This mixture is also an excellent one if it is desired to clean up a paddock that has been invaded with *Agropyron repens,* creeping fog *(Holcus mollis),* and browntop *(Agrostis tenuis).* On these medium soils cocksfoot and red clover can also be used, sometimes to distinct advantage, and can supplement the Italian mixture with one of a more permanent nature. The mixture recommended would be 8 to 10lb. of cocksfoot with 3 to 4lb. of red clover, the tendency being for the red clover to dominate the

sward in the first and second year, but if either a hay or a seed crop can be worked in, a dominant cocksfoot sward will be the result. This mixture can have a useful life of from 6 to 10 years. Again, its length of life will depend on the type of grazing management it is given.

3. THE DOWNS AND FOOTHILL SOILS

These soils cover a considerable portion of the district and in some areas, particularly those with a heavy clay subsoil, do present some difficulties. Their past history is one of neglect, resulting in a heavy cover of browntop. They are generally in the higher rainfall belt and are not easy to work. Papers have been given at past conferences on what has been achieved by the advent of tractor power, lime, and phosphate, and it is on these soils that the use of the improved pasture species has paid dividends. The rolling and sometimes steep nature of the country makes it necessary' to keep ploughing to a minimum and to this end a mixture such as the following is recommended: Perennial ryegrass 10 to 15lb., short-rotation ryegrass 5 to 10lb., cocksfoot 5lb., white clover 2lb., red clover 3lb., and crested dogstail llb., and in some of the drier areas 21b. of subterranean clover. The amount of perennial ryegrass and short-rotation ryegrass has been reduced to give the clovers a chance to play their part. Experience has shown that if too great a quantity of ryegrass is sown, it has a tendency to become aggressive to the exclusion of both the cocksfoot and the clovers. As they are in the higher rainfall belt, an early sowing can be adopted and the reduced poundage of ryegrass gives the clovers a chance to establish before the winter sets in. Under careful grazing management and adequate fertiliser this mixture can last from 8 to 10 years. In some areas the inclusion of timothy at 2lb. per acre, particularly the improved strain, has shown quite good establishment and does contribute to the sward. It must be emphasised that careful grazing management is the key to the length of life of the pasture. It must be given a chance to grow and spelling the pasture in the early spring and again in the autumn is very necessary. On the other hand, if the pasture is allowed to get rank in growth, this can do more harm than over-grazing. One is forced to the conclusion, in travelling through the country, that more pastures on the downs country are ruined, not by over-grazing, but by under-grazing.

4. THE LIGHT PLAINS SOILS

These soils are found over a considerable area of the district and before 1936 received very little attention in the establishment of the higher producing grasses and clovers. The appreciation of the value of lime and superphosphate and a renewed interest in subterranean clover have been responsible for a considerable change and improvement, with the result that these soils are now well on the way to playing an increasing part in the drive for increased production.

They are of a droughty nature and anything of a permanent mixture must contain plants that have two things if success is to be achieved. They are:

1. An annual plant that produces sufficient seed to reproduce itself, for example, subterranean clover.

2. Plants with a deep or fibrous rooting system that. can withstand reasonably dry periods, for example, red clover, cocksfoot, *Phalaris tuberosa*, and lucerne.

Perennial ryegrass, short-rotation ryegrass, Italian ryegrass, and white clover are also useful plants that can be used.

In the early stages of development failures were common due to the lack of appreciation of the importance of lime and superphosphate in the establishment and subsequent maintenance. It is surprising that even today, in spite of what has been written and spoken, there are some who still do not appreciate the importance of annual applications of superphosphate for the maintenance of a vigorous subterranean clover plant.

Time will not permit to go into detail regarding the early work in the development. The early recommendations are still valid, but increasing attention is being paid to lucerne, cocksfoot, *Phalaris* ***tuberosa,*** and creeping lucerne in an endeavour to arrive at a satisfactory permanent mixture to recommend. The difficulty associated with a lucerne-cocksfoot mixture is that the cocksfoot will dominate the lucerne in from 2 to 3 years. Trials have been carried out with cross drilling of the cocksfoot and also drilling it in alternate rows; and the latter method does show distinct promise and may be the answer to one of the many

problems associated with the establishment of the lucerne-cocksfoot combination.

Several mixtures that can be recommended for light land are as follows :-

(a)

	lb.
Perennial ryegrass	10-15
Subterranean clover	4
White clover	1

(b)

	lb.
Perennial ryegrass	10-15
Red Clover	3
Subterranean clover	4
White clover	1

(c)

	lb.
Short-rotation ryegrass or Italian ryegrass	15-20
Subterranean clover	4
White clover	1

(d)

	lb.
Phalaris *tuberosa*	4
Lucerne	10

(e)

	lb.
Medicago glutinosa	4
Phalaris tuberosa	5
Subterranean clover	4

(f)

	lb.
Lucerne	10
Cocksfoot	2-3

(g) In alternate drills Lucerne . . . . 6 } Good results by early
Cocksfoot . . . . 3 } spring sowing.

The above mixtures are drilled in the autumn.

More recent trials have indicated that a creeping lucerne in *Medicago glutinosa* may be very useful for sowing on these light soils. In the meantime the original recommendation of ordinary lucerne with cocksfoot and other plants can be relied on to give good production.

There is one point that must be emphasised with the lucerne-grass mixture. The lucerne will not persist once the grass species become dominant, and this also applies to subterranean clover. Both these plants favour an open sward and given these conditions they can play their full part in production.

These light soils offer a challenge to the plant breeder, the experimentalist, and the extension worker for further efforts in finding suitable plants and methods to bring about a really permanent mixture to suit these soil conditions.

HIGH RAINFALL AREAS

So far no mention has been made of mixtures that can be used in high rainfall areas such as West-

land, Grey, Buller, Murchison, Takaka and Collingwood. In these areas it is not so much a question of pasture species, but one of climate and cultivation. The accepted practices in other districts do not always apply to these areas. All that can be said is to work the soil down to a suitable seed-bed and sow the mixtures. This might mean sowing in the winter, but if that is the only opportunity, it is worth the risk to sow, as it may be months before suitable conditions come round again and a good deal of work and production will be lost.

The following are suggested mixtures :—

(a)	lb.
Perennial ryegrass	10
Short-rotation ryegrass	10
Red clover	3
White clover	2
Cocksfoot	5
or	
Timothy	3

(b)	lb.
Short-rotation ryegrass	20
Red clover	3
White clover	3
Cocksfoct	5
and/or	
Timothy	3

Paspalnm is another grass rarely mentioned in the South Island districts. It has been found growing in the Takaka-Collingwood and the Buller-Karamea districts and it is suggested that its inclusion in the above mixtures might be considered.

What has been said regarding seed mixtures must of necessity vary with local conditions. The amounts that have been specified may be altered to meet those conditions, but there is a limit to which these alterations may go. After all, you are interested in having a good, close sward. It follows, therefore, that unless sufficient seed is sown, an open sward will result and the ingress of weeds will follow with a resultant drop in grass production.

The mixtures that have been given will, if other conditions are right, result in a satisfactory sward and a good producing pasture being obtained. In this paper an attempt has been made to review the part that the pasture species play. Very broad soil classifications have been used; seed mixtures have been given that are being used, and an estimate given of the expected life of pastures under good management.

May I conclude by leaving these thoughts in your mind:

1. Proper and timely cultivation in seed-bed preparation.
2. Late summer or early autumn sowing.
3. Adequate fertiliser and lime.
4. Proper grazing management by early autumn and spring spelling.
5. The making of hay or silage when there is excessive growth for the number of stock carried.

Attention to these 5 items will allow the pasture species to give full value and the plant breeder. and extension officer the satisfaction of knowing that their work has not been in vain.