

(b) *Single-plant Study*.—Two thousand two hundred single plants drawn from twenty-two of the best commercial Hawke's Bay lines previously tested were planted out for detailed study. These have been heavily culled during the year for rust and other constitutional weaknesses. The best of those left will be lifted and split up into tillers and subjected to a further trial under a triple system of mowing—lot 1 under cultivation as single plants; lots 2 and 3 will be planted out and, when established, sown about with a mixture of cocksfoot and white clover; lot 2 will be mown at seven to ten day intervals; and lot 3 will be cut at ensilage or hay stage. Those then that show best general production under all conditions will be further split up and propagated as an improved strain. Five hundred plants that have been tested under intercultivation and mowing for two years are showing marked differences in behaviour, and the intention is to propagate the best of these and plant out for seed-production.

(c) *Growth-form Experiment*.—Nine hundred single plants, representing sixty clones of fifteen plants each, and eight different growth-forms have been set out and placed under the triple system of cutting as outlined in (b) above.

(d) *Elite-strain Work*.—Two acres and a half of rye-grass (21,000 tillers) were planted out at Flock House, Bulls. These were secured by splitting up some 50 plants selected out of approximately three thousand Hawke's Bay single plants. A mistake was made in not cutting or grazing these back prior to shutting up for seed. The crop went into the spring and summer heavy in leaf and, owing to overmaturity of the leaf, rust attack was so severe that the majority of the area was cut and the crop removed prior to ripening. A somewhat later-maturing, erect, dark-coloured leafy type, however, resisted rust, and some 2 bushels of seed was secured from this lot. This seed is at present under trial and if it proves a superior type a larger area will be sown out in the spring. All the rye-grass plants that rusted have been ploughed in and a selection made from the rust-resistant type. These will be further split up into tillers and the  $2\frac{1}{2}$  acres replanted with these during the coming winter.

Half an acre of an elite strain of rye-grass from Aberystwyth was sown out this autumn in rows 18 in. apart. This is to be grown on behalf of the Welsh Plant Breeding Station in pursuance of their policy of once growing in New Zealand elite strains from that station. A seed crop should be secured during the 1931-32 season.

#### WHITE CLOVER.

(a) *Certification Trials*.—One hundred and sixty-five lines for determination of type and for certification purposes were sown out in the spring. An additional two hundred and ten lines were sown out this autumn. An interim report on the spring-sown lines has been submitted to the Agronomist.

(b) *Single-plant Study*.—Four thousand single plants put out in November, 1929, have been studied in detail, and careful records of the performance of each made. The New Zealand Wild White lines have been outstanding. Kentish and ordinary New Zealand have made moderate growth only, while the New Zealand Dutch types and ordinary imported lines have done very poorly indeed.

(c) *Broadcast Trials*.—Those sown in 1928 have been ploughed up. Up to the time of ploughing in, the New Zealand Wild White was easily the best, and had spread and swamped out adjacent poorer types.

Eight hundred lines under trial sown in 1929 have been carefully recorded. Total production, speed of recovery after cutting, and persistency of the various lines were most marked. The New Zealand Wild White is again outstanding, and plots sown with this type are improving rather than deteriorating. Ladino White has put up a very poor showing during the past autumn, and the Kentish, although dense, is far below the New Zealand Wild White type in production at any period of the year. The imported Dutch types have virtually gone right out.

(d) *Elite-strain Work*.—Fourteen thousand eight hundred plants were set out at Flock House, Bulls. These made excellent growth during early autumn, but no payable seed crop was produced, but a few pounds were hand-collected for trial prior to taking a full crop next season. The 4,400 single plants at the Station representing the best New Zealand Wild White have been heavily culled, and some of the more outstanding plants have been marked for propagation by cuttings and further testing during the coming year.

#### RED CLOVER.

(a) *Certification Work*.—A few lines only of red clover are under trial for determination of type, and none yet are actually under certification. Some Montgomery Red has been imported and sown out in New Zealand for seed-production purposes. It is highly probable that the Department will be asked to certify to these crops, and samples of the seed sown have been submitted by growers to enable this to be done.

(b) *Single-plant Study*.—One thousand single plants of Montgomery Red planted in 1929 were allowed to run to a heavy crop this summer. A heavy death-rate has occurred which would indicate that a good deal of work yet is required before we can definitely offer a truly permanent red clover.

Three thousand five hundred single plants were put out during the year. These were in the main Montgomery Red lines and a number of other types from overseas research stations. Several Aberystwyth-bred lines are included in this trial. It is extraordinary the marked variation that exists in red clover even of the station-bred lines, and much preliminary testing of growth-form is necessary before we can determine just what is the best type to work for. It would appear certain that the intermediate late red clover as represented by Altaswede and Hersnap strains is useless for New Zealand conditions. It would appear that Aberystwyth had spent a good deal of time on this type. The two types of most value to New Zealand are the Broad Red type and the Montgomery type, the former of particular value for temporary and short-rotation grassland and the latter (after severe culling and much work in getting a uniform type) may be very suitable for permanent pasture. Montgomery Red will not replace Broad Red in New Zealand, but it could well be added as an additional clover, as it were, for permanent-pasture work.

(c) *Growth-form Experiments*.—In order to test growth-form particularly among the Montgomery Reds six plants each of six different growth-forms were selected and from each plant were propagated by cuttings clones of fifteen plants each. These have been planted, and two of the three rows of each sown about with cocksfoot and white clover. These will be differentially cut, as in the case of rye-grass growth-form experiments.

(d) *Broadcast Trials*.—Those sown in 1928 have been ploughed up. The European Broad Reds—Lombardy, French, and Italian—had almost completely disappeared in both hay and mown sections. New Zealand Broad Reds stood the test extremely well, particularly in the hay section. The Montgomery Reds never at any time beat the Broad Reds in production, but certainly were persisting much better under constant mowing. Forty-one lines sown in the spring, 1930, are being differentially cut under triple-mowing system. The Broad Reds have outyielded all other types since growth commenced. Under regular cutting, however, the Montgomery Red is swarding well.

(e) *Elite-strain Work*.—No progress apart from testing growth-form.