

PEDIGREE SEED PRODUCTION.

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The end phase of selection and breeding is pedigree quality. Pedigree presumes constancy to type in the parent and in its offspring, and it presupposes that selection has proceeded towards the retention of desirable characteristics only. Natural ecotype selection processes have for upward of 80 years been at work in New Zealand on the European grasses and clovers originally introduced. The guiding hand in that selection has been environment and fortuitous chance mating. The arable environment has tended to the annual. The perennial grazing environment has tended to the perennial - low growing and low producing perennials under a close grazing environment; a taller, more leafy and higher producing type under a looser grazing environment.

Artificial selection of the plant breeder aids and abets natural selection by facilitating the process of elimination of the undesirable factors, firstly by the removal of "off" types by eye, and, secondly, by progeny testing that distinguishes between homogeneity and heterogeneity in the parent. Pedigree is the ultimate expression of the natural ecotype, but evolved by processes undreamed of, in respect of speed as against where natural environmental forces are alone the culling and selecting agent. The human hand, for example, may in a day bring pollen to stigma that under natural conditions where the law of chance is alone operative may take a thousand years.

Natural ecotype selections are being commercialised in New Zealand under our system of strain testing and seed certification. Seed certification in New Zealand has given confidence to our own farmers in the renewing of their grasslands and is becoming also a factor in our export trade, and ultimately I am confident that world trade generally will demand seed certified as to type and origin just as now it demands information regarding germination and purity.

Pedigree in the seed trade is bound to eventuate as a generality rather than as a speciality, and the Department's endeavour at the moment is to produce pedigree stock seeds and to arrange under certification for the multiplication of these to a point where they may be put on the market at a price that will enable every farmer to use them. Pedigree means little nationally unless it can be exploited by the rank and file of the producers of the country.

The value of pedigree seeds - It is not possible to lay down at the moment the monetary value of pedigree in herbage, but the following pointers are put forward.

(1) Pedigree seeds carry with them an inherent capacity for greater production. It must not be

assumed, however, that pedigree will ensure success unless conditions are made favourable for their optimum growth any more than a high producing pedigree animal will produce well when starved and ill-treated. Pedigree does, however, offer a greater potentiality for higher production when optimum conditions for growth are created by the farmer.

TABLE I: Showing potentiality for high production of pedigree ryegrass against ordinary certified ryegrass and British, indigenous. Green weights each of 100 single spaced plants.

| <u>Ryegrass Strain</u> | <u>Green Weight.</u> | <u>Relative.</u> |
|------------------------|----------------------|------------------|
| Certified Mother seed, | 591 ozs. " | 100 |
| Pedigree, | 1175 | 199 |
| British indigenous, | 303 " | 51 |

(2) Pedigree seeds are selected and bred to give a longer seasonal spread of production. Instead of the usual sharp peak of production from each species of the sward pedigree tends to give a broad peak, growth coming earlier and carrying on later into the winter.

TABLE II: Showing long seasonal spread of production of pedigree white clover against other strains. Seasonal growth - Weight in pounds.

| <u>White Clover Strain:</u> | <u>Summer:</u> | <u>Winter:</u> | <u>Spring and Summer:</u> | <u>Late Autumn:</u> |
|-----------------------------|----------------|----------------|---------------------------|---------------------|
| Certified Mother Seed: | 14,500. | 2,520. | 38,934. | 3,500. |
| Pedigree: | 18,608. | 5,350. | 39,300. | 5,110. |
| Ordinary New Zealand: | 8,380. | 950. | 27,024. | 740. |
| British Wild White: | 6,790. | 662. | 25,420. | 510. |
| Imported Dutch: | 6,090. | 510. | 15,214. | Nil. |

This point in regard to spread of production is being carefully watched and the New Zealand pedigree strains as they appear on the market will therefore not necessarily consist of one homogeneous uniform type - a general attribute of pedigree standard in so far as the individual is concerned - but will consist of a mixture of types known to breed true, to blend well together and to give a high per acre production, spread as uniformly as possible throughout the year.

(3) Pedigree seeds assure a greater persistency of the species sown and this probably will be seen to best advantage in the sowing down of second class soils even though here maximum production may not be secured owing to harder conditions for plant growth. Greater persistency in the initial breaking in process of poor land is an essential feature to success, and this coupled with an inherent high producing capacity in the strain sown means that each step in the improving of soil conditions ensures a corresponding response by the pasture.

TABLE III: Showing relative persistency of pedigree ryegrass and certified Mother seed - Analysis 400 single plants.

| <u>Strain Of ryegrass:</u> | <u>Percent persistency after 13 yrs.</u> |
|----------------------------|--|
| Certified Mother seed: | 48% persisting. |
| Pedigree: | 98.5% " |

Pedigree seeds are less susceptible to disease, **care being** taken in selection and breeding to ensure that no disease susceptible plant is carried forward to the pedigree stage. The total elimination of disease, however, is not claimed at the moment, but the point is being very closely watched.

Increase growing and Commercialisation of Pedigree Seeds.

For five years the Department has **been** working steadily selecting and testing individual plants of the most important grassland species, and a stage has now **been** reached where the commercialisation of this work is at hand and it is proposed to proceed along the following tentative lines: -

Phase 1: The plant Research Station raises nucleus pedigree stocks from seed of selected plants of approved type and which have been tested as to their **ability to** breed true to that type. The approved plants are control pollinated within pollen-proof glasshouses in the case of grasses, or bee-proof enclosures in the case of clovers. Sufficient of this control pollinated seed is produced to plant approximately one acre at the plant Research Station where it is grown under as good isolation as possible. In planting this area single spaced plants are used, these **being** raised from the control pollinated material sown in boxes in sterilised soil. The spacing of the plants ensures control of all volunteers that may be lying dormant in the soil. The seed crop from this one acre is called "Nucleus pedigree stock seed." This year the Station produced 38 bushels of nucleus pedigree stock perennial ryegrass, 224 lbs. of nucleus pedigree stock white clover, and 120 lbs. nucleus pedigree stock Montgomery red clover.

Phase 2: The second phase is the growing on of this nucleus pedigree stock seed **by** farmers, specially selected from a point of view of district and isolation. This seed is grown by the farmer on contract to the Department and a price to the farmer has been decided upon which is equivalent to the ruling market price for certified Mother seed of the same species plus a bonus to cover the cost of extra work that is involved in the cleaning of the crop. Wherever possible contracts are let with farmers who are at present producing certified Mother seed of the same species so as to ensure that if any volunteer does contaminate the crop it at least will be of a certified Mother seed standard rather than one that may **be** rejected for ordinary certification. Approximately 73 acres have been sown under contract this autumn.

The resultant seed crop grown under contract is the property of the Department and is **named** "Government pedigree stock seed." Four hundred and fifty pounds of Government stock seed of white clover were produced this year at the Pure Seed Station at Lincoln in the South Island.

The Department may be open to some criticism for entering at all into contract growing of pedigree seed but I have recommended this course in order to make the work revenue producing to a point where the Government **may** recoup itself for the expenditure

involved in selection and breeding up to the point where stocks, are available for commercial seed production'. At the present time the Plant Research Station is badly equipped in the matter of a permanent area of land, machinery, and labour, and contract growing to reproduce and multiply our nucleus stocks is resorted to so that the pedigree work of the station may be put on a sound footing to carry on the work in an up-to-date and efficient manner.

It is not intended that the Department will enter competitively in the seed Trade as far as the main crop of pedigree seeds is concerned, but it has adopted the principle of contract growing to increase its small nucleus pedigree stocks because it can place that growing in areas abounded by naturally good ecotypes rather than concentrate the growing on a single farm where isolation is extremely difficult, and, moreover, use can be made of the farm, the farmer, his implements, machinery and stock, that are all so essential in grass and clover seed production and which the Department would have to secure and maintain if it undertook the increase growing on its own account. Experience in the future may dictate the Department needs greater control of land preparation, cultivation, stocking, harvesting, threshing, etc., than what it can get by contract growing, but until this eventuality does present itself contract growing will be given a good try out.

Phase 3: The third phase sees this Government pedigree stock seed sold outright by the Department to seed merchants on a wholesale basis with a recommendation that it be either contract grown by the merchant or sold to prospective seed growers.

In the case of enquiries from farmers direct to the Department it is intended that while the Department has stocks on hand such direct orders will be filled by the Department, but the trade will be given full opportunity as soon as harvesting is complete to purchase the whole of the Government pedigree stocks. It is suggested that Government pedigree stock seed sold to farmers will be on a retail basis and those to merchants on a wholesale basis,

The Government pedigree stocks produced this year (450 lbs.) were sold by the Department, mainly wholesale, but a certain amount was sold retail to farmers who had sent application or had spoken for the seed prior to harvesting. Approximately 150 acres of this seed have been sown out this autumn or arranged for spring sowing.

Phase 4: The fourth phase results in the production of certified pedigree seed within one or other of the following classes:-

(1) Where the Government pedigree stock seed is sown in an area approved by the Department and where it can be definitely ascertained by field inspection and laboratory tests that the stand secured is of the seed sown and not of a volunteer type then the resultant crop may be harvested under certification, sealed and tagged as "Certified Pedigree Mother Seed."

(2.1) Where the Government pedigree stock seed is sown in a non-approved area or where it is contaminated

somewhat by volunteer strains it may be graded as "Certified pedigree commercial seed," or it may be degraded to ordinary certified seed or rejected for certification, according to extent of contamination.

Phase 5: The fifth phase, assuming that the crop produced under phase 4 is certified pedigree Mother seed, consists in further once growing the certified pedigree Mother seed to produce a crop that is eligible for certification as "Certified pedigree commercial seed," or as ordinary certified seed, or rejected according to extent of contamination as under (2) Phase 4. It is not expected there will be any rejection in connection with the growing of these crops. Certified pedigree commercial seed is the class of pedigree seed that will be used for export or for the laying down of permanent pasture, apart from seed production altogether.

This completes the once growing of seed so far as the pedigree class is concerned, but certified pedigree commercial seed may still be used to produce seed within the ordinary certification class, subject, of course, to field inspection and trial. Summarised, pedigree seeds may fall into the following four tentative classes: -

- (1) Nucleus pedigree stock seed which is produced only at the Plant Research Station.
- (2) Government pedigree stock seed which is produced on contract with approved farmers and sold to seed merchants by the Department on a wholesale basis, or to farmers on a retail basis.
- (3) Certified pedigree Mother seed - produced by farmers on approved areas and handled under certification as for ordinary certified crops.
- (4) Certified pedigree commercial seed produced by farmers and handled under certification as for ordinary certified crops.

In addition to the last two classes the ordinary certified seed will still be on the market, and while the introduction of pedigree classes of certified seed complicates the buying and selling of seed, yet I think the differentiation into pedigree and ordinary certified is well worth while in view of the call for improvement in seed type that is becoming universal.

For export purposes it may be necessary and desirable to simplify greatly the classes of certified seeds offered and it is suggested two classes of certified seed be made for export, one class covering all ordinary certified seed and known as "New Zealand Certified seed," the other to cover all pedigree certified seed and known as "New Zealand Certified pedigree seed."

For the internal trade where grades are essential in the scheme of increasing the original stocks it would seem impracticable that more than two classes be maintained.

This paper has been brought forward for general discussion and it does not necessarily represent the final arrangement that may be made by the Department, either in the classification of pedigree seeds adopted herein, or in the means of disposal of the Government pedigree stocks. The opinion on these matters, both on the farmer and of the trade, is requested.
