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

P. Shotton, Technical Officer, Systems Research, DDRF and the late T. Price, Senior Extention Officer, Darwin

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](image)

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

Pioneer Overseas Corp, Pacific Seeds, Pedigreed Seed Company and Grainco Seeds

Les Huth Department of Primary Industry and Fisheries, Darwin for the rainfall analysis of the Douglas Daly District.

REFERENCES


Please visit us on our website at [www.primaryindustry.nt.gov.au](http://www.primaryindustry.nt.gov.au)

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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)

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>YEAR</th>
<th>FIRST FLOWER DATE Days After Sowing</th>
<th>50% FLOWER DATE Days After Sowing</th>
<th>HEAD TYPE (o,so,sc,c)</th>
<th>LODGE (1 to 5)</th>
<th>HEIGHT cm</th>
<th>HEAD MOULD (1 to 5)</th>
<th>HEAD EXERT (1 to 5)</th>
<th>LEAF DISEASE (1 to 5)</th>
<th>HAND HARVEST (kg/ha)</th>
<th>POPULATION (pph)</th>
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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
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Mould:  
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Head Exertion:  
- 1 = Poor Exertion

Leaf Disease:  
- 1 = Severe Leaf Disease

1 = No Lodging  
5 = No Head Mould  
5 = Good Exertion  
5 = No Leaf Disease