

# THE MORLEY FARM

A Report for Members of the Norfolk Agricultural Station

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This is a progress report for Station Members and its contents are confidential.

## CEREAL FOLIAR DISEASES

As a result of surveys carried out throughout England and Wales by the Agricultural Development and Advisory Service it is apparent that considerable yield losses occur in cereals from foliar disease attack. The 1972 survey on winter wheat indicated an average loss of 13-14% due to yellow rust, mildew and *Septoria*. It was found that 98% of crops sampled were infected by *Septoria* with an average level of infection covering 17.8% of the second leaf. It has been estimated that the yield loss due to yellow rust, mildew and *Septoria* was 3, 2.5 and 8% respectively. In view of these findings the cereal foliar disease control programme has been extended at the Station to test chemicals which may control *Septoria*. At the same time trials on the control of yellow rust of wheat, and mildew and brown rust of barley have been continued.

While varieties differ in their susceptibility to foliar diseases the incidence of most diseases is very dependent on climatic conditions. The weather in the spring of 1973 was quite different to the previous year so that it came as no surprise that the disease pattern was different from the previous season. Even on relatively susceptible varieties, yellow rust was not a serious problem while mildew and *Septoria* were widespread on most wheat varieties. It is likely that its good resistance to mildew and *Septoria* accounted to some extent for the outstanding yields achieved by the variety Maris Huntsman.

### Winter Wheat—Yellow Rust

Yellow rust was first noticed within the area of the trial on 16 May. This was on the variety Joss Cambier but it was also found to be present on Cappelle-Desprez in the same trial one week later. Steady development continued during the next 2 - 3 weeks until traces of the disease were present on most plants of Joss Cambier by 6 June. At this time the weather became hotter and drier so that conditions were no longer favourable and further spread was negligible except in the most dense and lush crops.

The 1973 trial was carried out on the varieties Joss Cambier and Cappelle-Desprez, these being accepted as varieties having moderate susceptibility and reasonable tolerance to the disease. Un-sprayed plots of Joss Cambier suffered an eventual overall infection on the second leaf of 3.5% with patches in excess of 50% and gave a yield of 37.2 cwt per acre. Cappelle-Desprez suffered a negligible attack of yellow rust and yielded 35.7 cwt per acre.

The chemicals tested were *Antracol*, BAS 3170F, HOE 6052, and a tank mix of *Calixin* and *Polyram*. Chemicals were applied on each of two dates, 22 May and 7 June as single applications and also on both dates as a double application. Except in the case of *Antracol*, the disease control followed a similar pattern to that found in 1972. *Antracol* did not appear to have had any effect on the disease in this trial in 1973. The *Calixin* + *Polyram* mixture rapidly gave a useful reduction in disease level but fresh infection began to develop after 2 - 3 weeks. On the other hand, both the systemic fungicides BAS 3170F and HOE 6052 were slower to give any visible effect, but persisted for at least 3 - 4 weeks.

Single applications of *Calixin* + *Polyram* on 22 May or 7 June reduced the yellow rust on the second leaf of Joss Cambier from 3.5% to around 2.0% while the double application reduced infection to 1.3% when assessed on 2 July. A single early application of either BAS 3170F or HOE 6052 on 22 May or the double application reduced infection to less than 1%. On this occasion the application of either of these chemicals was less effective on 7 June than on 22 May. The best yield response was from the double application of *Calixin* + *Polyram* on Joss Cambier where an increase of 4.3 cwt per acre was recorded. The best single application was from the same chemicals on 22 May when they gave an increase of 2.9 cwt per acre. Responses of around 1 cwt per acre were recorded with *Calixin* + *Polyram* on Cappelle-Desprez and this yield benefit is thought to have come from a limited control of mildew. The application of BAS 3170F or HOE 6052 caused yield losses of up to 4.5 cwt per acre on Cappelle-Desprez. Losses were greatest following the 7 June spraying which coincided with unusual weather conditions. Losses on Joss Cambier were less, only being significant with HOE 6052.

Responses in terms of yield were very small in comparison with the 1972 trial but it should be remembered that the incidence of disease was relatively low. In addition there was a physiological disturbance in the wheat crop in early June which appears to have been aggravated by two of the systemic fungicides. Wheat throughout the country suffered from a yellowing of the flag leaf which occurred during the week-end 9 - 10 June. This was particularly severe on the variety Cappelle-Desprez and was attributed to physiological stress. Although some authorities suggested that this was a drought symptom there did not appear to be any lack of soil moisture at Morley and extremes of day and night temperature may have contributed to the problem. Certainly a ground frost was recorded on the morning of 5 June while daytime temperatures rose to 24.4°C on 8 June.

Yellow rust infection in 1973 barely reached a level at which spraying would have been recommended and in these marginal circumstances the best yields were obtained following the use of the *Calixin* + *Polyram* mixture. In cases of more severe infection the BAS 3170F and HOE 6052 materials could be more justifiable as shown in 1972. The conclusions set out in 1972 remain valid in that yellow rust should be controlled by the use of a range of resistant

or moderately resistant varieties with the present chemicals being a valuable stand-by in the case of a severe breakdown.

### Septoria

Two types of *Septoria* commonly affect wheat crops in this country. *Septoria nodorum* is a seedborne fungus controlled by certain seed dressings and is often responsible for poor germination of home-grown seed. At the seedling stage its effects are often known as seedling blight. However it is also easily recognised on the ripening ear which can become discoloured to give a characteristic chocolate-brown glume blotch symptom. A severe infection of this type inevitably leads to a poor grain sample.

*Septoria tritici* is responsible for leaf blotch on wheat and can have a debilitating effect on the crop which appears to be much greater than a similar attack of mildew. *Septoria tritici* is spread by rain splashing and has been thought to be predominantly a disease of the west country until the surveys mentioned earlier indicated that it is quite widespread. Recent seasons have produced quite severe attacks near the north Norfolk coast and the variety Maris Ranger appears relatively susceptible to both species.

A trial was laid down on the variety Maris Ranger and the chemicals tested in a fully replicated trial were *Bavistin*, *Calixin*, thiram and a mixture of *Benlate* and maneb. Additional single plots were sprayed with BAS 3170F, HOE 6052, *Antracol*, R-28921 and *Benlate* to see if activity against *Septoria* spp. was observed. All chemicals were applied on 25 May or 7 June as single applications and also on the two dates as a double application. These dates corresponded to growth stages 7 and 10. Both mildew and *Septoria* were quite severe in the 1973 trial so that by 5 July almost 20% of the area of the second leaf on the unsprayed plots had been destroyed. There appeared to be a modest reduction in *Septoria tritici* on the second leaf following the application of any of the chemicals in the main trial with the best control being achieved by the *Benlate* + maneb mixture. At the same time, all except thiram reduced the level of mildew and in this respect *Bavistin* appeared to have been the most effective.

During the month of July premature senescence of the top two leaves occurred. This did not appear to be entirely related to *Septoria* attack but again it was reduced to some extent by the application of fungicides and once more it was the *Benlate* + maneb mixture which was most effective. There was very little infection of the ear by *Septoria nodorum* but in any case the surface was heavily masked by mildew.

The yield of the unsprayed plots was 36.6 cwt per acre. This was increased to 43.0 cwt by the use of two applications of *Benlate* + maneb. The best single application was an early spray of *Bavistin* which produced a yield of 41.0 cwt per acre. At the same time these two chemical treatments were most effective in improving grain size. The single observation plots indicated that a higher rate of *Benlate* alone was just as effective as the mixture used in the main trial and also that R-28921 had sufficient activity to justify inclusion in the full trial in 1974.

Modern systemic fungicides can have a broad spectrum of activity as is the case with *Benlate*. It is therefore not possible to say categorically whether the yield increase was due to the control of *Septoria*, mildew, eyespot (*Cercospora herpotrichoides*), or even other diseases which may be controlled by the chemicals. In this trial the variety of wheat selected has good tolerance of eyespot and was sown after potatoes so that eyespot was unlikely to have affected the trial. It must however be accepted that the yield has benefited by the control of mildew as well as *Septoria*. In future years it may be possible to differentiate between responses if one disease occurs in the relative absence of the other.

Further work will be carried out to obtain information over a range of seasons but the first year has been most encouraging. At current cereal prices a 10 - 12% yield increase obtained from a single spray can justify relatively expensive chemicals if its effectiveness can be accurately predicted. A proprietary mixture of *Benlate* and mancozeb is already marketed in France and it seems likely that similar materials will soon be available here.

#### **Spring Barley—Mildew control and brown rust**

In 1972, the A.D.A.S. barley foliar disease survey showed that mildew was the most widespread disease of barley with 96% of all samples affected and a national loss estimated at 8.5%. Brown rust infection was found on 62% of samples and was more severe in the Eastern Region than in any other. In view of these findings the two trials which had been started the previous year were continued.

The variety Proctor was again used in a trial in which half the plots were seed dressed with *Milstem* in an attempt to control mildew throughout the season. The chemicals under investigation for brown rust control were BAS 3170F and HOE 6052 applied as foliar sprays on 19 June. Mildew development was relatively slow during May and early June but increased during the middle of June. By 10 July the mildew level on the 2nd leaf of untreated plots was 13.4% and on the *Milstem* treated plots it was 5.2%. The resultant increase in yield due to the seed dressing however was found to be only 1.2 cwt per acre.

While the conditions appeared to be favourable for the development of brown rust—in that it became warm and dry—there were some quite cold nights and the disease developed only slowly. At the beginning of July however, there was a surge of infection and leaf senescence occurred soon after. The two foliar sprays gave some measure of brown rust control and kept the plots looking 'greener.' In the absence of *Milstem* seed dressing there was a yield increase of 1.7 cwt from BAS 3170F and only 0.5 cwt from HOE 6052. No yield differences were found where *Milstem* had been used.

In the second trial, *Calixin* and BAS 3170F were applied on 29 May and 19 June to the varieties Julia and Proctor. The latter variety was more severely infected with both mildew and brown rust

than was Julia. The early application of *Calixin* considerably reduced mildew infection on both varieties while BAS 3170F decreased brown rust on both varieties especially when applied at the later date.

Whilst the highest yield of Julia was achieved with an early application of *Calixin* followed by BAS 3170F in mid-June, differences were not statistically significant. The variety Proctor however did show a yield response to *Calixin* with increases of 1.7 and 3.1 cwt per acre when applied in May and June respectively. Whilst BAS 3170F increased yields by 1.1 and 1.5 cwt per acre respectively with early and late application, when used in combination with an early application of *Calixin* yields were increased by 4.0 and 3.2 cwt per acre respectively from early and late application. A late application of BAS 3170F on Proctor also reduced the amount of small grain—less than 2.2mm—in the samples.

Foliar diseases were late developing on spring barley in 1973 and crops ripened very early so that the period of infection was short. Thus there was little time available for treated crops to respond and yield responses were perhaps lower than might normally have been expected. Both of these trials will be repeated for a third year in 1974.

## CEREAL HUSBANDRY TRIALS

### Time of applying nitrogen to winter cereals

Work on the effect of rate and time of applying nitrogen to winter cereals has continued and is of increasing importance now that this country is a member of the European Economic Community and is bound by the Community's rules and regulations with regard to grain quality for selling into intervention. Factors that affect quality vary with the cereal in question and in the winter wheat trial, besides the measurement of yield, other factors examined have involved the measurement of the effect on grain size, on flour production and on biscuit or bread making ability.

In 1972 the varieties under test were Joss Cambier, Maris Widgeon and West Desprez. The two latter varieties were also included in the 1973 trial but Joss Cambier was replaced by Maris Huntsman in an attempt to prevent the possibility of heavy rust attack masking all other treatment effects. The nitrogen levels were 60, 80 and 100 units per acre applied on 10 April, 15 May or split equally between the two dates. Yields were relatively low, possibly because the trial was harvested after the rest of the field and consequently suffered some bird damage. Maris Huntsman gave the highest yield of almost 42 cwt per acre with the other two varieties each some 10 cwt lower.

The previous crop was sugar beet and 60 units per acre of nitrogen proved to be the best for all three varieties with yield reductions for any further increase in nitrogen level. The best yields were achieved following the late top dressing, the lowest

when applied in April and the split dressing was generally intermediate. The proportion of large grains in the sample was reduced and the amount of tail corn increased by increasing the nitrogen level. Time of application had relatively little effect on grain size.

Results of the milling quality determinations are not yet complete but a distinct varietal difference has been found. Maris Huntsman produced a fine soft flour of modest colour and good water absorption resulting in a weak dough suitable for biscuit production. The  $\alpha$  amylase activity was very high making it totally unsuitable for inclusion in a bread flour grist. West Desprez had a stronger dough which could be used either for biscuit or bread production. Maris Widgeon produced a flour of good water absorption with a strong dough unsuited to normal biscuit production but useful for bread production.

The highest grain protein contents followed the late applications of nitrogen and there was also an increase in protein by increasing the nitrogen level, though Maris Huntsman showed no increase above 80 units per acre. Past experience has shown that the gluten content of grain behaves in a similar manner to protein levels in that it is increased by a high nitrogen level and by late application. Wheat for bread making requires values in excess of 10% for protein and 11.0 grammes wet weight of gluten per unit of dry grain and these are only likely to be achieved by a high level of nitrogen—80 to 100 units—and with at least part of the top dressing going on relatively late.

At current prices it seems quite uneconomic to grow one of the 'quality' wheats which attract a miller's premium of up to £3 per ton while losing a yield advantage of 10 cwt per acre obtainable by growing a variety such as Maris Huntsman.

The nitrogen requirement of barley varies depending on whether the product is to be used for feeding or for malting. A high grain nitrogen content is desirable for feeding while a low nitrogen level is essential for malting. In the winter barley trial nitrogen was applied at 40, 80 and 120 units per acre in February, March and April to Maris Otter.

YIELD OF GRAIN (cwt per acre at 85% d.m.)

NITROGEN (units per acre)	TIME OF APPLICATION			MEAN
	February	March	April	
40	39.6	43.9	41.0	41.5
80	42.5	44.6	41.6	42.9
120	39.8	38.5	38.1	38.8
MEAN	40.6	42.3	40.2	

The best yields were achieved from a March application and there was little difference in response from 40 and 80 units. An application of 120 units either in March or April was found to reduce yield by up to 6 cwt per acre. There was also a marked reduction in grain size with increasing nitrogen level and with later application. It will be interesting to see the grain nitrogen results because past experience has shown that this usually increases with increasing nitrogen level and later application.

The winter rainfall was quite low and so there would be relatively little leaching and soil organic nitrogen would be high in the spring and summer. This factor can also explain why 40 units per acre of nitrogen when applied in March was adequate for yield purposes.

### Time of sowing winter wheat

While most of our winter wheat varieties can safely be sown until mid-February experimental work at various centres has shown that early drilling is likely to give higher yields. Results however, have been quite variable so it was decided that the Station should co-operate in a new series of trials co-ordinated by the N.I.A.B. to investigate the effect of date of drilling on different varieties of winter wheat. The varieties chosen for the study were Cappelle-Desprez, Maris Ranger, Maris Huntsman, Bouquet, Atou and Maris Freeman drilled at three dates in the autumn—namely 25 September, 16 October and 17 November.

Slight variations in yield response to date of drilling were found between the varieties.

YIELD OF GRAIN (cwt per acre at 85% d.m.)

VARIETY	TIME OF SOWING			MEAN
	September	October	November	
Cappelle-Desprez	35.9	33.7	32.3	33.9
Maris Ranger	35.8	37.7	36.5	36.7
Maris Huntsman	50.4	53.9	52.0	52.1
Bouquet	38.3	38.4	37.1	37.9
Atou	38.8	38.3	37.4	38.1
Maris Freeman	39.6	39.5	37.1	38.7
MEAN	39.8	40.3	38.7	

Cappelle-Desprez showed a steady decline in yield with any delay in drilling after September. Maris Ranger and Maris Huntsman however achieved their best yields when drilled in October while drilling the others in September or October gave similar yields.

With all six varieties however, delaying drilling into November reduced yields. The most outstanding variety was Maris Huntsman especially at the October drilling when it outyielded Cappelle-Desprez by over 1 ton per acre.

There was very little yellow rust present but a moderate infection of mildew was recorded on some varieties—notably Cappelle-Desprez, Atou and Maris Ranger. However, there were no significant differences between dates of drilling and the level of infection. These two diseases—yellow rust and mildew—are both spread by being carried over on green material. The aim should be to have a distinct break from one crop to the next by a thorough system of cultivations or a combination of cultivations and spraying with paraquat.

The incidence of *Septoria* was reduced at the October and November drillings when compared with the earliest sowing. *Septoria* is carried over in straw and crop residues and for a reasonable measure of control it is important to cultivate the stubble into the warm top soil for bacteria to destroy the disease. Delaying drilling to mid-October is likely to result in reduced levels of infection in the succeeding crop.

All the results from this trial suggest that winter wheat will be more likely to achieve its full potential if it is drilled by the middle of October rather than if drilling is delayed into November or December.

Apart from beginning stubble cultivations immediately after harvest, one way of being able to drill more winter wheat by this optimum time is by direct drilling. This technique however, should only be used on free draining soils in fields which do not have a couch grass or a perennial weed problem.

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

### Winter Wheat

The trial of 20 varieties was drilled in mid-October on a very dry seedbed, following potatoes. Emergence was slow due to the dry conditions, but establishment was eventually satisfactory.

Because the winter of 1972/3 was mild no frost damage occurred but the lack of severe weather encouraged the overwintering of various diseases. Mildew was recorded in late spring and increased rapidly, with infection levels of around 50% recorded on Cappelle-Desprez, Maris Ranger, Val, Cama and Joss Cambier. Maris Huntsman remained clear of infection. Yellow rust was first seen on adjacent but earlier drilled field crops in May, but the warm sunny weather of June was not conducive to the spread of this disease. Light infections only were recorded in the trial, the maximum level being 1% on Joss Cambier with slightly lower levels on Cama and Maris Templar.



Damp weather during July was favourable to *Septoria*, which reached quite high levels on some varieties on both the leaves and ears. Infections of 50% or more were recorded on Maris Ranger, Joss Cambier, Cama and the semi-dwarf variety Maris Bilbo, and moderate levels occurred on Maris Nimrod, Maris Templar and Maris Fundin. Varieties showing good resistance included Maris Huntsman, Maris Widgeon, Chalk and Mega.

The heavy rainstorms in June and July caused widespread lodging. This was severe in some varieties particularly Cappelle-Desprez, West Desprez and Chalk. Virtually no lodging occurred in Maris Ranger, Joss Cambier, Cama and Flinor. The semi-dwarf selections Maris Bilbo and Maris Fundin were unaffected by the storms and stood perfectly until just before harvest. Approaching maturity however, both brackled badly, with some straw breakage and ear loss.

The trial was harvested on 14 August under perfect conditions, with moisture levels of under 14% in most varieties. Yields were high and averaged 41.4 cwt over all varieties. Cappelle-Desprez was disappointing, its yield of 32.5 cwt being the lowest in the trial. The other control variety, Maris Ranger gave 41.5 cwt. Maris Huntsman was outstanding with a yield of 56.8 cwt which was 54% above the control mean. Maris Templar was the next highest at 50.4 cwt followed by Maris Fundin at 47.5 cwt. Three other varieties outyielded Maris Ranger, these being Maris Nimrod (45.5 cwt), Mega (43.9 cwt) and Flinor (41.6 cwt) and yields over 2 tons were obtained from Maris Bilbo, Maris Freeman, Val and Joss Cambier. It is also interesting to note that, with one exception, all varieties gave a better response to 50 units of nitrogen per acre than to double this level.

### Winter Barley

The trial was drilled in late October, and overwintered with no damage. *Rhynchosporium* appeared in late spring but most varieties remained free, with a low level on Maris Otter and traces on Sonja (Engelen 2300) and Malta. Mildew was more serious, with moderate to severe levels on several varieties, Senta being the most heavily infected. The rainstorms of June and July caused havoc amongst the weaker strawed varieties, resulting in severe lodging in Astrix, Senta and Mirra. Maris Otter was only moderately affected, and the new 2-row selections Alpha and Cossack stood well.

Harvesting was on 30 July, with a resultant average yield of 38.7 cwt. The control varieties Maris Otter and Senta, gave 38.6 cwt and 34.4 cwt respectively. The highest yield of 43.9 cwt was from a new 2-row variety in its first season of testing. Good yields were obtained from other 2-row varieties notably Sonja with 42.5 cwt, Alpha 42.1 cwt and Cossack 40.2 cwt. The yields from the 6-row varieties were mostly below the 2-row ones.

## Winter Oats

The trial, which consisted of the four recommended varieties and one new selection, was drilled in mid-October. Mildew levels increased rapidly in early summer, with all the Recommended varieties suffering moderate to heavy infections. Despite the summer storms, lodging was serious only in Pendrwm. The trial was harvested under good conditions in early August. All varieties gave similar yields of just over 2 tons with the exception of Pendrwm which was approximately 2 cwt lower.

## Spring Wheat

The trial of 11 varieties was drilled on a good seedbed on 12 March. Emergence and early growth were slow in the cold weather that followed drilling.

Mildew increased steadily in mid-summer reaching a level of 40% on Cardinal and lower levels of around 20-25% on most of the other varieties. Relatively low levels occurred on Maris Dove, Sirius, Sappo and Maris Ensign. Yellow rust was much less prevalent than in the previous season, with Cardinal suffering the heaviest infection with patches of up to 25%. The disease was recorded at much lower levels on Rothwell Sprite, Maris Dove, Sappo, Maris Butler, Maris Pinion and Tilly. *Septoria* increased rapidly during July, reaching a maximum level of 50% on Maris Pinion. All varieties were infected to some degree, but only low levels were seen on Sappo and Maris Butler.

During early August lodging occurred in several varieties, an infrequent occurrence on spring wheat at Morley. Most seriously affected were Maris Butler and Sappo. The crop was slow to ripen and was harvested at rather high moisture levels on 29 August. The control varieties Kolibri and Rothwell Sprite gave respective yields of 33.9 and 33.4 cwt. The highest yield was 43.2 cwt produced by Sappo which was 29% above the control mean. Maris Dove and Sirius were the nearest to this, with yields of just over 39 cwt. All varieties in the trial, with the exception of Cardinal, outyielded the two control varieties.

## Spring Barley

Because of the large number of varieties, there were three trials in 1973. The main trial included all those on the Recommended list with new varieties at an advanced stage of testing. The Statutory Performance trial was composed of new varieties at an early stage of testing and the Fungicide trial compared 9 varieties with and without mildew fungicide treatment. All trials were drilled in mid-March. Mildew appeared early in the season, but did not reach very high levels. Moderate levels were recorded on susceptible varieties in the Main trial, with 40% on Zephyr and just under 30% on Proctor. The levels on Julia, Lofa Abed and Vada although under 20% were higher relative to other varieties than in previous seasons. Mazurka and Wing, at one time completely resistant, were lightly infected and similar levels occurred on Maris Mink and Universe.

Brown rust suddenly increased during hot weather in early July and very quickly reached a severe level on the leaves of Midas. High levels also occurred on Zephyr, Proctor, Berac and Wing, but cooler weather set in before infection spread onto the awns. Only low levels were recorded on the leaves of Lofa Abed, Hassan, Vada, Abacus (RPB 11069) and Armelle. A disturbing feature was the appearance of yellow rust on several varieties, a disease that has not been seen on spring barley for several years. Although no heavy infections occurred, patches of moderate infection were recorded on Berac, Universe and Vada.

The heavy summer storms caused considerable leaning but few varieties suffered severe lodging. Those most affected were Lofa Abed, Hornisse, Gerkra and Proctor. Some varieties were virtually unaffected, and outstanding amongst these were Maris Mink, Midas and Universe. Aramir and Armelle also stood well.

Harvest was taken exceptionally early on 2-3 August, with moisture levels as low as 12% in some varieties. The control varieties Proctor and Zephyr produced yields of 27.4 cwt and 33.0 cwt respectively, and all the others in the trial outyielded Proctor. Aramir was the highest yielding with 42.6 cwt—41% above the control mean. Yields approaching this were obtained from Maris Mink (41.1), Armelle (40.1) and Abacus (40.0), while yields approaching the 2 ton mark were given by Universe, Hassan and Sejet (SJ.678060). Julia, with 36.6 cwt, was 21% above the control mean and Lofa Abed and Vada did less well than in previous seasons probably as a result of early lodging with yields around 35 cwt, 15% above the controls.

The Statutory Performance trial was harvested 7 days later, by which time considerable ear loss had occurred. Julia was 5 cwt lower yielding than in the Main trial, and Zephyr and Proctor were 5 and 2 cwt respectively down on their Main trial yield.

In the fungicide trial 9 varieties were grown, untreated and treated with a systemic mildew fungicide seed dressing. The treated plots were also sprayed in early June. As in previous seasons the ranking order of the highest yielding varieties was not greatly changed by the fungicide treatment. Highest yields from untreated plots were obtained from Mazurka (34.5 cwt), Julia (34.1 cwt), Vada (33.9 cwt), Berac (33.6 cwt) and Zephyr (29.7 cwt). These varieties all gave responses to treatment except Mazurka, which reflected the almost complete absence of mildew on this variety when untreated. Highest yields from treated plots were Berac (38.1 cwt), Julia (38.0 cwt), Vada (37.7 cwt), Zephyr (37.2 cwt) and Mazurka (34.1 cwt). The highly susceptible Golden Promise gave the largest response to treatment—from 24.1 to 32.5 cwt—but it is worth noting that this yield was below that of the top four untreated varieties.

### Spring Oats

The trial of 14 varieties was drilled in mid-March. Mildew appeared quite early in the season and built up to severe levels on several varieties, particularly on Selma (90%), Astor (75%), Condor

and Leanda (both 60%). The summer storms caused appreciable damage, the most serious lodging being in Astor, Mostyn and Maris Titan. The trial was harvested on 13 August under very dry conditions. The control varieties Condor and Astor gave respective yields of 28.2 and 28.6 cwt. Three varieties gave yields of over 2 tons, these being Maris Tabard (43.7 cwt), Maris Oberon (41.1 cwt) and Maris Titan (40.1 cwt).

### **Forage Maize**

A trial of 10 varieties was drilled at Coston Hall Farm on 14 May. Emergence and establishment were good, and the average population for the trial was 51,000 plants per acre.

Very rapid growth was made throughout the summer, with all varieties reaching a height of at least 7 feet. Maturity was accelerated by the warm dry weather of September and harvesting was carried out on 9 October. The average dry matter content at harvest was 26.7% with some varieties well above this. The earliest variety was Julia, with a dry matter content of 33.0%, while Cargill Primeur 170 was also fairly early (29.2%).

Yields were good, with an average for the trial of 6.11 tons of dry matter per acre. Yields from the three controls Caldera 535, Inra 200 and Kelvedon 33 were 6.53, 5.83 and 6.18 tons respectively. Yields from the new varieties ranged from 5.76 tons from Kapio to 6.25 tons from Anjou 259, but none of these yield differences were significant.

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