STRAIN TESTING AND NUCLEUS PEDIGREE SEED PRODUCTION

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It is my intention to review the strain testing and nucleus pedigree seed production work conducted by the Grasslands Division during recent years, Particular attention will be *given* to any developments which have taken place and to any new work which has been commenced since a Grasslands Conference was last held at this centre.

SEED CERTIFICATION:

The high prices obtainable for small seeds in conjunction with the demand for New Zealand seeds in England during the war years resulted in a remarkable increase in the number of samples coming under plot trial as part of the requirements of the N.Z. Government seed Certification scheme. The following numbers of samples have been sown in small trial plots in the years 1944-46:

	1944	1945	1946	1947 Autumn sowings only
Red Clover	1680	1885	3680	
White Clover	576	1024	2101	
Subterranean Clover	5	23	II	
Perennial Ryegrass	440	416	701	460
Italian Ryegrass	500	1333	1662	
Short Rotation Ryegrass	Nil	140	660	1660
Cocksfoot	250	434	294	
Timothy	Nil	31	30	
Browntop	125	248	194	
Miscellaneous	Nil	96	8	
Totals:	3576	5630	9341	

However, it is anticipated that the peak number of samples has been reached and there will be fewer tests required this year. It has always been our aim to complete the tests as expeditiously as possible. Broadly speaking, clover plots are satisfactory only when spring sown. This applies also to the slower establishing grasses such as cocksfoot and timothy, The ryograsses can be autumn sown provided the samples come to hand before the end of &arch. An intimate knowledge of the behaviour of the strains with which we are working has enabled us to improve our technique from time to time, An example of this comes from the Short Rotation Rycgrass tests. Trial measurements have shown that Short Rotation Ryegrass made 24 per cent. of its annual growth in the winter months against 14 per cent. from Perennial Ryegrass. Accordingly, we have found it possible to sow the new season's samples of Short Rotation Ryegrass in the autumn and within six weeks after sowing a reliable report on the ryegrass type can be given. On the other hand, the test for the Italian ryegrasses relies on the early maturity associated with true western wolths especially if the latter are spring sown. Therefore, all Italian ryegrasses are sown in the spring and any lines which contain inferior types of plants soon develop early maturing inflorescences leading to early ripening seed heads. The certified types of Italian, most of which are not of pedigree origin make considerable leaf growth before throwing up any flowering shoots.

With the Red and White clovers requiring to be plot tested there is no short cut method. The Red clover differences cannot be reliably detected till the spring, twelve months after the sowing, but all that time when the Broad Red types commence growth, two to three weeks before the Montgomery types, the differences are remarkably distinct. White clover of pedigree origin will make good winter growth if weather conditions are not too severe, but even so it is often necessary to have these plots down for the twelve months before giving a final report,

perennial ryegrasses can be sown either in the autumn or in the spring and within three months of sowing contamination Of even such small amounts as 0.03 per cent. of Italian ryegrass can be detected.

The New Zealand certification scheme appears to be unique in so far that no other seed producing country in the world appears to have a similar orderly system of grading which can be applied equally to each of the several seed producing districts, and a system which, working with the good will of the seed *grower,* and of the merchant, gives the purchaser a guarantee of trueness to type when he buys seed in correctly sealed and branded containers. Likewise, high standards of purity are maintained in all seeds certified.

STRAINS INVESTIGATIONS:

Recent strain investigation6 have been confined to a study of the varying types in Timothy (Phleum pratense) and Strawberry clover (Trif olium fragif erum) .

Timothy (Phleum pratense) is a species of European origin. It is a late maturing grass which grows best in damp situations, but it is also found growing over quite a wide variety of soils, ranging from loams to peats. It requires a relatively fertile soil. It grows in temperate climates but *shows to* advantage in the colder temperate zones. It is a highly palatable grass. Timothy hag been most extensively used in the United States of America and is also an important species in Canada and in Northern Europe. In America the use of this grass has been for hay crops, being used alone or in a mixture with red clover, but in New Zealand timothy is required to grow in an entirely different Set of ecological conditions. Here it is included in seeds mixtures for sheep grazing rather than for dairy farming.

Up till recently Mew Zealand was importing 80 *tons* of timothy seed annually and practically all of this came from the United States of America.

During the course of our investigations samples of different origin as follows have been collected:-

American	23
Commercial	57
Canadian	3
Scotch	6
Swedish	7
New Zealand grown	29
Welsh Plant Breeding Station Selection	15
	140

All the American, Canadian, Scotch, and Imported commercial types tended to be early maturing types, prone to steminess, erect growing and poor tillering. Some of the Canadian and American selections were more leafy than the average commercial samples, but all were essentially early maturing, free seeding hay types. All of these were subject to frost injury or "Winter burn."

The Swedish types were the most susceptible to frost injury, showing the greatest degree of winter burning,

The Welsh selections included the two Aberystwyth hexaploid strains S.51, hay type and also the S.50 *extreme* pasture type. These were markedly different from any *of* the previously *mentioned* types. Although the S.51 strain is regarded as a hay type it has been a good leafy type quite superior to the ordinary hay types.

The densely tillered and leafy S.48 pasture, hay type has shown itself to be an excellent type of plant and its usefulness has already been recognised by the introduction into **the** Government Certification scheme of New Zealand S.48 strain, In the past years varying but relatively small quantities of timothy seed have been harvested in New Zealand, more especially in. Southland. Prom the samples in our trials the Southland grown samples resemble the American types, but yet seem to have undergone a certain degree of ecotypical selection towards a more dense and more leafy type, better suited to New Zealand requirements as a pasture plant, All the evidence available suggests **that** a leafy intermediate pasture hay type is the one which will be of greatest value in our pastures. The superiority of this type is shown by the following yield figures from a grazing measurement trial now in progress:

Period: 1/10/45 - 6/10/47:

	lb. Dry Matter per acre	Relative to N.Z. Grown S.48 = 100
N.Z. Grown S.48	7958	100
Commercial	4248	53

A nucleus selection based on the S.48 type is being brought to the seed increase stage, but in. the meantime the New Zealand grown and certified S.48 strain is one which can confidently be recommended to all those who wish to include this. excellent pasture-hay type timothy in their seeds mixture when sowing down to grass. There is evidence, too, that sufficient timothy seed could be grown annually in this country to meet all our requirements.

The Welsh S.50 selection is an extreme pasture type, fine leaved and dense at the crown, In English trials it has proved a most persistent strain under hard grazing conditions. In our trials it has proved winter hardy but its relatively low production of herbage and its apparently -poor seed setting limit the possibilities of its use in New Zealand.

Strawberry Clover: So far preliminary investigations only have been completed with this species. A collection of seed samples and of turf's from differing habitats has been collected for trial. Some strawberry clover plants have been found growing in dry situations as well as in wet saline localities so that by strain selection the usefulness of this species might be widened. Amongst our present collection one strain named Palestine is outstanding. It is a vigorous winter growing type with large leaves and long petioles as large and as long as are found on the New Zealand No.1 white clover, Its weakness appears to be in its relatively sparse seed setting. This type is being grown out in dry situations to see if it is as hardy and a6 drought resistant as the smaller leaved more common typos found in New Zealand.

NUCLEUS SEED F'RGDUCTION:.

Each year nucleus, seed is being harvested from increase areas planted with seed from glasshouse and nucleus isolations .of bred and selected plants of the following species and strains - Perennial ryegrass, Italian ryegrass, Short Rotation ryegrass, Timothy, Cocksfoot, Montgomery red clover , Cowgrass and White clover. A further stage of increase is usual before nucleus seed

is supplied to tho Department of Agriculture for increase under contract to yield *Government stock* seed. Each year the approximate quantities passed *on* for contract growing *are* as follows:-

Perennial ryegrass	90 bushels
Italian ryegrass	120 "
Short Rotation Ryegrass	150 "
Montgomery Red Clover	200 lb,
Cowgrass	150 lb.
White Clover	150 lb.

and tho s tock seed of *grasses* and clovers distributed each *year is* now an item 'exceeding £12,000 in value.

The following is an example of the rapid increase6 which can be achieved in the multiplication of a successful selection The figures quoted arc for Short Rotation ryegrass.

Year	Quantity	Estimated Value
1941	Glasshouse isolation	
1942		
1943	Nucleus amounts o n l y	
1944		
1945	5420 bushels	£8..,130
1946	44,762 bushels	£67,143
1947	200,000 bushels	£150,000

BLIND SEED DISEASE:

Blind seed disease has been attacking ryegraas crops *most* severely in the last five years. Many crops in, the seed growing districts of Canterbury have bean heavily infected for several years in succession and accordingly the problam as a whole is one of great economic *importance.* Our experiments have shown that until a resistant strain of true perennial ryegrass can be bred up, the only means of control at present is that which can be obtained by crop management. In this direction the aim is early closing of seed areas and the inclusion of a good type of white clover so that early in December the crop will be a dense growth of ryegrass and white clover which will lodge and remain lodged until the crop is harvested,

Some experiments were conducted last season, using the various commercially available fungicides, on a field crop of Perennial ryegrass. Some bottor germinations were obtained using Cuprox as a dust and Colloidal sulphur as a spray, but complete control was not achieved.

Further experiments are in operation to determine the place of fertilisers, particularly nitrogenous fertilisers, in promoting vigour and density within a crop, as these. appear to be the two most important factors capable of application on a farm scale .

Generally pedigree seed growing requires the utmost care ii good yields and freedom from undesirable impurities are to be obtained, and so far the New Zealand seed grower, assisted by the seed certification system, has produced high grade pedigree seeds remarkably purr; and true to type. Such seeds should be used freely by our own farmers in the revival of their pastures and On the sowing down of special purpose pastures, while any surplus of such seeds should be able to find a place in the seed markets in other parts of the world.