THE PRODUCTION OF FESCUE SEED.

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The production of Fescue seed although of comparatively minor importance to the Dominion as a whole, is regarded by the producers of the major portion of the crop in Otago and Southland from a very different standpoint. Furthermore, at a time when markets for our primary produce are apparently limited, and diversified farming is generally advocated, the growing of small seeds, and in particular, Fescue Seed for which we have an existing market is to be encouraged. Apart from the loss of vitality of the seed in transit, the overseas buyer rccognises the superiority of New Zealand grown Chewings Fescue for use where a thick fine turf is desired.

HISTORY OF CHEWINGS FESCUE IN SOUTHLAND AND OTAGO.

Before considering this crop from the seed production point of view a few remarks regarding its early history in Southland, will perhaps be both interesting and enlightening. It would appear that in 1880 this seed was first introduced into Southland in a lawn mixture supplied by Messrs. Hurst & Sons, London, and a small paddock at Rimu, Southland, was sown down with this mixture. This paddock was harvested and later some of this seed was used on Glenelg Station for sowing on the hilly country. About seven years later this property was bought by Mr. George Chcwings, and the first considerable quantity, about eighty sacks of seed was harvestcd there, - the following year 250 sacks were sent in for cleaning. Mr. George Chewings then went to thc North Island on holiday, and during his trip advised many farmers and runholders whom he met to try his Fescue for thc pumice lands of Auckland. The result of this was, that enquiries were received from the North, for samples and quotes for "Chewing's Fescue" and Chcwings Fescue it has remained until today. The third lot of seed dressed in Southland, was two consignments of **450** and 200 sacks and it is from this small beginning that an export trade, for Chewings Fescue has been built up,, until in **1933** there was a tote1 quantity of **966** tons of seed exported, of which.592 tons went to U.S.A., 294 tons to the United Kingdom and **57** tons to Canada. The value of this crop was £34526.

FESCUE COUNTRY. The area of land in New Zealand producing Chewings Fescuc Seed, according to the statistics of 1933/34 was **7834** acres of which, **7800** acres were in Otago and Southland. Thc type of country upon which the growing of this crop is undertaken, is extensive plains, the soil type generally light and shingly, of fairly low fertility and consequent low stock carrying capacity. The climatic conditions of thc Fescue growing districts, particularly in Southland are fairly extreme; some idea of this can best be illustrated by mention of the fact that one district is known locally as "Siberia." Thc winter months are generally cold and bleak, and the summer hot and dry, and during this latter period, these plains are subject to strong westerly gales. These conditions appear admirably suited to Fcscuc Seed production, except that the gales mentioned, make the harvesting of the crop something of a hazard.

SOWING AND EARLY TREATMENT. Areas intended for seed production are generally sown broadcast in November/December. Seeding is generally at the rate'of about 20 pounds per acre, a nurse crop usually rape or rape and turnips, is general. Somctimcs Fescue is sown in September/October with Oats, the oats are cut and, threshed, and the stubble is grazed by sheep. When thc former method of sowing is adopted thc nursc crop is grazed off in breaks during thc succeeding

Autumn and Winter, and in the following spring the young Fescue growth provides a limited amount of grazing. This grazing is conducive to good tillering and the more even ripening of the seed crop later. Generally Fescue is not regarded as a good pasture grass, but if kept to the short stage of growth the sheep graze it quite readily particularly in the mornings when there is dew on the leaf. If the sward has not thickened up satisfactorily, the area is not seeded in the first year, but grazing is carried on until October in the second year-or until such time as is considered necessary,. when the area is closed up for seed purposes.

HARVESTING, The harvesting of this crop demands a great amount of skill and experience, the existing climatic conditions, the size of the areas generally to be harvested, and the nature of the crop, have all to be taken into consideration to ensure best results. In a dry year the crop is cut in December, in a normal season cutting does not take place until January and in a late or wet season this is delayed until February. The method generally adopted to decide whether or not cutting should commence, is for the grower to walk through , his crop;as soon as there is the least sign of the developed seed falling when touched no time must be lost; if a start is not made at this stage there is groat risk of very considerable loss of seed. According to the size of the area to be cut so the number of binders used, varies. Fescue is ready almost to thc day, and it is rccognised that the crop must be all cut and stooked within three days of opening up of the paddock. Any hollows whcrc thc ripcning might bc uneven are left out of the main block and these arc cut separately at the correct stage. The idcal in Fescue, as in other grass seeds, is to supply the trade with a well developed seed, of heavy bushel weight, and of good bright colour; the colour of good marketable seed should be-steel blue. The crop is stooked off the binders, and is then allowed to dry out or mature in the stook. If tho chance of threshing out of the stook is remote thc Fescue is stackcd, but growers generally are loath to do this, as thc seed shakes readily and every handling means a loss of seed. Further mention of stook and stack threshing will be made later.

SUBSEQUENT TREATMENT. A seed crop is generally taken for three or four consecutive seasons, according to the soil type and the condition of the paddock. After the fourth harvest the turf generally appears to become "Root Bound" and produces very little seed, Renovation is then necessary. This renovation generally consists of skim ploughing, and here again skill and experience arc very necessary. The ploughing must be undertaken as late in the winter as possible, consideration of course having to be given to the size of the area to be ploughed. The late ploughing is necessary to avoid as much frost as possible; too much frost breaks up the furrow and weakens the early fescue growth. One of the greatest drawbacks in this renovation of Fescue is, that it permits of the ingress of weeds, the two worst being Cat's-ear (Hypochaeris radicata) and Fog (Holcus Lanatus). The furrow must be shallow, and as narrow as possible, and must be well "cocked". In other words each furrow must over-lap its fellow as high up as possible; if the furrow is turned over too flat or the old turf turned down the Fescue will not survive. If this ploughing is properly carried out, the Fescue comes away, between the furrows, in the following spring, The economic importance of skill in this matter of renovation is therefore obvious. Renovation by ploughing can generally be undertaken four times at four yearly intervals, At the end of this time thc Fescue snard is so weakened that further renovation is no longer payable and the area is then broken up and after a ,

short rotation is resown. A point worthy of note is that the first year after skim ploughing, there is little *or no* seeding, so that the grower generally loses one crop in *four.*

TOPDRESSING. Of recent years there has been a fairly steady increase in the quantity of nitrogenous fertilizer used on Fescue. It has also been suggested that the use of fertilizer would obviate the necessity for skim ploughing but this latter, is decidedly problematical. There is no doubt, however, that, given favourable climatic conditions, an application of Sulph, Ammonia of between ½ to 1 cwt. per acre is a paying proposition in the matter of increasing the seed crop. It is necessary that two factors be taken into consideration if this is to be so. Firstly, the application must not be made too early, and there must be sufficient moisture to insure benefit from the fertilizer. It will be recognised, when consideration is given to the facts previously stated, regarding the usual weather conditions prevailing when fertilizer is likely to be applied, that the resultsfrom such applications are uncertain. To ensure a payable return it is necessary to secure 1½ bags of seed per acre, ex mill; a crop yielding less than this would not pay to cut in an average year, An increase of ½ a *bag* of seed to the acre from topdressing will pay. Furthermore an application of 1 cwt. of Sulph. of Ammonia per acre followed by favourable weather conditions, will, and has in the past, made all the difference between a good payable crop and a failure. Growers in the South recognise that the best time to apply nitrogen is just when the Fescue is commencing to shoot,, but of course as previously stressed much depends upon favourable climatic conditions. If the application is made too early a vigorous leaf growth is promoted, and the seed yield appears to suffer in consequence. The results, whether detrimental or otherwise, of these nitrogen applications over a number of years, have yet to be ascertained., No phosphates are applied, but Carbonate of Lime generally in small quantities is often used as an agent to assist in the even distribution of the Sulph, of Ammonia. While on this matter of topdressing mention should be made of a case in Southland, where an application of 1 cwt. of Sulph, of Ammonia to a twelve year old Fescue pasture resulted in a very heavy seed crop; previous to this the paddock had been considered as useless for a seed producing area. The usefulness of applications of fertilizers to fescue is worthy of further investigation.

EXPORT MARKET AND GERMINATION FACTOR. Practically the entire bulk of the seed produced is exported, up to 1000 tons can be placed; the export figures for 1931, 1932 and **1933** are 705, 672 and 966 tons respectively. Later figures are not available. The seed is used almost exclusively for golf courses, tennis courts and other playing areas generally, The average price to the grower for dressed seed is about 6d. per-pound, but this price varies very considerably, up to 2/3d. per pound being paid for seed last season. The price depends, as in most seeds for export, upon the seed yields in the Northern Hemisphere and of course upon the yields and quality of the local product. Since 1931 there has been a steady decline in the area producing seed, the figures arc 1931/32 - 13,000 acres, 1932/33 - 9426 acres, and in 1933/34 - 7834 ***acres.*** The figures for the last season are not available, but the area was not excessive, and the yields were light. This decline in the area can be attributed to the unstable state of the export market from season to season, and a strong influencing factor in the export market was the unsatisfactory germination of the seed on arrival overseas. For a great many years this loss in germination during transit has been recognised, but buyers were not greatly perturbed so long as prices

were low; but with improved prices this loss in germination became of considerable importance. It was thought that time cr stage of cutting might be responsible for the loss of vitality, and as stated previously, the custom of threshing from stook,as against stacking and threshing, might be the cause. There is no doubt but that this is one of many contributing factors, and moisture content and'mode of transit further aggravate the trouble. Experiments, to, investigate possible reasons for, and methods whereby this loss in germination might be overcome, were undertaken by the Department of Agriculture in 1932 and 1933. One of these experiments consisted of twelve commercial lines, six stack threshed and six threshed from stock, the ides being to compare the behaviour of stook and stack threshed seed+ both dried and undried. The results showed no superiority of the stack threshed over the stook threshed, but the dried seed gave definitely superior results under germination tests in America. Another experiment, the seed for which was specially grown at the Government Experimental Area, Gore; consisted of four manurial treatments.

1. Super at 2 cwt, per acre.
2. Super at 2 cwt. plus Sulphate Ammonia, at 2 cwt. per acre.
3. Super 2 plus Sulphate of Ammonia 2, plus 30%Potash Salts.
4. Sulphate of Ammonia 2 cwt. per acre, and no manure.

There were twelve replications of each treatment. The plots were harvested at three stages --

1. Barely ripe.
2. Ripe stage.
3. Over ripe stage.

At each stage four replications of each treatment were cut. All were threshed out of stook, and there were no significant differences in the germination of the seed from the various manurial treatments, or at the different stages of cutting when tested in New Zealand prior to export. Samples of the seed from each treatment, and each stage, were shipped to England, using the following methods. --

(1 and 2) Dried to 5%and 9% moisture content, and shipped in lined moisture proof sacks.
(3.) Undried and shipped in cool storage.
(4). Undried and shipped under ordinary hold conditions.

The samples were placed upon arrival under germination test at the Official Seed Testing Station Cambridge, and the result indicated little or no loss of vitality of the seed which had been dried and packed in moisture-proof sacks. That shipped in cool storage (undried) and ordinary hold (undried) indicated a loss of from 1% to 13%, the greatest' loss being in the seed taken from the plots cut at the barely ripe stage. These results would appear to indicate that, provided harvesting is not commenced too early, the loss of vitality in transit can be overcome by drying and packing in special containers. It should, however, be born in mind that this experimental shipment as a whole was successful. Except for the seed taken from the early cut plots mentioned above, the germinations on arrival were all over 90% and the lowest of the entire consignment was80%. This latter figure represents a loss of only 13% during transit,' and the greatest loss during this period was 14%; this is comparatively low when we consider that commercial shipments have been reported on arrival overseas with a germination as low as 30%. Undoubtedly the drying of seed would give satisfaction, but the cost of a drying plant, special packing, etc,, would considerably increase the cost of seed to the overseas buyer, and the point arises as to whether this extra cost is justified;. or in other words if

drying is really necessary, particularly in consideration of the fact that at least one exporting firm in Southland is getting splendid results from forwarding their seed in cool storage. Many shipments have been sent, and according to their report, there has been no germination of- less than 90% on arrival. Generally germinations have been 95% and over, and the extra cost of shipping by this method is less than ¼d. per pound. The greatest trouble is to get refrigerator space allotted for the seed, The results mentioned above would indicate that further investigation in this matter could be undertaken. It is understood that a small seed drying plant is in course of erection in Southland, and undoubtedly the owners would be willing to co-operate in any shipping of seed trials.

CONCLUSION, (1.) The production of Fescue Seed is of considerable importance to growers and merchants in the South and the production of seed should be fostered particularly as the type of country devoted to Fescue Seed production is such that the fertility could not be raised economically to a high stock carrying capacity and if the market for this seed can be maintained growers can obtain a very good financial return. (2). There is scope for investigation work regarding top-dressing and renovation of Fescue areas, a suggestion being that grass harrows of the Whakatane type could be used for renovation to reduce considerably the area annually under the plough. (3) That further investigation work, particularly with reference to seed drying and cool storage is necessary before finality can be reached in the matter of the loss of vitality of Fescue seed during transit.