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Grain Sorghum Variety Evaluation Trials for the Douglas Daly District, NT

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ABSTRACT

The ongoing grain sorghum evaluation trial is essential to keep up to date with varieties, which are available and perform well in the Northern Territory. Sorghum varieties are often dropped from production and replaced by new lines depending on performance and demand.

The liaison with the supplying seed companies through this ongoing evaluation trial provides valuable information for grain sorghum producers in the Northern Territory.

INTRODUCTION

Grain sorghum has been grown in the Top End over the past 20 years with grain yields varying depending on seasonal conditions, changing technology, management practices and the varieties available. Most of the grain sorghum produced is used as stockfeed within the Northern Territory.

As well as grain, the sorghum stubble is a valuable fodder for cattle resulting in high weight gains. At a stocking rate of 1 steer/ha, weight gains were 0.9 kg/hd/day over a 15-week period. (Sturtz and Chapman 1995).

OBJECTIVE

The aim of the trial each year is to compare and monitor the characteristics of several commercially available varieties, which include newly released varieties and those which have



performed well in past years. Through this evaluation, Top End sorghum producers are kept up-to-date on the varieties available, their characteristics and performance under local conditions.

MATERIALS AND METHODS

The trials are conducted at the Douglas Daly Research Farm (13° 50' S, 131° 10' E) on a sandy red earth (Blain) soil. The annual average rainfall for the area is 1200mm, mainly between November and March (see Figure 1).

Wherever possible, the trials are conducted in the same way as a commercial crop, as recommended by DPIFM Agnote No 695, *Growing Grain Sorghum in the Northern Territory*.

During the 1997-98 and 1998-99 seasons the selected areas were ploughed and cultivated prior to planting. The areas were previously under a legume stand of *Centrosema pascourum* cv. Cavalcade.

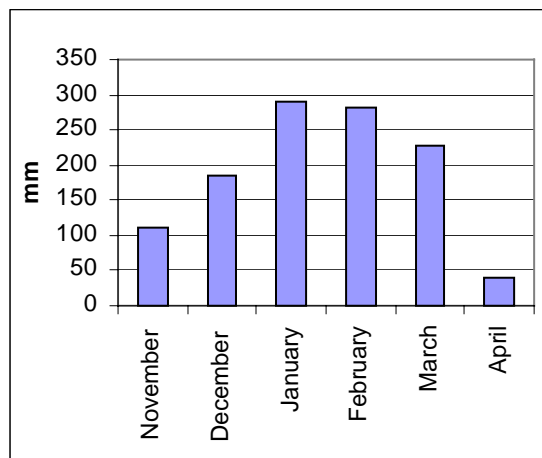


Figure 1. Long-term Average Rainfall at Douglas Daly Research Farm, November to April

TRIAL DETAILS

Design: Each year the different varieties were replicated 4 to 5 times with the 1997-98 and the 1998-99 trials replicated 4 times in random order in a block design, each of 7 rows x 60 metres long. (*The 8th is a border row, as the machine harvester is wide enough for 7 rows only*).

Fertiliser: Depending on soil analysis and paddock history nitrogen (N), phosphorus (P), potassium (K), sulphur (S) and trace elements were applied for suitable plant nutrition. In the 1998-99 season, fertiliser application included:

- 22 kg/ha P
- 45 kg/ha K
- 80 kg/ha N (split applications)
- 22 kg/ha S

Planting: Mid to late December using a precision row planter (8 row Mason).

Row spacing: 75 cm.

Planting rate: 7.5 kg/ha (approximately 200,000 seeds per hectare).

Planting depth: Approximately 10mm.

Seed treatment: The seed is coated with Concep® seed dressing for protection against Dual® herbicide.

Weed control: Glyphosate® 450 at 2.5 l/ha as a pre-planting knock down spray.

Nu-Trazine 500® and Dual® both at 2 l/ha as a post-planting, pre-emergent herbicide.

Post planting weed control:

- In the 1998-99 season, Starane® at 0.4 l/ha was applied for control of various broad leaf weeds.
- In the 1997-98 season no weed control was required.

Measurements: Days to flowering, first flowering and 50% flowering, days to maturity, resistance to leaf disease, plant lodging, plant height, head type, head exertion, head mould at harvesting, plant population, hand and machine harvest yield and grain moisture.

SORGHUM VARIETIES USED IN THE TRIAL

Pacific Seeds, Pioneer Overseas Corporation, Pedigreed Seed Company and Grainco Seeds were the main suppliers of seed for the trials. Two other seed producers also contributed a few varieties in 1994-95.

Seeds that performed well were retried in subsequent years, when available. New varieties, recommended by seed breeders, were also grown.

In most years 12 to 15 varieties were grown with 2 to 6 varieties supplied by each company. In 1998 Pedigreed Seed Company and Grainco Seeds stopped production of their sorghum lines. For that year, only Pacific Seeds and Pioneer Overseas Corporation seeds were used.

The results and observations of the trial were analysed and averaged and then tabled. Comments on the performance of each variety and any significant differences were recorded. The different varieties had a range of flowering and maturity dates. Hand harvest was undertaken when the grain was physically mature. However machine harvesting was used at the same time to minimise bird damage. The variable maturity and plant characteristics must therefore be taken into account when comparing each of the varieties. Grain harvest yields were calculated at 14% moisture content. Bird and insect damage, harvesting problems due to plant height and head exertion were also taken into account. Stubble biomass, leaf disease and 'stay green' effectiveness were also important features for high value grazing.

Copies of results are sent to the contributing seed companies and DPIFM Extension Officers for distribution to sorghum producers. Table 1 shows the results of the varieties currently available and how they have performed over past years.

DISCUSSION

Seed germination, vigour and size varied between each variety and between seasons. A lower population will often compensate yield with larger heads. However, weed competition in these areas can be a problem.

Harvesting ability can be a problem with the taller varieties because of the extra plant material, which goes through the harvester and the difficulty of cutting and feeding the material into the harvester. This was observed in the 1997-98 season with the variety *Graze N Sile*, which produced the highest hand harvest yield but the lowest machine harvest yield. The taller varieties are also susceptible to lodging.

Head exertion is also associated with harvesting difficulty, as extra plant material is required to go through the harvester and be separated from the grain.

Bird and insect problems can be severe particularly on the earlier maturing varieties and this may result in a non-representative harvest yield.

FURTHER RESEARCH

Leaf disease, head exertion, plant height and maturity times have an effect on the grazing potential of sorghum stubble and need further study. Further study of the plant 'stay green' ability, stubble yield and stubble feed quality is also required.

ACKNOWLEDGEMENTS

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REFERENCES

Hausler P., Price T. & O'Gara F. (1996) *Growing Grain Sorghum in the Northern Territory*, Agnote 695, October 96, Department of Primary Industry & Fisheries, Darwin.

Sturtz J.D. & Chapman A.L. (Editors) (1995) *Conservation Farming for the Semi-Arid Tropics*, Proceedings of a Workshop at the NT Rural College, Katherine 18-20 July, 1995 pp 93-95.

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Table 1.

SORGHUM VARIETY TRIALS 1992---1999
Location -- Douglas Daly Research Farm

(Sorghum varieties currently available 1998/99 plus past performances of these varieties)

VARIETY	YEAR	FIRST FLOWER DATE Days After Sowing	50% FLOWER DATE Days After Sowing	HEAD TYPE (o,so,sc,c)	LODGE (1 to 5)	HEIGHT cm	HEAD MOULD (1 to 5)	HEAD EXERT (1 to 5)	LEAF DISEASE (1 to 5)	HAND HARVEST (kg/ha)	POPULATION (pph)	MACHINE HARVEST (kg/ha)	COMPANY
MR 31	1998-1999	53	56	o	5	120	2	3	2	3831	80,000	1803	Pacific
	1997-1998	57	61	so	5	120	3	4	3	3138	122,000	2195	
GRAZE N SILE	1998-1999	60	64	sc	4	210	3	3	4	5441	82,000	3382	Pioneer
	1997-1998	62	72	so	5	190	4.5	4	4	4236	89,300	1733	
Pac 2391	1996-1997	58	65	so	5	180	4	3	3	n/a			
	1998-1999	58	62	so	5	130	3	2	3	4026	44,000	2543	Pacific
8527	1998-1999	60	63	sc	5	135	3	3	3	4303	88,000	3234	Pioneer
	1997-1998	64	69	c	5	130	4	4	3	3358	139,500	2885	
8118	1996-1997	58	63	sc	5	130	3	4	3	3090			
	1995-1996	64	64	sc	5	140	3	4	4	5050			
DK 35	1998-1999	55	61	sc	5	150	4	3	3	5017	128,000	4315	Pioneer
	1997-1998	61	68	sc	5	150	5	4	3	3325	143,500	3132	
Magnum MR	1998-1999	48	51	sc	5	105	2	2	1	3192	110,000	2059	Pacific
	1998-1999	52	55	sc	5	115	1	2	1	3965	99,000	2316	Pioneer
	1997-1998	57	61	sc	5	120	3	3	3	3512	136,500	2922	

Head Type:
o = Open
so = Semi Open
sc = Semi Closed
c = Closed

Lodge:
1 = Severe Lodging
5 = No Lodging

Mould:
1 = Severe Head Mould
5 = No Head Mould

Head Exertion:
1 = Poor Exertion
5 = Good Exertion

Leaf Disease:
1 = Severe Leaf Disease
5 = No Leaf Disease

SORGHUM VARIETY TRIALS 1992---1999

Location -- Douglas Day Research Farm

(Sorghum varieties currently available 1998/99 plus past performances of these varieties)

VARIETY	YEAR	FIRST FLOWER DATE Days After Sowing	50% FLOWER DATE Days After Sowing	HEAD TYPE (o,so,sc,c)	LODGE (1 to 5)	HEIGHT cm	HEAD MOULD (1 to 5)	HEAD EXERT (1 to 5)	LEAF DISEASE (1 to 5)	HAND HARVEST (kg/ha)	POPULATION (pph)	MACHINE HARVEST (kg/ha)	COMPANY
Pac 2392	1998-1999	54	59	so	5	125	2	3	2	3356	103,000	1962	Pacific
	1997-1998	58	63	o	5	130	4	4	3	3370	137,700	2699	
Chopper	1998-1999	59	63	sc	4	215	4	3	3	4787	78,000	3297	Pacific
	1997-1998	62	74	c	4	200	4.5	4	4	3599	132,500	2285	
MR Bonus	1998-1999	60	63	c	5	130	3	3	3	4303	88,000	3234	Pioneer
XS 779	1998-1999	58	62	c	5	130	2	3	4	3829	66,000	2291	Pioneer
MR Goldrush	1998-1999	49	52	o	5	110	2	3	1	2848	60,000	1903	Pacific
	1997-1998	55	58	so	5	120	3	4	2	3319	148,500	2770	
MR Buster	1998-1999	54	57	sc	5	115	3	2	3	3969	74,000	2585	Pacific
	1997-1998	58	62	sc	5	120	4	3	3	3177	135,300	2563	
1996-1997	52	56	so	5	110	4	4	5	3	3210			
1995-1996	59		sc	5	125	3	3	3	2	4240			
1994-1995	55		so	5	120	4	4	4	4			3100	
1993-1994	55		so	5	125	5	5	4	2			3310	
1992-1993	55		so	5	125	5	5	3	3	3687			

Head Type:

o = Open

so = Semi Open

sc = Semi Closed

c = Closed

Lodge:

1 = Severe Lodging

5 = No Lodging

Mould:

1 = Severe Head Mould

5 = No Head Mould

Head Exertion:

1 = Poor Exertion

5 = Good Exertion

Leaf Disease:

1 = Severe Leaf Disease

5 = No Leaf Disease