

dry spring represented a condition under which nitrogen had not been tried previously. The results were quite satisfactory, and the Department is now in a position to recommend the spring application of soluble nitrogen to the wheat crops. On an average, a 5-bushel increase is to be expected from the use of 1 cwt. of nitrate of soda or sulphate of ammonia. This on top of an average 5-bushel increase from super means a 10-bushel increase over "no manure." Potash is of little use, and is likely to depress the yield. The increased rate of sowing of super to 2 cwt. per acre does not give very good promise in the main.

Propaganda: After last harvest a summary of six years' results, with recommendations to farmers, was printed, and 5,000 copies were distributed amongst wheat-growers.

(ii) Trial of five different forms of nitrogen at three different times of application: Until this year there was no information on the correct time to apply nitrogen to autumn- or winter-sown cereals. A detailed trial was made involving the use of nitrate of soda, sulphate of ammonia, urea, calcium cyanamide, and calnitro. The results indicate that nitrate of soda is the most efficient form of nitrogen, and the best time to apply is between the middle of September and the middle of October. Sulphate of ammonia was next in efficiency, but apparently should be applied about a month earlier than nitrate of soda. In view of its cheaper rate per unit of nitrogen, sulphate of ammonia is the best form for farmers to use. This work must be continued for several years before definite conclusions can be drawn.

(b) *Rate of Seeding Trials*.—A knowledge of the effect of rate of seeding on yield is highly important in variety trials. Evidence obtainable indicated that a small increase in seeding in excess of the optimum for the particular season and soil would not affect the yield. If, however, the seeding happens to be a few pounds below the optimum the yields suffer. In variety trials it is necessary to eliminate such factors as rate of seeding. To test the accuracy of the evidence, two trials were laid down with two wheats differing markedly in habit of growth. The results of one trial confirms the theory on which the trials were based. With one variety 95 lb., 110 lb., and 120 lb. of seed per acre respectively did not differ in yield or size of grain produced, although all were better in yield, than a seeding of 80 lb. per acre. In the other trial the yield continued to rise with each increase in rate of seeding. Hence the optimum was not exceeded, so the working hypothesis could not be tested.

(c) *Variety Trials*.—Three of these were carried out in Canterbury, and indicate the necessity of the trial of varieties on different soil-types. In one trial Major was 6 bushels better than Tuscan, while, on another soil-type it was several bushels poorer. A programme is arranged for the coming season in collaboration with the Wheat Research Institute.

(d) *Effect of Hot-water Treatment for Control of Disease on Yield* (trial conducted on behalf of Mycologist).—The trials of last season were continued, with very promising results. Three treated varieties were under test. Tuscan under hot-water treatment yielded about 4 bushels per acre better than untreated. Hunters under treatment was 2 bushels better than untreated. There was no effect with Pearl.

These trials and the rate of seeding ones were conducted at Lincoln College on paddock kindly lent by the College. The officers of the College rendered every assistance required.

#### (2) Oats.

(a) *Manuring*.—Three trials were conducted at the Gore Experimental Farm. The results of these were published in the *Journal of Agriculture* for January, 1930, page 45.

(b) *Hot-water Treatment*.—In the 1928–29 trial the treatment had no effect in yield. The 1930 trial was spoilt by a growth of weeds and was not threshed.

#### (3) Barley.

(a) *Manuring*.—Three manuring trials were conducted in Canterbury and Otago. The results are not yet available.

(b) *Hot-water Treatment*.—As for wheat. In 1928–29 the treatment had no effect, in 1929–30 the treatment gave a remarkable increase of about 7 bushels per acre. This trial was carried out on the Canterbury Seed Co.'s farm, by courtesy of Mr. Hewlett, manager of the Canterbury Seed Co.

#### (4) Potatoes.

(a) *Manuring*.—(i) Early potatoes, Pukekohe district (Auckland): Three experiments were conducted in early potato manuring. The salient features of the results were: (1) Potash at 2 cwt. per acre had no effect on yield when added to phosphate and nitrogen. When used at 4 cwt. per acre the yield was depressed. (2) Sulphate of ammonia gave paying results when used at 2, 4, and 6 cwt. per acre in addition to superphosphate. The greater quantity gave the best paying return. (3) Manure placed in a narrow band of about 3 in. wide along the line of the sets was significantly more effective than manure sown in a broad band about 9 in. wide. These trials are being repeated. A report on these experiments will be published in the *Journal of Agriculture* for April, 1930.

(ii) South Island experiments on main crop of potatoes: The 1928–29 experiments showed a fairly consistent response to superphosphate and also to sulphate of ammonia. As an addition to phosphate, potash had little effect, except in South Canterbury and Southland.

About 20 experiments were sown in 1929. These are not harvested yet. The indications are that phosphate + nitrogen is giving the best results. Newer fertilizers such as Ammophos and Diammonphos are under trial. The results of the experiments covering a period of three years will be summarized for publication this winter.

(b) *Certified versus Non-certified Seed Potatoes*.—Eight trials were laid down in the South Island to test the differences between a mixture of lines of certified potatoes and a mixture of lines of uncertified potatoes with each of four varieties. The work has been conducted on behalf of the Agronomist. The crops are not yet dug. The growth indicates a marked superiority of the certified lines over the uncertified.