THE SPROWSTON FARM

A Report for Members of the Norfolk Agricultural Station

December, 1955 Vol. 1. No. 5

RESULTS OF CEREAL TRIALS, 1955

The results of cereal trials carried out in 1955 are summarised below and where possible a contrast has been made with the results of previous years' trials. Members are reminded that results from one year's trial should be treated with caution. It should also be remembered that a number of the trials set out below have been carried out during two abnormal years. The very wet summer of 1954 led to considerable lodging which frequently caused a depression in yield at higher fertiliser rates. In 1955 the long dry spell before harvest prevented much grain from reaching full maturity before rapid ripening occurred and this has again caused a partial reversal of the normal response to nitrogenous fertilisers.

WINTER WHEATS

Nitrogen, Row-Width and Seedrate Trial. This trial has now been carried out for four years, using the short strawed French type variety Hybrid 46. The treatments consist of all combinations of the following factors: Seedrate 1¼, 2½ and 3¾ bushels per acre; Top-dressing 2, 4 and 6 cwt. per acre of Nitro-chalk (in 1952 equivalent quantities of sulphate of ammonia were used) and Row-width 4, 8 and 12 in. The top dressing treatments were applied in late April or early May.

Owing to the variation from year to year of the effects of the various treatments it is difficult to derive a very consistent pattern from the results which are set out below.

Row-Width. In three out of four years the use of the narrow row-width has led to a significant increase in yield compared with the wider rows. Compared with the standard 8-inch rows the 4-inch rows gave an increase of one sack per acre and 12-inch rows gave a decrease of one sack per acre on the average in 1952, 1953 and 1954. In 1955 there were no significant differences but the 4-inch and 8-inch rows gave almost the same yield, which was about half a sack per acre better than that given by the 12-inch rows.

Seedrate. The effects of varying the seedrate have been very variable from year to year. In 1952 3¾ bushels per acre gave the highest yield of 19.1 sacks, which was significantly better than the yield from 2½ bushels; this was in turn significantly better than 1¼ bushels which yielded 17.9 sacks. In 1953 and 1955 there was no great difference between the yields from the low and medium seedrates which were both significantly greater than the yield from the high seedrate. The lowest seedrate produced 0.7 sacks per acre more than the highest seedrate in 1953; in 1955 the difference was 1.5 sacks. In 1954 the exact reverse of the 1952 results was obtained. The low seedrate produced a yield of 20.9 sacks per acre which was 0.6 sacks per acre better than the yield from the medium seedrate and 2.2 sacks per acre greater than that from the high seedrate.

Nitrogenous Top-dressing. In addition to the various rates of nitrogenous top-dressing mentioned below the whole area of this trial received a basal seedbed dressing equivalent to 1 cwt. sulphate of ammonia, 1 cwt. of superphosphate and ½ cwt. of muriate of potash.

The response to nitrogenous top-dressing has varied considerably from year to year. In 1952 1½ cwt. per acre of sulphate of ammonia produced a yield of 17.9 sacks per acre, a further 1½ cwt. of fertiliser increased the yield by 0.7 sacks and the top rate of 4½ cwt. gave a yield of 19.1 sacks. In 1953 responses were much greater; 2 cwt. per acre of nitro-chalk gave 16.6 sacks per acre, 4 cwt. of fertiliser increased the yield by 2.6 sacks and 6 cwt. of fertiliser gave a further 1.4 sacks of grain. The abnormally wet summer of 1954 caused considerable lodging on plots receiving higher rates of nitrogenous fertiliser and some consequent loss in yield. There was no difference between the yields obtained from 2 or 4 cwt. of nitro-chalk but the 6 cwt. level reduced the yield by 1.2 sacks to 19.2 sacks per acre. The results in 1955 were very similar to those in 1954, but for different reasons. Both 2 cwt. and 4 cwt. of nitro-chalk gave a yield of 18 sacks per acre whilst the 6 cwt. rate led to a reduction in yield of 1 sack per acre. Although each increase in nitrogenous top-dressing rate produced a greater number of ears at harvest it also led to a progressive reduction in the 1,000 grain weight. Compared with grain which received 2 cwt. per acre of nitro-chalk the 1,000 grain weight was reduced by 8 per cent. on plots receiving 4 cwt. of fertiliser and by 16 per cent. at the highest fertiliser rate. This suggests that the higher rates of nitrogenous manuring delayed maturity and that when the long dry period before harvest brought growth to a stop the grain on plots receiving a high rate of nitro-chalk had filled out only very slightly compared with grain on plots fertilised at a lower level.

Time of Drilling and Top-Dressing Trial. This second winter wheat trial also uses Hybrid 46 and is designed to test the effects of four spring top-dressing treatments on wheat drilled at two different times in the autumn with and without a compound fertiliser applied to the seedbed. The times of drilling are about mid October and early December but in 1953 the late drilling suffered so badly from bird damage that the area had to be re-drilled at the end of January. The seedbed compound fertiliser applied to half the area at each time of drilling was equivalent to 1½ cwt. sulphate of ammonia, 2 cwt. of superphosphate and ½ cwt. of muriate of potash. The top-dressing treatments were:— (*a*) Control (no top-dressing), (*b*) 4 cwt. of nitro-chalk applied early (mid March), (*c*) 4 cwt. of nitro-chalk applied late (late April) and (*d*) a split dressing, 2 cwt. applied early and 2 cwt. applied late. In the first two years the wheat followed a one year clover ley and in the third it followed a crop of vining peas.

Time of Drilling. In every year early drilling has produced an increased yield compared with later drilling. The increases in sacks per acre were 0.5, 2.5 and 1.0 in 1953, 1954 and 1955 respectively.

Compound Fertiliser on the Seedbed. In spite of the fact that the wheat followed a leguminous crop compound fertiliser on the seedbed has led to an increased yield in all three years. The increases obtained were 1.5, 0.5 and 0.7 sacks per acre, these increases being averaged over the two times of drilling. The increase in yield due to seedbed artificial was greater when the wheat was drilled late but the subsequent top-dressing had a smaller effect than on late drilled plots which did not receive seedbed artificial. Thus it seems clear that late drilled winter wheat will benefit from seedbed fertiliser but that subsequent rates of top-dressing can be reduced when seedbed fertiliser has been applied.

Top-Dressing. The application of 4 cwt. per acre of nitro-chalk has produced a marked response in all years but no significant differences between the different times of application have been obtained. There is a small but consistent difference between the responses to early and late top-dressing for early drilled wheat which suggests that early drilled wheat is more likely to benefit from a top-dressing applied early rather than one applied late. In two years out of three the split dressing has given a slightly higher yield than the all-at-once dressing, but in neither case is the increase sufficient to justify the extra cost of the double application. The response to top-dressing is much greater in early drilled wheat than in late drilled wheat which benefits more from

the application of seedbed artificial fertiliser. Thus it seems likely that for early drilled wheat top-dressings alone are sufficient whereas the late drilled wheat will benefit to a greater degree from a seedbed dressing combined with a reduced rate of top-dressing in the spring.

The magnitude of the response to 4 cwt. of nitro-chalk averaged over other treatments was 4, 2 and 7 sacks per acre in 1953, 1954 and 1955 respectively.

SPRING WHEATS

Nitrogenous Manuring. This trial, which has now been carried out for three years, is designed to investigate the maximum economic response to nitrogenous fertiliser obtainable from the Swedish variety Atle. The whole trial area received a liberal basal dressing of phosphate and potash; the treatments consisted of a control receiving no nitrogenous fertiliser and rates of 2, 4, 6 and 8 cwt. per acre of nitro-chalk applied either all at once on the seedbed or half on the seedbed and half as a top-dressing in late May. The 8 cwt. level was introduced in the second year of the trial series because an economic response was obtained at the 6 cwt. level in 1953. In every year the spring wheat followed a white straw crop.

In 1953 each increase in nitrogenous manuring produced an economic increase in the yield. When all the fertiliser was applied to the seedbed these increases were 2.4, 1.6 and 1.2 sacks per acre, the yield being 14.8 sacks per acre when 6 cwt. of nitro-chalk was applied. On the average the split dressing gave 1.5 sacks per acre more than the same dressing applied to the seedbed only. In 1954 and 1955 no difference between seedbed only and split dressings occurred. In 1954 lodging on plots receiving the highest levels of manuring reduced yields and the maximum economic response was obtained at the 4 cwt. level of nitro-chalk. In 1955 no economic increase in yield was obtained at fertiliser rates in excess of 4 cwt. per acre because the long dry spell before harvest dessicated the grain on high manure plots before it had filled out.

Nitrogen, Row-Width and Seedrate Trial. This trial, which was started in 1954, is an extension of the previous trial to investigate the effects of row-width and seedrate in addition to the response to application of nitrogenous fertiliser. The variety used was again Atle. The treatments are all combinations of three seedrates, 1½, 2½ and 3½ bushels per acre, two row-widths, 4 inches

and 8 inches and two levels of nitrogenous fertiliser application, 3 and 6 cwt. per acre of nitro-chalk which was divided equally between the seedbed and a top-dressing applied in late May.

In both years the narrow row-width has given an increase of about 1 cwt. of grain per acre compared with the wider row-width. The response to the double dressing of nitrogen amounts to about one sack per acre more grain. The seedrate results are variable. In 1954 the 2½ and 3½ bushel rates both yielded about 1.4 sacks per acre better than the 1½ bushel per acre rate. In 1955 the low seedrate gave the highest yield (9.5 sacks per acre) and each increase in seedrate led to a reduction in yield of one sack per acre.

N.I.A.B. CROP VARIETY TESTING SCHEME

Winter Wheat Trials. In 1954 there were two winter wheat trials, one of high yielding wheats, with Bersee as the control, and the other of quality wheats, with Bersee, Hybrid 46 and Holdfast as the control varieties.

In previous years, Capelle Desprez has given the best results at Sprowston. It has usually outyielded Hybrid 46 by a small margin, and this year's results again reflect this trend. Bersee yielded well, showing its ability to do so in a year when there is no lodging. It did slightly better than Hybrid 46, and was narrowly outyielded by Capelle Desprez. The German variety Heines VII, which has now been in trial for two years, outyielded Hybrid 46 by a small amount. Last year, its yield was similar to Hybrid 46, though the two were not included in the same trial, but were in adjacent trials. Heines VII suffered a fairly severe attack of mildew, both on the growing plant and on the ear, but the disease seemed to have little effect on the grain, which was plump, and well-filled. Mesnil has also completed two years in trial, but the results so far have been disappointing, since it has given a poorer yield than the control variety, Bersee, in both years. 43C has given conflicting results. In 1954 it gave nearly a sack per acre more than Bersee, but this year its yield was 1.7 sacks less. B.9, a new quality wheat, though not yet available commercially, outyielded both Bersee and Hybrid 46 this year. In 1954, it gave the lowest yield in the series, being easily outyielded by Bersee and Hybrid 46. Hence the need for treating one year's results with caution, and the importance of thorough testing in full-scale trials for at least three years if information of any real value is to be obtained. Two of the numbered varieties included in the trials have now been named. They are 2B/38 which is now called Milfast (an Atle-Holdfast cross) and 4/11 (a Jubiligem-Atle cross) now called Dominator. The yield of Milfast

was about the same as Holdfast, and that of Dominator about a sack and a half per acre more. Colmar, now in its second year of trial, gave a higher yield than Bersee in 1954 but was out-yielded by it this year, and only just out-yielded Holdfast.

A recent extension of the Variety Testing Scheme has been the application of different levels of nitrogenous top-dressing to enable the performance of the varieties under test to be assessed over a wide range of manuring. It was felt that the full potential value of a high yielding wheat could not be brought out in a trial manured only to the level suitable for the older varieties included as controls. This will doubtless produce valuable results in the future.

Spring Barley Trials. The trial designed to compare the performance of two new malting barleys, Provost and Maythorpe, with Proctor, grown in 1954, was repeated this year. In 1954 Maythorpe was so severely attacked by birds that the trial could not be satisfactorily harvested, and the results were of little value. Ideal conditions this year enabled the trial to be harvested successfully and showed that Maythorpe outyielded both Proctor and Provost by 1.2 and 2.4 sacks per acre respectively, its yield being 19.4 sacks per acre. Maythorpe, though it is more susceptible to lodging than Proctor or Provost (both are somewhat shorter strawed than Maythorpe), is the earliest to ripen. Provost matures later than Proctor and nearly as late as Spratt-Archer. The grain of all three is described as being of good malting quality; their differing maturities may play a useful part in spreading out the harvest.

Spring Wheat Trials. Two new varieties, Svenno and 1060, were included in the Spring Wheat Trial this year, in which Atle was the control variety. All varieties under trial out-yielded Atle. Svenno is reported to be of hard-milling and promising baking quality, and was only narrowly outyielded by Koga II, which, for the second year running, exceeded in yield the other varieties in this series. 1060 is slightly earlier maturing than Atle, and though longer in the straw, stands as well as Atle. Peko is a soft-milling wheat and later maturing than Atle. Though the straw-length somewhat exceeds that of Atle, the straw-strength is about equal. Peko though outyielding 1060 was eclipsed by the higher yielding Svenno and Koga II.

Spring Oat Trials. As in 1954 no variety outyielded Sun II, which was the control variety. A new variety, Sisu, has out-yielded Sun II in trials at other centres. It is reported to be of a similar maturity and though slightly longer in the straw, it is of equivalent straw-strength. Its grain quality is not yet known.

TURKEY BREEDING

Of all farm animals poultry are perhaps the most readily susceptible to improvement by breeding. This is not due to any inherent difference in the mechanism of inheritance—Mendel's laws are obeyed—but to the fact that poultry do reproduce at a rapid rate. One generation can be sexually mature at seven months of age and perhaps more important, one female can produce in a four-month breeding season no less than 20 progeny of each sex. This immediately opens the way to a practicable system of progeny testing. At Sprowston the breeding problem is being attacked primarily on a family basis.

The most profitable turkey is one which will produce many high-grade chicks capable of growing rapidly to market weight with low mortality and a pleasing appearance. All these characters have a genetic background, some of greater complexity than others. Level of egg production, hatchability and other similar attributes are believed to be controlled by a number of genes but can be greatly modified by environment. Other factors such as feather and flesh colour (quite important factors in the appearance of carcasses) are controlled in a comparatively simple way and can only be affected by gross environmental change. These differences must be considered when a breeding plan is being evolved. In the first place the birds' surroundings must be uniform otherwise comparison between grounds becomes valueless. Secondly a balance must be struck between breeding primarily for characters of great economic importance and the complexity of their inheritance mechanism. For example breast width is of great importance and is fairly simply inherited. A policy of individual selection of broad breasted birds for breeding would give good results. If however this method were adopted for a complex character such as egg production not very much progress would be made. It is important to frame the breeding policy to take care of both these extremes of characters and this can best be done by combining family breeding with selection of superior individuals from the best family groups.

At the Turkey Centre selection for good egg production, hatchability and day old poult quality is done on family lines and from the superior families so obtained birds of above average growth rate and body conformation are selected for breeding. In the 1955 breeding season over an eight-week period the flock average hatchability of all eggs set was 70 per cent. Four of the pedigree breeding pens were above this percentage, four were below it and one pen was exactly 70 per cent. From these four above average pens next year's breeding stock will be selected. These will be chosen from parent hens with an individually good breeding record

and from contemporary brothers and sisters showing above average carcass qualities. Where possible it is desirable to select breeders from families of low variability as the chance of picking an individual good performer from a family showing great range in performance is less likely.

In selecting breeding stock the method may be likened to a pyramid. At the base is the whole flock available for selection. Recording limits the choice to a few families forming the body of the cone and at the apex, by further refining, is found the breeding bird. Thus the forecast of success can be weighted by knowledge of flock performance and also by the output of the family from which the individual breeder is drawn. Flanked by such buttresses the chance of success is increased.

No more can be claimed.

DEBENTURE ISSUE

Owing to death or other unforeseen events the Station has for disposal from time to time £10 Debentures bearing interest at 3½ per cent. per annum. It would greatly assist the Committee in the disposal of these Debentures if a list could be made of Members willing to purchase them as they become available. If, therefore, you are interested in becoming a Debenture holder would you please notify the Director.

The Sprowston Farm is a progress report and its contents are confidential. The report is punched for filing, and files can be obtained from the Office, price 5/9 each, post free.

Published by the Norfolk Agricultural Station.