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### Wheat variety trials on research stations, 1952

I Thomas

*Department of Agriculture*

J Reeves

*Department of Agriculture*

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# WHEAT VARIETY TRIALS ON RESEARCH STATIONS, 1952

By I. THOMAS, Superintendent of Wheat Farming  
and J. REEVES, Agricultural Adviser

**T**O test the suitability under local conditions of the newer wheat varieties, whether bred in this State or introduced from the Eastern States, variety trials are conducted each year on five wheatbelt research stations. The results of these trials indicate the varieties most suitable to the various areas of the wheatbelt and serve as a guide to the farmer in the choice of the most suitable varieties to grow.

The development by the plant breeder of wheat varieties suited to Western Australian conditions is playing an important role in the present prosperity and current development of the wheatbelt. Such varieties as Bungulla and Bencubbin, with their high yields and drought resistance, have already greatly helped the farmer. Today, with increasing acreages being laid down to subterranean clover, also with cultivation of large areas of newly cleared "light" land, the requirements are for

varieties more adapted to present conditions.

For the so-called "light lands", both straw strength and high flour quality are important, while for clover-ley areas straw strength is again a major consideration.

## SEASONAL CONDITIONS AT RESEARCH STATIONS

The rainfall figures for each of the five stations are summarised in Table No. 1:

TABLE 1.

*Rainfall at Research Stations, 1952-53 Season.*

Station.	Growing Period Rainfall.							Annual Total.
	May.	June.	July.	Aug.	Sept.	Oct.	Total.	
Avondale, 1952 ....	243	242	372	130	132	102	1,221	1,466
Average, 26 years ....	209	325	299	224	104	78	1,239	1,564
Chapman, 1952 ....	224	196	323	98	114	67	1,023	1,144
Average, 47 years ....	229	414	389	259	143	87	1,523	1,787
Merredin, 1952 ....	139	70	204	44	88	102	647	914
Average, 42 years ....	134	187	182	148	79	73	803	1,167
Salmon Gums, 1952 ....	79	89	142	23	102	185	620	1,227
Average, 27 years ....	130	149	144	142	102	115	783	1,339
Wongan Hills, 1952 ....	229	139	264	94	127	99	952	1,072
Average, 27 years ....	180	259	261	198	92	70	1,060	1,396



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As for several years now, the trials at Avondale, Chapman and Wongan Hills were planted on clover-ley land which was prepared for planting immediately prior to seeding. At the other stations plots were planted on land which had been fallowed. Conditions at the individual stations are briefly outlined below:—

**Avondale**—Planting was carried out under favourable conditions. Growing conditions were good and finishing rains in October resulted in above-average crops. Some damage was done at maturity by stormy conditions and high winds.

**Chapman**—Opening rains were good, enabling planting to be carried out under suitable conditions; however the following rains were infrequent and coupled with high winds caused below-average yields.

**Merredin**—Normal May rainfall enabled planting to be carried out satisfactorily, but lack of June rains resulted in an uneven germination with a final germination occurring with good soaking rains in July. Rainfall continued below average and beneficial falls in the second week of October came too late to be of much benefit to the maturing crops; consequently, yields were below normal.

**Salmon Gums**—Below average falls occurred in May; these were insufficient for good germination. Cold weather and lack of rain further retarded crops so that good finishing rains in October and November could not fully benefit the crops and yields were low.

**Wongan Hills**—Planting conditions were reasonably satisfactory but lack of further good rains adversely affected germination and subsequent growth. The rains of mid-October enabled the crops to mature and yield reasonably satisfactorily.

### DISEASE RESISTANCE

During the last season, no major changes occurred in this State in respect to flag smut or stem rust.

**Flag Smut**—All varieties under test on the research stations, with the exception of Gabo and the new crossbred M.108, are resistant to this disease.

**Stem Rust**—The efforts of plant breeders have received set-backs on at least two occasions by the appearance of new rust races soon after the widespread cultivation of rust-resistant varieties. With the general cultivation of Eureka in New South Wales, there appeared rust race 126B attacking it. Similarly the 1948 complex of races appeared after the introduction of the varieties Yalta, Kendee, Gabo and Charter, which until then had been regarded as rust-resistant.

In Western Australia, the Eureka and Wongoondy attacking race (race 126B) has been isolated from collections extending over several years, so that these two varieties are now liable to be attacked in any future epidemic, although to date race 126B has only been isolated from other than these two varieties. The complex of races first discovered in N.S.W. in 1948 has apparently not yet arrived in this State and varieties attacked by these races, such as Gabo, Yalta, Bencubbin 48, Javelin 48 and Insignia 49, can still be regarded as resistant here.

In addition, the varieties Dowerin, Festival, Warigo, Panther and the new crossbreds M.107, M.108, M.109 and M.112 are resistant to all stem rust races known to be present in Australia.

Although stem rust epidemics are infrequent in this State, the growing of rust resistant varieties in a year of bad rust infection may mean the difference between normal yields and total crop failure.

### FLOUR STRENGTH

The plant breeder today is vitally concerned with the flour quality (baking strength) of his selections. The result has been, in most cases, an improvement in this characteristic and the relatively newer, better quality varieties such as Eureka, Wongoondy, Kondut and Gabo are now being grown





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on an increasing proportion of the wheatbelt. In this State, these and other varieties of medium strong and strong flour quality in 1946 were sown on 4% of the total area grown to wheat, in 1949 10% while in 1951 they had increased to 22%.

However, the flour quality of any variety, whether normally classed as weak or strong, is considerably influenced by soil and climatic conditions. The climate is not yet under man's control, but soil conditions are, and the farmer can considerably influence his soil fertility by his rotational practices and by the growing of suitable legumes, particularly subterranean clover. It cannot be too strongly stressed that varieties can only express their inherent quality to the fullest when grown under suitable climatic and soil conditions.

In Table 2 are tabulated the major characteristics of wheat varieties under trial, including their flour quality and disease resistance.

## DISCUSSION OF RESULTS

For the convenience of discussion, it is usual for the cereal growing areas to be divided into three major zones according to rainfall. Zone 1 covers districts with less than 14in. rainfall, Zone 2 those recording 14in. to 18in., and Zone 3 those with over 18in.

In Zone 1 are located the Merredin and Salmon Gums Research Stations and experimental evidence from these two stations can be applied to the low rainfall areas of the eastern wheatbelt and to the more limited areas of the southern mallee, respectively.

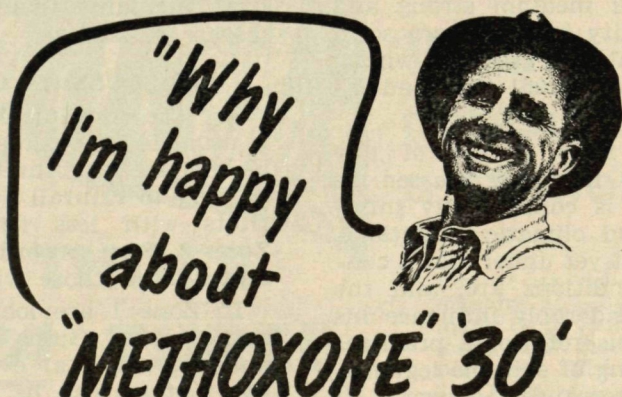
Wongan Hills, although in Zone 2, is close to the boundary of Zone 1, and is

TABLE 2.

*Tabulated Characteristics of Varieties under Trial.*

Variety.	Produced by.	Maturity.	Flag Smut Resistance.	Stem Rust Resistance.	Grain Quality.
Bungulla ....	W.A. Dept. of Agriculture	Very early	Highly resistant	Susceptible	State f.a.q.
Beneubbin ....	do. do.	Midseason	do. do.	do.	do.
Kondut ....	do. do.	Late midseason	Resistant	do.	Medium strong
Dowerin ....	do. do.	Early midseason	do.	Resistant	Above State f.a.q.
Wongoondy ....	do. do.	Early	Highly resistant	Now liable in W.A.	Approaching premium strong
Eureka ....	N.S.W. Dept. of Agriculture	Midseason	Resistant	do. do.	do. do.
Gabc ....	Sydney University	Early	Susceptible	Resistant in W.A.	do. do.
Benuobbin 48	Waite Research Institute	Midseason	Resistant	do. do.	State f.a.q.
Javelin 48 ....	do. do.	do.	do.	do. do.	Medium strong
Insignia 49 ....	do. do.	Early	do.	do. do.	State f.a.q.
Insignia ....	Victorian Dept. of Agriculture	do.	do.	Susceptible	do.
Yalta ....	N.S.W. Dept. of Agriculture	Midseason	Highly resistant	Resistant in W.A.	Premium strong
Warigo ....	Waite Research Institute	do.	do. do.	Resistant	Medium strong
Panther ....	do. do.	Late midseason	Resistant	do.	Medium strong to premium strong.
Festival ....	N.S.W. Dept. of Agriculture	Early midseason	do.	do.	Premium strong
M. 107 ....	W.A. Dept. of Agriculture	do. do.	do.	do.	Above State f.a.q.
M. 108 ....	do. do.	do. do.	Moderately susceptible	do.	Medium strong
M. 109 ....	do. do.	do. do.	Highly resistant	do.	do. do.
M. 112 ....	do. do.	Midseason	do. do.	do.	Premium strong





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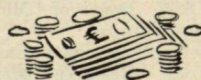
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TABLE 3.

Wheat Variety Trials at Research Stations, 1952-53 Season.

	AVONDALE.			CHAPMAN.			MERREDIN.			SALMON GUMS.			WONGAN HILLS.		
	Percentage of Control.		Yield.	Percentage of Control.		Yield.	Percentage of Control.		Yield.	Percentage of Control.		Yield.	Percentage of Control.		Yield.
	1952.	Average.		1952.	Average.		1952.	Average.		1952.	Average.		1952.	Average.	
Midseason Maturing Varieties for Early Planting—															
Bencubbin	26.2	100	Bus.	4.6	100	13.0	100	75	100	7.3	100	15.6	100	100	100
Kondut	28.8	110	%	5.1	(9)	100	(7)	86	(8)	5.7	77	14.8	95	(8)	94
Bencubbin 48	27.3	104	(2)	97	85	12.5	96	(2)	89	5.7	69	14.6	93	(2)	99
Warigo	23.6	90	(2)	92	63	12.6	97	...	...	5.1	78	13.1	84	(2)	86
Javelin 48	25.6	98	...	...	90	...	...	...	...	5.7	69	13.7	81	...	...
Panther	25.9	99	...	4.1	88	...	...	...	...	5.1	72	12.6	87	(8)	96
Eureka	30.1	115	(9)	109	109	11.0	84	(8)	82	6.1	83	13.1	84	(5)	87
Yalta	24.9	95	(5)	95	123	(6)	105	...	...	...	...	...	...	...	...
Difference for Significance—P = .05															
3.2	12	...	0.3	6	...	Not significant.	...	...	...	0.6	8	1.3	8	...	...
Early-midseason Maturing Varieties—															
Bencubbin	...	...	8.8	100	11.8	100	...	...	...	...	...	11.2	100	...	...
Eureka	...	...	11.3	128	8.9	75	...	...	...	...	...	10.9	97	...	...
Dowerin	...	...	9.8	111	10.3	87	...	...	...	...	...	9.0	80	...	...
M. 107	...	...	10.3	117	9.2	78	...	...	...	...	...	11.9	106	...	...
M. 108	...	...	...	...	8.1	68	...	...	...	...	...	9.8	87	...	...
M. 109	...	...	10.5	119	10.8	91	...	...	...	...	...	9.9	88	...	...
M. 112	...	...	9.3	105	7.1	60	...	...	...	...	...	9.9	88	...	...
Difference for Significance—P = .05															
...	...	...	0.7	8	1.5	13	...	...	...	...	...	1.2	11	...	...
Early Maturing Varieties for Late Planting—															
Bungulla	23.0	100	15.4	100	11.0	100	100	100	100	12.4	100	13.5	100	100	100
Insignia 49	22.6	98	16.8	109	11.9	108	(2)	99	(2)	11.5	92	15.1	112	(2)	97
Dowerin	15.9	69	13.3	86	(6)	82	(7)	86	(7)	10.3	83	11.6	86	(5)	84
Insignia	22.9	99	17.6	114	11.7	107	(2)	110	(2)	12.3	99	16.5	123	(2)	108
Woongoondy	14.1	61	(7)	110	(6)	98	(11)	101	(7)	96	12.1	13.0	96	(7)	97
Gabo	19.2	83	(6)	113	(5)	98	108	(7)	95	11.4	91	15.3	113	(6)	97
Festival	...	...	14.9	97	...	...	...	...	...	...	...	...	...	...	...
Difference for Significance—P = .05															
1.6	7	...	0.7	4	0.7	6	...	...	...	0.8	7	1.0	7	...	...

N.B.—Figures in brackets indicate the number of years under trial.



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typical of large areas of light heath plain occurring in many areas of the State. Also in Zone 2 are the Chapman and Avondale Research Stations, the former being situated on the northern edges of the wheatbelt, and the latter being typical of the west central and upper great southern districts.

The yielding ability of varieties under trial are summarised in Table 3. In the midseason and late maturing varieties, Bencubbin is used for the control, while the standard for early maturing varieties is Bungulla.

### MIDSEASON AND LATE MATURING VARIETIES

Two new varieties, Javelin 48 and Panther, were tested for the first time. Both varieties at Avondale, and Javelin 48 only at Merredin, gave yields equal to the control variety, Bencubbin; elsewhere the yields were somewhat disappointing. They will, however, be tested again in 1953.

Except at Chapman, where its yields were low, the results of two seasons' trials have shown that the rust-resistant Bencubbin 48 is capable of yielding as well as Bencubbin itself. Apart from rust-resistance, it is almost identical with Bencubbin, and it can therefore be recommended in rust-labile areas in place of Bencubbin.

The variety Warigo continues to be rather disappointing in yield and in this respect appears to be an unsuitable variety except perhaps in the western areas of the wheatbelt; the yield at Avondale only being the same as that of the control variety.

Both Kondut and Eureka have again yielded exceptionally well at Avondale and Chapman, the yields of Eureka significantly exceeding those of Bencubbin at the two stations, while Kondut outyielded the control at Chapman. This indicates the suitability of these two varieties in the higher rainfall areas of Zone 2. Although none of the research stations is situated in Zone 3, it is considered that these two varieties

would be more suitable for early planting in this zone than other midseason varieties.

### EARLY MATURING VARIETIES

For the first time, Insignia and the rust-resistant Insignia 49 were grown together. At the three stations, Avondale, Merredin and Salmon Gums, their yields were identical, whereas at both Chapman and Wongan Hills Insignia outyielded Insignia 49.

At Salmon Gums in 1952, Bungulla outyielded Insignia 49, while at Chapman, Merredin and Wongan Hills both Insignia and Insignia 49 gave higher yields than the control. At the other centre, Avondale, yields of all three varieties were equal.

Over a two season average, both Insignia and Insignia 49 have either yielded as well as, or better than Bungulla; showing that they are capable of high yields under a wide range of soil and climatic conditions. Although no better in flour quality than Bungulla, Insignia 49 with its good straw strength, high yield and rust-resistance should prove a useful variety in this State.

At Avondale the three varieties, Dowerin, Gabo and Wongoondy, were outyielded by Bungulla. This is not normal as the progressive average shows that both Wongoondy and Gabo normally outyield Bungulla at this station. The low yields of these three varieties was probably due to a succession of severe frosts in September, which may have caught the three varieties at a particularly susceptible stage.

Except for Gabo at Salmon Gums, both Gabo and Wongoondy at the other stations were either equal to Bungulla or superior to it. As they have desirable agronomic characters, they can be recommended for all zones of the wheatbelt. Dowerin appears to require better finishing conditions in spring and is therefore only recommended in the better rainfall areas, that is, in Zones 2 and 3.

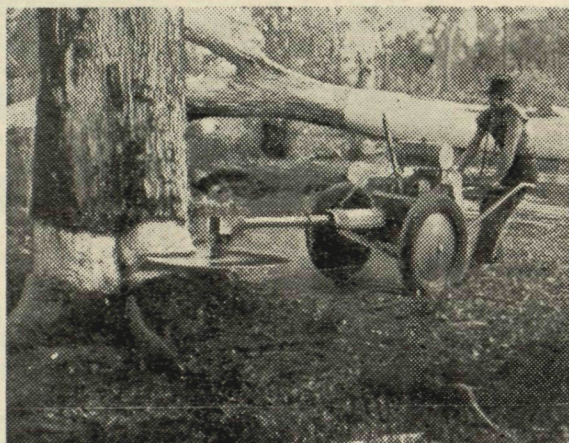


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TABLE 4.

*Recommended Varieties.*

Maturity Group.	Zone 1 (Early).	Zone 2 (Midseason).	Zone 3 (Late).
	Less than 14in. Annual Rainfall.	14in. to 18in. Annual Rainfall.	Over 18in. Annual Rainfall.
Midseason ....	Bencubbin Bencubbin 48	Kondut Bencubbin Bencubbin 48 Eureka Yalta	Kondut Eureka Bencubbin 48 Yalta Bencubbin
Early ....	Wongoondy Gabo	Wongoondy Gabo Dowerin	Wongoondy Gabo Dowerin
Very Early ....	Bungulla	Bungulla	Bungulla

For Zone 3 also, both Gabo and Wongoondy can be regarded as suitable early-maturing varieties for late planting.

The new rust-resistant variety Festival was tested at Chapman for the first time, where its yield was equal to that of the control variety.

As a guide, the recommended varieties for each zone have been listed in Table 4.

### NEW CROSS-BRED VARIETIES

Four new cross-bred varieties developed at the Merredin Research Station were included in large-scale variety trials for the first time. M.107, M.108 and M.109 are the result of selections from a cross between Kenya C.6041 and Eureka 11, while M.112 resulted from a cross between Eureka 11 and M.61 (Sword x Kenya C.6041). The Kenya parent was used for its rust resistance and Eureka principally for flour quality and straw strength.

In these cross-breds an endeavour has been made to combine together the important characteristics of strong

straw, disease resistance, high flour quality and high yield. Most of the varieties in popular use today are deficient in at least one of these major characteristics.

The results are somewhat variable for at Chapman, three of the cross-breds, M.107, M.108 and M.109, gave higher yields than the Bencubbin control, but were in turn all outyielded by Eureka, one of the varieties they have been designed to replace.

At Merredin and Wongan Hills, respectively, M.109 and M.107 gave yields equal to the control variety; apart from these two instances, yields have been somewhat disappointing. However, the results are for one year's trial only and further trials will be necessary before conclusions as to yield are arrived at.

### ACKNOWLEDGMENTS

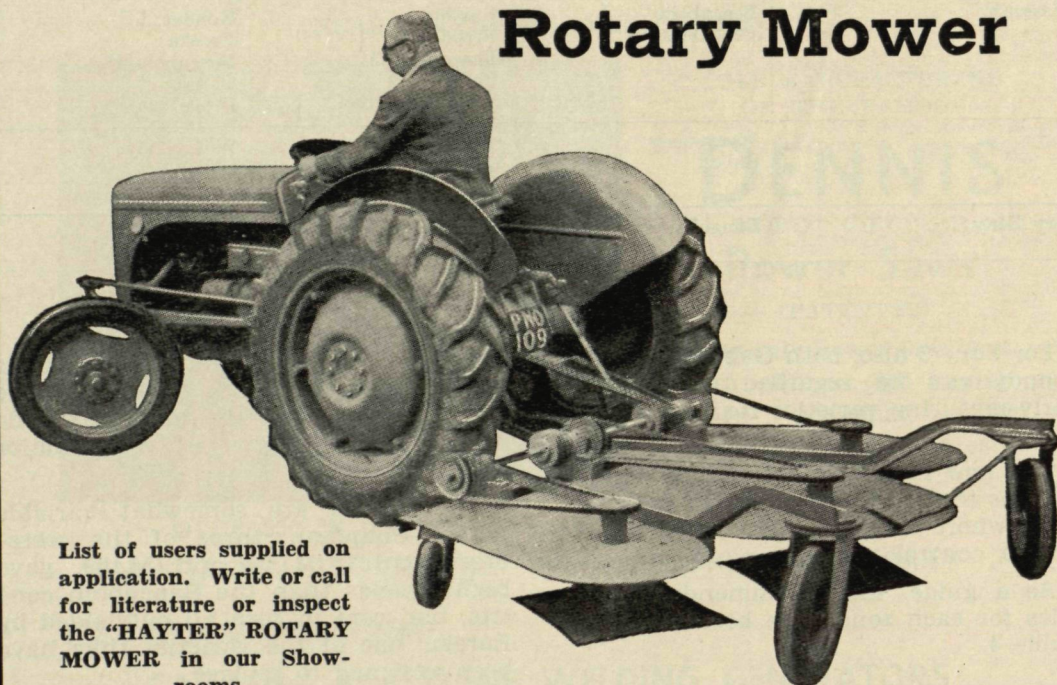
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