

**NOTE**

**FORAGE YIELD AND PROTEIN CONTENT  
OF FIVE SUDANGRASS CULTIVARS IN  
AHWAZ<sup>1</sup>**

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**ABSTRACT**

A 3-year (1984-86) yield trial was conducted at the Agricultural College Experimental Station, University of Shahid Chamran (Ahwaz) to determine the yield performance and protein content of five sudangrass [*Sorghum bicolor* (L.) Moench var. Sudanense] cultivars. 'Beef Builder T' cultivar had the highest fresh and field-dried forage yields each year. 'Vidan' which has been replanted for a long time in the region had lower yield due to loss of heterosis. No significant differences were noted between the crude protein percentages of these cultivars. However, protein percentages gradually declined with continued cuttings. It was concluded that 'Beef Builder T' was the highest yielding silage cultivar, and both 'Piper' and 'Grazer N<sub>2</sub>' were suitable for forage production in the region.

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## تحقیقات کشاورزی ایران

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### مقایسه پنج رقم سودانگراس از نظر عملکرد علوفه و میزان پروتئین در اهواز

جعفر بحرانی

دانشیار بخش زراعت و اصلاح نباتات دانشگاه شهید چمران - اهواز

#### چکیده

جهت ارزیابی عملکرد بالقوه علوفه و میزان پروتئین پنج رقم سودانگراس، آزمایش سه ساله‌ای (۱۳۶۳-۶۵) در مزرعه آزمایشی دانشکده کشاورزی دانشگاه شهید چمران اهواز انجام گردید. رقم "Beef Builder T" دارای میزان عملکرد علوفه تر و خشک بیشتری در هر سال بود. رقم Vidan که مدتهاست در منطقه زراعت می‌شود به علت هیبرید بودن صفات ژنتیکی خود را از دست داده و عملکرد کمتری داشت. بین درصد پروتئین خام ارقام مذکور اختلاف معنی‌داری وجود نداشت. در عین حال درصد پروتئین کلیه ارقام در چین‌های متوالی به تدریج کاهش یافت. با توجه به نتایج این آزمایش می‌توان رقم "Beef Builder T" را به عنوان رقم مورد توصیه جهت علوفه سیلویی و هر کدام از ارقام "Piper" یا "Grazer N2" را به عنوان رقم علوفه‌ای در منطقه توصیه کرد.

#### INTRODUCTION

Sudangrass [*Sorghum bicolor* (L.) Moench var. *Sudanense*] is an important forage crop in the Khuzestan province of Iran. Although the plant has been grown in the region for more than 25 years, information on the yield performance of the different cultivars is limited. Zarbakhsh (6) recently found superiority of some cultivars in Dezful. Worker (5) determined that the peak dry matter content of different cultivars occurred at flowering, with protein content declining afterwards. Marble *et al.* (3) reported that sorghum-sudangrass hybrids yielded maximum dry forage when cut at flowering stage.

"Vidan" was the only sudangrass cultivar which had been grown in Khuzestan region in the past. Since this cultivar was initially a hybrid, and there are no hybrid seed production programs in the region, its

genetic characteristics have been gradually lost through replanting from open-pollinated seeds. Therefore, it was necessary to introduce new cultivars to the region.

### MATERIALS AND METHODS

A 3-year (1984-86) experiment was conducted at the Agricultural College Experimental Station, University of Shahid Chamran, Ahwaz to evaluate the yield potential of five sudangrass cultivars, "Beef Builder T", "Grazer N<sub>2</sub>", "Piper" (US introductions), "F<sub>1104</sub>" (Romania) and "Vidan" (Israel).

The soil of the experimental site was a silty clay loam, with pH of 8.5. The seeds were drilled in 4 rows 60 cm apart in 7×3 m plot at the rate of 30 kg ha<sup>-1</sup> on around May 15 of each year. The experimental design was a randomized complete blocks with 4 replications, and it was conducted at different sites each year. The plots received 300 kg ammonium phosphate before planting and 50 kg ha<sup>-1</sup> urea after each cutting. Regular irrigation was applied, and the plots were kept free from weed by hand. The plants were cut to a 5-cm stubble height at about 10% flowering after leaving 50-cm border for each plot (cutting area was 6.5×2.5 m). The fresh forage was immediately weighed and left in the field to dry and was reweighed after about 2 weeks throughout the experiment (air-forced oven was not available for dry matter determination). Ten plants were randomly selected from each plot at each cutting and used for nitrogen determinations according to the micro-kjeldahl method (1). Two to four cuttings were taken during the growing season for each cultivar, and the last cutting was taken in early October.

Total annual fresh and dry forage and crude protein percentages were analyzed separately for each year and combined for a 3-year analysis (4).

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## RESULTS AND DISCUSSION

Ahwaz has a semitropical climate characterized by long hot summers and short mild winters. Under such conditions sudangrass having a C<sub>4</sub> photosynthetic pathway and about 5 months of growing season grows well with sufficient water and fertilizers.

Total fresh and dry forage of the different cultivars for the 3-year period are shown in Tables 1 and 2. "Beef Builder T" with thicker stems and larger leaves produced the highest fresh and dry weights, and differences in forage yields were statistically significant (at 5% level) in 3 years. The field-dried forage yields which have been obtained in this experiment are not bonafide dry matter yields. However, as these forages were dried under high summer temperatures (40 to 50° C), field-dry weight did not differ much from that of dry matter. Similar results have been obtained at the Safi-Abad Experimental Station (Dezful) where the dry matter of these cultivars were determined (6).

The significant effects of the year and year × cultivar which were observed on fresh and dry forage yields were probably due to yearly temperature differences. Generally, the growth of the plants is proportional to temperature when sufficient moisture and fertilizers are provided. There was a highly significant correlation between total forage produced each year and the average temperature of the growing season (May to October) (correlation coefficient was 0.827 and 0.976 for fresh and dry forage respectively). The high yielding cultivars also showed their highest yielding potential during the warmer years.

"Vidan" had the lowest yield each year and in the 3 year average as expected. Indeed, this cultivar has already lost its genetic characteristics (heterosis) and its replanting is no longer recommended in the region.

No significant differences were noted between the crude protein percentages of the different cultivars each year (except for the first year) and for the 3-year average (Table 3), but the effects of year

Table 1. Mean fresh forage yields of sudangrass cultivars (T ha<sup>-1</sup>).

Cultivar	1984	1985	1986	Means
Beef Builder T	106 a*	168 a	145 a	140 A
Piper	93 ab	150 ab	118 bc	121 AB
Grazer N <sub>2</sub>	88 ab	142 ab	126 ab	118 AB
F <sub>1104</sub>	95 a	129 ab	104 bc	109 BC
Vidan	79 b	105 b	98 c	93 C
Means	92 C	139 A	118 B	

\* Means in each group of data with different letters are statistically different at 5% level according to Duncan's multiple range test.

Table 2. Mean dry forage yields of sudangrass cultivars (T ha<sup>-1</sup>).

Cultivar	1984	1985	1986	Means
Beef Builder T	33.6 a*	34.4a	28.3 a	32.1 A
Piper	23.1 b	32.9	26.9 a	27.5 AB
Grazer N <sub>2</sub>	22.0 b	27.8 b	26.0 ab	25.3 B
F <sub>1104</sub>	23.7 ab	24.3 b	23.3 ab	23.1 AB
Vidan	19.2 b	27.4 b	21.7 b	22.8 B
Means	24.2 A	21.3 B	25.2 A	

\* Means in each group of data with different letters are statistically different at 5% level according to Duncan's multiple range test.

Table 3. Crude protein percentage of sudangrass cultivars in different years.

Cultivar	1984	1985	1986	Means
Beef Builder T	3.02 b*	3.18 b	3.31 a	3.17 A
Piper	4.35 a	3.65 a	2.89 a	3.63 a
Grazer N <sub>2</sub>	4.88 a	4.80a	2.60 a	4.09A
F <sub>1104</sub>	3.98 b	4.06 a	3.16 a	3.73 A
Vidan	4.24 a	4.45 a	2.94 a	3.87 A
Means	4.09 A	4.02 A	2.98 B	

\* Means in each group of data with different letters are statistically different at 5% level according to Duncan's multiple range test.

Table 4. Crude protein percentages of sudangrass cultivars at different cuttings.

Cultivar	1st cutting	2nd cutting	3rd cutting
Beef builder T		3.45 a	2.77 a
Piper	5.18 a	7.10 a	1.46 a
Grazer N <sub>2</sub>	3.13 a	3.31 a	5.78 a
F <sub>1104</sub>	2.02 a	3.37 a	5.94 a
Vidan	4.48 a	3.70 a	1.90 a
Means	5.34 A*	3.58 B	2.25 C

\* Means in each group of data with different letters are statistically different at 5% level according to Duncan's multiple range test.

and the year  $\times$  cultivar on protein percentage were significant. The reason for these variations may be attributed to soil N content of the different experimental sites. It is worth mentioning that these forage protein contents are lower than the normal ones in sorghum. The reason for the low protein values is probably due to laboratory procedure which was used for all the samples uniformly and thus is relatively valid.

An interesting point about protein percentage of the plants was that it gradually declined during the growing season (Table 4). Late summer or fall depression of nitrogen has been reported in plants such as *Andropogon gerardi* Vitman (2). The reasons for this depression may be attributed to the transfer of nitrogen to basal parts of stem to be used for regrowth in next season. More research is going on in this area.

### CONCLUSIONS

It can be concluded that "Beef Builder T" cultivar was the highest yielding silage cultivar and both "Piper" or "Grazer N<sub>2</sub>" were suitable for forage production in the region. Replanting of "Vidan" is no longer recommended.

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