

## Yield of starch and soluble carbohydrates in perennial forage sorghums

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Perennial forage sorghums, such as *S. alnum*, a short-lived perennial showing drought and salt tolerance, are widely grown on brigalow lands of E. Australia as pioneer crops and in short-term pastures. Pritchard (1964) extended the environmental range of these sorghums by breeding for yield, palatability, persistence and tolerance to frost and diseases. Two inter-specific hybrid sorghums resulted (2n = 40), viz. cv. Silk (*S. halepense* x *S. roxburghii* cv. Krish x *S. arundinaceum*) and cv. Sucro (*S. alnum* x *S. sudanense* x *S. vulgare*). Silk gave high forage yields with extended growing season. Sucro had typical brown caryopsis, and high sugar levels (Pritchard, unpub. data). These hybrids were tested at Narayen Research Station with *S. alnum* cv. Crooble (Silvey. 1976).

Starch and soluble sugar levels (Ford, 1974) were measured in the leaf blade, leaf sheath and stem of Crooble, Silk and Sucro. Plants were harvested just before flowering, stored in dry ice, freeze-dried and ground (1 mm). Crooble had less total sugars in the stem than Silk (P<0.01) and Sucro (P<0.05) (Table 1). This was due mainly to the differences in sucrose contents (P<0.01). No other cultivar differences were significant.

**TABLE I. Starch and soluble sugar levels in forage sorghum (% dry wt.)**

Tissue and Cultivar	Starch	Alcohol Soluble Sugars				Total Sugars
		Fructose	Glucose	Sucrose		
Leaf blade <sup>+</sup>	1.0	1.4	1.4	1.4	4.2	
Leaf sheath <sup>+</sup>	0.5	1.2	2.8	2.6	6.6	
Stem : Crooble	0.3 a	4.9 a	6.0 a	4.2 a	15.0 a	
Silk	0.8 a	NS 7.5 a	NS 8.0 a	NS 6.4 b	22.1 ab	
Sucro	0.4 a	NS 8.1 a	NS 9.5 a	NS 7.3 b	24.9 b	

Mean values between cultivars were not significantly different.

Values not followed by same letter differ significantly : \* P<0.05, \*\* P<0.01.

These levels of stem sugars are higher than in *S. bicolor* which is considered an important crop for fuel alcohol production (Alsina, et al., 1974). Silk and Sucro, have potential as energy crops in drier (500-1000 mm annual rainfall) regions of tropical Australia. Perennial sorghums may have an advantage over sugar cane or cassava because they can grow from seeds or ratoons, need less cultivation, can be harvested after 3-5 months of growth and may be grazed. At Narayen over a six year period, mean annual dry matter yields of intermittently grazed sorghum have been : Silk - 9.5 t/ha (4.7 - 19.1 t/ha); Sucro - 7.6 t/ha (3.7 - 15.0 t/ha) and Grooble - 8.3 t/ha (3.7 - 15.8 t/ha). With two harvests per year, sugar yields of 3-4 t/ha may be expected from Sucro and Silk sorghums under dryland conditions. In some years sugar yields of up to 8 t/ha from sorghum compare favourably with sugar cane (e.g. Bureau of Sugar Experiment Stations, 1977).

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