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PERFORMANCE OF COMMERCIAL MAIZE HYBRIDS UNDER IRRIGATION ON THE DARLING DOWNS AND THE ST. GEORGE IRRIGATION AREA

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SUMMARY

Twenty-one dent and two pop types of maize hybrids were grown under furrow irrigation in some or all of nine trials from the 1965-66 to the 1969-70 summer season.

Q23, DS601, GM211, Q1280, GH134, GH128, Q692 and Q724 showed average performances above the trial mean yields. The recently introduced hybrids DeKalb 805A, Pioneer Q500 and DeKalb XL45 were not as comprehensively tested but gave very promising performances. Lodging resistance was superior in these latter types.

Days to 50% silking, lodging incidence, 1,000 grain weight and grain nitrogen data are presented.

I. INTRODUCTION

Increasing interest in irrigated maize growing in the mid 1960s on the Darling Downs and the St. George Irrigation Area necessitated evaluation of the several maize hybrids commercially available. The origin and explanation of the designation of these hybrids are described by Schroder (1971).

Water supplies for irrigation in this locality are generally limited. Consequently early-maturing hybrids showing high yield potential and thus giving good yield to water use ratios are sought.

Small areas of popcorn are grown annually. Their concurrent testing enables computation of comparative economic returns when price per unit for each maize type is known.

II. MATERIALS AND METHODS

Three trials were conducted on the southern Darling Downs (Bony Mountain), four on the central Darling Downs (Brookstead and Dalby) and two on the St. George Irrigation Area.

Soil types were black earths of alluvial origin at the Bony Mountain and Brookstead sites, a grey soil of heavy texture at Dalby and a red brown earth on the St. George Irrigation Area.

The design used was a four replicate randomized block in each case. Two-row plots varying from 30 to 130 ft were used in all cases except at the Brookstead site in 1967-68 and 1968-69, where 4-row plots were used.

Plots were hand-thinned to equal plant populations at all sites except Bony Mountain and Brookstead in 1967-68 (Table 1). De Kalb XL45 was included in some trials at the standard population and also at 1·5 times this population. Popcorn hybrids were similarly entered in trials at Dalby and St. George in 1968-69.

Planting, fertilizer and row spacing details are given in Table 1. It is to be noted that all but three trials are regarded as mid-season and late-planted maize crops.

TABLE 1

PLANTING, ROW SPACING, PLANT POPULATION AND FERTILIZER DETAILS FOR INDIVIDUAL TRIALS

Trial	Sowing Date	Row Spacing (in.)	Standard Plant Population (plants/ac)	Fertilizer Application (lb/ac)			
				N	P	K	Zn
1965–66 Bony Mountain	22.xii.65	40	not available	50	..	..	..
1966–67 Bony Mountain	15.xi.66	40	16,000–21,000	50	20	60	..
1966–67 Brookstead ..	29.xi.66	30	14,520	90	..	..	·6*
1967–68 Bony Mountain	2.i.68	40	12,000–14,000 (XL45–18,600)	50	20	60	..
1967–68 Brookstead ..	1.xii.67	40	16,000–20,000	150	30	50	20
1968–69 Brookstead ..	12.xii.68	30	23,000	145	..	..	·2*†
1968–69 Dalby	17.x.68	40	22,000	150	40	..	·2*†
1968–69 St. George ..	19.ix.68	40	22,000	130	20	..	·2*†
1969–70 St. George ..	..	40	22,000	150	20	..	9†

* Applied as a foliar spray.
† Seed dusted with zinc oxide.

The trials were furrow-irrigated and generally a sufficiently intensive supplementary-to-rainfall schedule was followed to satisfy the moisture requirements of all maturity groups. However, the three trials at Brookstead suffered some moisture stress, which would have adversely affected the yields of the later maturing hybrids in 1966-67 and 1967-68, and the early types in 1968-69.

All trials except the Bony Mountain 1965-66 trial were hand-harvested. The datum row length varied from 30 to 100 ft. The 1965-66 Bony Mountain trial was machine-harvested.

Grain yields were corrected to 14% grain moisture content.

Grain nitrogen percentage was determined by the Agricultural Chemical Laboratory Branch, Department of Primary Industries. Samples were taken from all trials except those at Bony Mountain. For appropriate trials only one sample for each strain, a composite bulked from the four replicates, was analysed.

III. RESULTS AND DISCUSSION

Grain yields, days from planting to 50% silking, loading percentage, 1,000 grain weight and grain nitrogen percentage are given in Tables 2 and 3.

TABLE 2

GRAIN YIELD (LB/AC) FOR SELECTED HYBRIDS

Hybrid	1965–66 Bony Mt.	1966–67 Bony Mt.	1966–67 Brook-stead	1967–68 Bony Mt.	1967–68 Brook-stead	1968–69 Brook-stead	1968–69 Dalby	1968–69 St. George	1969–70 St. George
QK37	—	—	—	7543 a*	4357 bcd	—	5533 abcd	—	—
DeKalb 805A	—	—	—	—	—	5757 efghi	5779 ab	7683 a	6639 bc
Pioneer Q500	—	—	7795 a	—	—	—	5157 abcdef	6465 bcd	6824 bc
Q23	—	5763 ab	—	6459 abc	5692 a	7154 a	4466 defghi	6049 cd	—
DeKalb DS601	6410 ab	5233 ab	6731 ab	6859 ab	4719 b	6629 abc	4992 abcdef	6855 abc	8029 a
GM211	—	—	—	6624 abc	4741 b	6256 cdef	5016 abcdef	—	—
DeKalb XL45 (HP)	—	—	—	—	—	5285 hijk	6120 a	6278†	6972 abc
Q1280	6138 ab	6306 ab	6767 ab	6105 bc	5109 ab	6832 abc	4575 cdefghi	5658 a	—
GH134	7177 a	4915 ab	6017 bcd	—	—	7055 ab	—	—	—
GH128	—	4950 ab	6753 ab	—	—	6410 bcde	4667 bcdefghi	—	—
Q692	6769 ab	5916 ab	6434 bc	6011 bc	4190 bcde	6518 abcd	3705 hijk	6536 abcd	6445 bc
Q724	—	4620 ab	—	6270 abc	4590 bc	5919 defgh	4786 bcdefgh	6670 abcd	—
Q790	5495 b	—	6590 b	6718 abc	4390 bcd	6127 cdefg	4260 fghijk	—	—
DeKalb DS606A	6114 ab	5598 ab	5864 bcd	6671 abc	3447 defg	5890 defg	4511 defghi	6780 abcd	—
DeKalb DS65A	6497 ab	6753 a	5634 bcd	6459 abc	2693 gh	5040 jk	5723 abc	—	—
Pioneer Q301	—	—	5729 bcd	7048 ab	3085 fgh	5595 fghij	4843 bcd	6302 cd	7369 ab
Q739	5581 b	4702 ab	5820 bcd	6411 abc	4233 bcde	6510 abcd	4653 bcdefghi	—	—
DeKalb XL45 (SP)	—	5952 ab	—	6930 ab	3343 defg	5078 ijk	5045 abcdef	5746†	6303 bc
DeKalb DS28	—	—	5145 d	6718 abc	3518 cdefg	5515 ghij	5101 abcdef	—	6158 c
Q1152	6534 ab	5209 ab	5699 bcd	4431 d	2557 gh	5770 efgh	4736 bcdefgh	7492 ab	6698 bc

TABLE 2—continued

GRAIN YIELD (LB/AC) FOR SELECTED HYBRIDS—*continued*

Hybrid	1965–66 Bony Mt.	1966–67 Bony Mt.	1966–67 Brook-stead	1967–68 Bony Mt.	1967–68 Brook-stead	1968–69 Brook-stead	1968–69 Dalby	1968–69 St. George	1969–70 St. George
DeKalb XL361	—	—	—	—	—	4692 k	—	—	7065 abc
PQ300	—	—	5164 d	—	3194 efgh	4792 k	—	—	7076 abc
DeKalb 510P (HP)	—	—	—	—	—	—	3738 ghijk	—	—
DeKalb 510P (SP)	—	—	—	—	—	—	3651 hijk	—	4440 d
DeKalb 517P (SP)	—	—	—	—	—	—	3244 jk	4592†	—
DeKalb 517P (HP)	—	—	—	—	—	—	3061 k	3903†	—
Total entries in trial	11	21	19	25	21	21	30	14	12
S.E. treatment mean	397	794	365	404	333	216	338	356	345
Co-efficient of variation percentage	13·1	29·8	12·1	12·8	17·4	7·27	14·3	10·7	10·3

HP High population (1·5 times standard population).

SP Standard population.

† 2 replicates only.

* Means in the one trial having a common alphabetical subscript are not significantly different at the 5% level of probability as shown by Duncan's multiple range test.

TABLE 3

DAYS TO 50% SILKING, LODGING PERCENTAGE, 1,000 GRAIN WEIGHT AND GRAIN NITROGEN PERCENTAGE FOR SELECTED HYBRIDS

Hybrid	Days to 50% Silking		Lodged Stalks (%)		1,000 grain weight (g)		Grain nitrogen (%)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
QK37	82	73–88	0·8	0– 2·4	284·5	n.a.	1·58	1·50–1·65
DeKalb 805A	67	65–70	4·2	1·6– 8·6	303·3	283·7–332·8	1·70	1·60–1·85
Pioneer Q500	75	72–78	3·5	1·3– 6·1	343·5	336·5–348·8	1·70	1·65–1·83
Q23	74	64–84	19·6	7·5–36·0	268·1	266·0–271·1	1·63	1·55–1·75
DeKalb DS601	71	63–79	6·7	0–15·8	311·1	289·1–337·4	1·69	1·50–1·92
GM211	71	63–78	1·4	0– 2·5	303·8	303·5–304·0	1·57	1·55–1·60
DeKalb XL45 (HP)	61	55–66	0·4	0– 0·9	264·4	233·0–289·9	1·79	1·55–2·05

TABLE 3—continued

DAYS TO 50% SILKING, LODGING PERCENTAGE, 1,000 GRAIN WEIGHT AND GRAIN NITROGEN PERCENTAGE FOR SELECTED HYBRIDS—*continued*

Hybrid	Days to 50% Silking		Lodged Stalks (%)		1,000 grain weight (g)		Grain nitrogen (%)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Q1280	76	64–85	6·2	0·1–25·0	294·4	283·3–300·5	1·67	1·60–1·75
GH134	75	73–78	6·0	0–18·1	321·5	n.a.	1·63	1·55–1·70
GH128	75	67–85	4·5	0– 9·4	286·2	279·8–292·5	1·76	1·60–1·90
Q692	75	64–83	9·3	0–30·4	288·6	261·2–325·7	1·63	1·50–1·79
Q724	70	63–74	15·6	0–54·7	256·0	248·8–265·7	1·66	1·50–1·80
Q790	74	64–80	10·2	2·9–17·5	266·3	260·8–271·7	1·60	1·55–1·65
DeKalb DS606A	71	63–79	9·1	2·2–29·6	272·5	265·8–278·6	1·69	1·45–1·85
DeKalb DS65A	73	65–85	11·5	4·2–22·8	240·9	223·8–257·9	1·61	1·55–1·65
Pioneer Q301	66	60–72	4·3	0–10·3	289·0	278·4–305·8	1·84	1·65–1·96
Q739	69	62–79	11·1	0–27·6	271·5	267·6–275·3	1·60	1·45–1·65
DeKalb XL45 (SP)	61	55–66	0·4	0– 0·6	271·3	240·7–298·8	1·81	1·65–2·00
DeKalb DS28	65	58–71	5·7	0–12·5	292·1	279·6–309·5	1·71	1·50–1·94
Q1152	71	63–80	9·0	0–30·6	236·9	212·8–269·5	1·72	1·60–1·95
DeKalb XL361	65	63–68	3·6	0·6– 6·6	299·3	264·2–334·4	1·86	1·75–1·96
PQ300	64	59–68	1·9	0– 3·8	299·1	279·1–319·1	1·85	1·60–1·95
DeKalb 510 P(HP)	77	n.a.	24·2	n.a.	141·0	n.a.	2·05	n.a.
DeKalb 510P (SP)	76	74–77	12·6	5·2–19·9	151·5	144·9–158·0	2·11	1·95–2·26
DeKalb 517P (SP)	77	75–79	40·3	18·3–62·4	136·7	133·9–139·4	1·85	n.a.
DeKalb 517P (HP)	77	75–79	70·6	57·9–82·1	131·8	126·0–137·5	1·85	n.a.

HP—High population (1·5 times standard population).

SP—Standard population.

n.a.—Not applicable.

Mean grain yields for all sites have not been calculated because of the non-inclusion of many hybrids in every trial. An attempt to compare hybrids validly has been undertaken in Table 4. Each hybrid's yield performance was calculated as a percentage of the trial mean yield. The average yield percentage of each hybrid to the trial mean yield was then calculated.

TABLE 4

YIELD OF INDIVIDUAL HYBRIDS AS A PERCENTAGE OF THE TRIAL MEAN YIELD

Hybrid	1965–66 Bony Mountain	1966–67 Bony Mountain	1966–67 Brookstead	1967–68 Bony Mountain	1967–68 Brookstead	1968–69 Brookstead	1968–69 Dalby	1968–68 St. George	1969–70 St. George	Average Percentage Yield of Trial Mean Yield
QK37	..	..	..	116	109	..	119	..	..	115 (3 sites)
DeKalb 805A	..	..	..	..	..	97	124	124	100	111 (4 sites)
Pioneer Q500	..	..	127	..	..	..	110	104	102	111 (4 sites)
Q23	..	105	..	100	143	120	96	97	..	110 (6 sites)
DeKalb DS601	102	95	109	106	118	112	107	110	120	109 (9 sites)
GM211	..	..	..	102	119	105	107	..	..	108 (4 sites)
DeKalb XL45 (HP)	..	..	..	..	..	90	131	101	105	107 (4 sites)
Q1280	97	115	110	94	128	115	98	91	..	106 (8 sites)
GH134	114	89	98	..	..	119	..	..	..	105 (4 sites)
GH128	..	90	110	..	..	108	100	..	..	102 (4 sites)
Q692	107	108	105	93	105	110	79	105	97	101 (9 sites)
Q724	..	84	..	97	115	100	103	107	..	101 (6 sites)
Q790	87	..	107	104	110	103	91	..	..	100 (6 sites)
DeKalb 606A	97	102	95	103	86	99	97	109	..	99 (8 sites)
DeKalb 65A	103	123	92	100	67	85	123	..	..	99 (7 sites)
Pioneer Q301	..	..	93	109	77	94	104	101	111	98 (7 sites)
Q739	89	86	95	99	106	110	100	..	..	98 (7 sites)
DeKalb XL45 (SP)	..	108	..	107	84	85	108	92	95	97 (7 sites)
DS28	..	..	84	104	88	93	109	..	92	95 (6 sites)
Q1152	104	95	93	68	64	97	101	121	100	94 (9 sites)
DeKalb XL361	..	..	..	..	..	79	..	..	106	93 (2 sites)
PQ300	..	..	84	..	80	81	..	..	106	88 (4 sites)
DeKalb 510P (HP)	..	..	..	..	..	..	80	..	..	80 (1 site)
DeKalb 510P (SP)	..	..	..	..	..	..	78	..	67	73 (2 sites)
DeKalb 517P (SP)	..	..	..	..	..	..	69	74	..	71 (2 sites)
DeKalb 517P (HP)	..	..	..	..	..	..	66	63	..	64 (2 sites)

HP High population (1·5 times standard population).
SP Standard population.

Of the older hybrids available, Q23, DS601, GM211, Q1280, GH134, GH128, Q692 and Q724 showed average yield percentages higher than the trial mean yields. The newer hybrids DeKalb 805A, Pioneer Q500 and DeKalb XL45 gave a promising performance. The earlier development and maturation of DeKalb XL45 and DeKalb 805A and high yield potential provide scope for maximizing yield per unit of irrigation water. Their superiority in lodging resistance is an added advantage.

QK37 showed the highest average percentage of the trial mean yield on the basis of limited testing. The extreme lateness of this and similar types in the districts under consideration preclude their use in commercial practice.

DeKalb XL45 gave higher (non-significant) yields in all cases where its population was 1·5 times normal.

There appeared to be no yield advantage with higher populations of popcorn and lodging was accentuated to a commercially unacceptable level.

Grain nitrogen data showed little variation but there was a tendency for some DeKalb and Pioneer lines to provide higher nitrogen percentages.

IV. ACKNOWLEDGEMENTS

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REFERENCE

SCHRODER, C. A. (1971).—Maize growing, *Qd agric. J.* 97:450-62.

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