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PERFORMANCE OF GRAIN SORGHUM STRAINS UNDER IRRIGATION ON THE DARLING DOWNS AND IN NEAR SOUTH-WESTERN QUEENSLAND

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SUMMARY

Later maturing grain sorghum strains (e.g. Texas 671, DeKalb E57, Pioneer 846 and NK 310) grown under irrigation failed to show any marked yield advantage over the earlier maturing Texas 610, Texas 626 and NK 212 strains. All hybrids generally were significantly better than the open-pollinated Alpha. Grain nitrogen percentage showed a wide variation but on average little difference between strains was noted.

I. INTRODUCTION

Results in Texas, U.S.A. (Dalton 1967) suggest that later maturing strains of grain sorghum have a higher yield potential than early-maturing strains under irrigation. Increasing irrigation use in southern Queensland prompted investigation into this aspect. Five trials were conducted in the region, comparing several commercially available grain sorghum hybrids and the common open-pollinated variety Alpha.

II. MATERIALS AND METHODS

Three trials were conducted on the central Darling Downs, one at Inglewood and one at St. George. Mean monthly screen temperature averages for major centres obtained from Bureau of Meteorology records are given in Table 1.

TABLE 1

MEAN MONTHLY SCREEN TEMPERATURE (°F) AVERAGES FOR MAJOR CENTRES—DARLING DOWNS AND NEAR SOUTH-WESTERN QUEENSLAND

Centre	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Dalby ..	53·0	55·5	61·7	68·6	73·6	76·2	77·3	76·2	73·0	66·7	59·6	54·4
Goondiwindi	53·0	55·8	62·3	69·7	75·6	78·9	80·8	79·5	75·5	67·8	60·2	54·3
St. George	53·1	56·3	63·4	70·8	77·3	80·7	83·5	81·1	76·7	68·6	60·8	54·7

The design used was a four replicate randomized block in each case. All trials, except that at St. George, were planted and harvested with the farmer co-operator's commercial machinery and plot size was of the order of one-tenth acre. At St. George, plots were 4·67 ft x 66 ft and were planted with commercial equipment, but for yield data heads were harvested from an area 4·67 ft x 30 ft and threshed on a small-scale thresher.

Planting details and fertilizer rates used are given in Table 2.

TABLE 2

PLANTING DETAILS AND FERTILIZER RATES FOR INDIVIDUAL TRIALS

Trial	Sowing Date	Sowing Rate (lb/ac)	Row Spacing (in.)	Fertilizer Application (lb/ac)	
				N	P
1965–66 Brookstead ..	26.x.65	5	40	150+	..
1967–68 Tummaville ..	4.x.67	11	7	100	..
1968–69 Brookstead ..	14.x.68	9	40	144	..
1968–69 St. George ..	22.x.68	11	28	150	20
1968–69 Inglewood ..	30.xi.68	12	28	130	20

Sorghum midge (*Contarinia sorghicola* (Coq.)) was present in small numbers on the trials at Brookstead, Tummaville and Inglewood. There was a tendency for numbers to increase toward the end of the flowering period in the Tummaville trial. As a consequence, later strains experienced slightly greater midge damage. No midge were noted on the trial at St. George.

Grain yields were corrected to 14% grain moisture content.

Grain nitrogen percentage was determined by the Agricultural Chemical Laboratory Branch, Department of Primary Industries. For each trial only one sample for each strain, a composite bulked from the four replicates, was analysed.

III. RESULTS AND DISCUSSION

Grain yield, days from planting to half bloom and grain nitrogen percentage data are given in Table 3.

A late strain, Texas 671, produced the highest average grain yield but this result was not consistent throughout the trials. This average yield was only slightly better than that from the early Texas 610, Texas 626 and NK212 strains. The yield advantage of this late strain did not approach that reported by Dalton (1967) of 202·41±62·35 lb/ac/day, which in this case would amount to an increase of the order of 2,024 lb/ac. The other late strains were markedly lower yielding than the abovementioned early strains.

As is obvious from Table 1, length of season would not limit the yield response from the late strains. Sorghum midge could not be considered responsible for significant changes in yield pattern among the varieties and irrigation was generally adequate for late season production.

It thus appears that the Texas 610, Texas 626 and NK212 strains have such a high yield potential in this locality that the general relation reported by Dalton (1967) is not obvious in the small group of strains tested.

TABLE 3

GRAIN YIELD, DAYS TO HALF BLOOM AND AVERAGE GRAIN NITROGEN PERCENTAGE FOR SELECTED STRAINS IN SEVERAL IRRIGATED GRAIN SORGHUM COMMERCIAL STRAIN TRIALS—DARLING DOWNS AND NEAR SOUTH-WESTERN QUEENSLAND

Strain	Grain Yield (lb/ac)								Days to Half Bloom		Grain Nitrogen (%)	
	1965–66 Brookstead	1967–68 Tummaville	1968–69 Brookstead	1968–69 St. George	1968–69 Inglewood	Average (All trials)	Average (1965–66 trial omitted)	Average (1967–68 trial omitted)	Average	Range	Average	Range
Texas 671	6,788a	6,385abcd	7,581a	6,532a	3,757a	6,209	6,064	6,165	80	72–91	1·77	1·55–2·15
Texas 610	6,616ab	7,110ab	6,798abc	5,986ab	4,390a	6,180	6,071	5,948	70	67–75	1·78	1·65–2·01
Texas 626	6,601ab	6,840abc	6,910abc	6,149ab	4,372a	6,174	6,068	6,008	70	66–76	1·77	1·50–2·03
DeKalb E57	5,623d	5,445d	6,572abc	6,136ab	3,829a	5,521	5,496	5,541	79	71–90	1·80	1·45–2·14
NK310	5,786cd	6,355abcd	5,738c	5,792ab	1,972b	5,129	4,964	4,822	83	80–86	1·83	1·45–2·10
Pioneer 846	..	7,345a	6,965ab	6,142ab	3,504a	*	5,989	*	77	70–87	1·66†	1·45–2·00
NK220Y	..	5,960bcd	5,800bc	5,761ab	4,103a	*	5,406	*	70	65–74	1·80†	1·65–1·90
NK212	6,392ab	..	7,253a	6,118ab	4,114a	*	*	5,969	70	68–73	1·82†	1·60–1·95
DeKalb F64	6,164bc	..	..	5,652b	4,047a	*	*	*	86	78–111	1·91†	1·75–2·10
Alpha	4,367e	5,310d	..	4,506c	..	*	*	*	78	74–84	1·85‡	1·70–2·15
Total strains in trial ..	14	14	8	11	10	..	..	..	..	..	..	..
S.E. treatment means	185	359	372	237	344							

* Average not calculated because of non-inclusion in some trials. † Calculated from four trials only. ‡ Calculated from three trials only.

Means in the one trial having a common alphabetical affix are not significantly different at the 5% level of probability as shown by Duncan's Multiple Range Test.

As the late strains have a greater irrigation water requirement and are more likely to encounter serious sorghum midge infestation (T. Passlow personal communication), the evidence presented indicates that for the time being at least attention should be concentrated on growing of the earlier maturing, high-yielding strains such as Texas 610, Texas 626 and NK212.

There was a general tendency for all hybrid varieties to outyield Alpha by a significant margin.

Grain protein percentage showed a wide variation from trial to trial but on average no differences between strains were apparent.

IV. ACKNOWLEDGEMENTS

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REFERENCE

DALTON, L. G. (1967).—A positive regression of yield on maturity in sorghum. *Crop Sci.* 7:271.

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