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Insignia lowers wheat quality

By J. A. Parish and H. M. Fisher, Advisers, Wheat and Sheep Division

Farmers in Western Australia have been advised not to plant Insignia wheat because it has poor grain quality. Many farmers want to know why Insignia is considered poor quality and what harm it could do. This article answers these questions and suggests alternative, better quality wheats for all present situations.

Insignia wheat was bred by the Victorian Department of Agriculture from the cross Ghurka x Ranee, made in 1933, and was released in Victoria in January 1946. It was quickly established as a leading wheat in Victoria and became very popular in some districts in other States. In Western Australia Insignia, together with its derivative Insignia 49, has been widely grown for many years and these varieties have occupied over half the wheat acreage in some eastern districts. The graph shows the percentage of the total wheat area sown to Insignia and Insignia 49 since 1950-51. The decline in the proportion sown to these varieties in recent years is associated with the rise of Gamena. Statistics for 1970-71 show that Insignia and Insignia 49 are still grown on 14.4 per cent of the wheat acreage in Western Australia with
Heron bringing the total to 20 per cent.

Insignia has been the subject of considerable controversy because it produces low quality flour for bread making and, on this account, the variety has never been recommended in W.A. Insignia 49 was recommended for a short time but the recommendation was withdrawn because quality was only slightly better than Insignia and well below Gamanya. With the increasing emphasis on improving wheat quality, both varieties are no longer recommended in other States, including many districts in Victoria.

**Insignia’s popularity**

Insignia growers give three main reasons for retaining the variety—high bushel weight, less shrivelled grain than Gamanya and good yields on heavy land.

**Bushel weight**

Insignia’s advantage over Gamanya in bushel weight has made it more acceptable for delivery at the bin in situations where bushel weight is low. The new variety Gambee averages 2 lb. above Gamanya in bushel weight and should satisfy the need for a variety of acceptable bushel weight for heavy soils in the eastern wheat belt.

**Shrivelled grain**

The information available from trials where the varieties were grown under identical conditions does not support the contention that there is less shrivelled grain in Insignia. However, this result might be different in seasons with a dry finish, such as occurred in 1969. Farmers are probably most impressed by the higher bushel weight. Even if bushel weight did reflect differences in shrivelled grain then the bushel weight advantage of Gambee should make it a suitable replacement for both Insignia and Gamanya on heavy soils of the eastern wheat belt.

It is possible that frost attack in some seasons may affect the earlier maturing and relatively susceptible Gamanya more than Insignia. Wide spread incidence of shrivelled grain and reduced yield of Gamanya in 1971 was attributed to frost in many eastern wheat districts.

**Yield**

Insignia has been yield tested in variety trials in Western Australia since 1950 and over the last 10 years extensive tests have been made in comparison with Gamanya. These comparisons have shown that average Insignia yields are lower than Gamanya in all areas. Results of 145 trials over the last 6 years are shown in the table, which gives comparative yields in terms of regions, zones and time of planting. These results show that, relative to Gamanya, Insignia’s best yields are in eastern districts, particularly the more central parts. This corresponds with the districts where Insignia is still widely grown. Comparisons based on data grouped for different times of planting show that earlier (May) sowing is necessary for Insignia to compare well with Gamanya.

Limited comparisons for soil types indicate that Insignia has shown some advantage on heavier soils but this is not consistent, being affected by season and sowing time. Insignia is more likely to out yield Gamanya when sowing is in May and on heavy soils, but it is common for yields to fluctuate in favour of either variety.

Where Insignia substantially out yields Gamanya it is probably due to slightly greater resistance to frost, or to the advantage of slightly later maturity which enables it to miss the devastating effect of frost or drought occurring near the flowering period, or to take better advantage of late rains in some seasons. These advantages are often shown by the variety Falcon which is slightly later maturing than Insignia and has also maintained good yields in the eastern wheat belt. While such varieties often escape damage, neither are essentially drought or frost resistant in the sense that they can readily withstand these effects when they occur at a more critical stage of growth.

**Quality faults**

Possible advantages of Insignia in some situations must be measured against the considerable disadvantage associated with low quality. Farmers can do a great deal of damage to the future sale prospects of Western Australian wheat by growing so much Insignia that a substantial amount of this variety is included in the crop sample. The specific faults of Insignia are described below:

**Poor milling**

Insignia is similar to other common soft varieties such as Heron and Robin which give a poor extraction rate with a normal milling system because of sieving difficulties. Commercial millers are partially able to overcome these difficulties but it still takes much more work to obtain flour from these varieties than many others.

**Low water absorption**

Low water absorption creates problems in both bread and noodle manufacture. Flour with a high water absorption, giving a high dough weight is essential for bread.

**Average yields as per cent of Gamanya 1966 to 71.**

<table>
<thead>
<tr>
<th>(number of comparisons in brackets)</th>
<th>Insignia</th>
<th>Falcon</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Rainfall Region (Above 18 inches)</td>
<td>84 (34)</td>
<td>96 (99)</td>
</tr>
<tr>
<td>Medium Rainfall Region (13-18 inches)</td>
<td>96 (61)</td>
<td>97 (99)</td>
</tr>
<tr>
<td>Low Rainfall Region (Below 13 inches)</td>
<td>96 (50)</td>
<td>97 (74)</td>
</tr>
<tr>
<td>Northern Zone</td>
<td>89 (20)</td>
<td>96 (38)</td>
</tr>
<tr>
<td>North Central Zone</td>
<td>95 (27)</td>
<td>99 (50)</td>
</tr>
<tr>
<td>Central Zone</td>
<td>93 (36)</td>
<td>94 (62)</td>
</tr>
<tr>
<td>South Central Zone</td>
<td>96 (29)</td>
<td>96 (46)</td>
</tr>
<tr>
<td>Southern Zone</td>
<td>91 (33)</td>
<td>98 (76)</td>
</tr>
<tr>
<td>Early Sown (May)</td>
<td>98 (33)</td>
<td>100 (67)</td>
</tr>
<tr>
<td>Midseason Sown (Early June)</td>
<td>91 (64)</td>
<td>95 (102)</td>
</tr>
<tr>
<td>Late Sown (Late June and July)</td>
<td>93 (48)</td>
<td>96 (103)</td>
</tr>
<tr>
<td>OVERALL</td>
<td>93 (145)</td>
<td>97 (272)</td>
</tr>
</tbody>
</table>
Characteristics associated with high water absorption, including a suitable proportion of damaged starch and strong gluten also favour good bread quality. Strong gluten enables the dough to stand up to mixing stresses in the bakery and gives bakers some flexibility in their dough mixing operations.

**Flour weakness**

In addition to low water absorption, dough made from Insignia flour has poor structural strength. This makes it extremely difficult for the baker to get the dough into suitable condition for placing in the oven. When weak dough is baked it will not hold the gas bubbles formed during fermentation and it is impossible to get good quality bread.

The main problem the baker faces with such poor quality flours is that acceptable quality bread can only be produced if all operations are done in such a way as to fit in with the characteristics of the flour. A good quality flour will produce acceptable bread even if there are a number of small variations from ideal operating conditions.

**Poor extensibility**

Insignia dough lacks extensibility, which again means a poor capacity of the dough to expand to hold the gas formed during fermentation.

**Noodles**

Noodles are another current major end use for W.A. wheat and for this purpose Insignia has the weaknesses of poor water absorption and lack of extensibility. This is not to say that satisfactory noodles cannot be made from Insignia but as a component in the mixture of varieties which make up the f.a.q. sample Insignia should decrease suitability for noodles.

**Summary**

In summing up the disadvantages of Insignia as a part of W.A. f.a.q. wheat, it has faults of low water absorption, poor extensibility and lack of strength which mean that it lowers value for bread making. It would also decrease the acceptability of the f.a.q. wheat for noodles. It is suggested therefore that farmers should plant Gamlena and other good quality bread wheats instead of Insignia.
EXTENSOGRAPH MEASUREMENTS OF DOUGH QUALITY
The reaction of a sausage-shaped piece of dough to a constant stretching force is recorded by an ink trace on a revolving drum. The shape of the graph produced indicates the suitability of the dough for various purposes.

GABO
High quality bread flour

GAMENYA
Good quality bread flour

INSIGNIA
Poor quality for bread
Intermediate quality for biscuits

GLUCLUB
Good quality for biscuits