

# SILAGE PRODUCTION POSSIBILITY OF SORGHUM VULGARE, S. SUDANENSE AND THEIR HYBRID ON THE SECOND CROP CONDITIONS OF TOKAT-TURKEY

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## ABSTRACT

The objective of the work was to determine biological characters of some fodder grasses (Sorghum, Sudangrass and their hybrid) under second crop condition of Tokat-Turkey with different N levels. The grasses were sown on 20-21 July 1994-1995 after harvesting the main crop of wheat, harvested at the end of October 28-29. Application of 40 - 80 - 120 kg/ha N fertilizer increased the plant height, fresh fodder, DM yield, CP contents in all plants. The hybrid showed the highest fresh and dry fodder yield (100.7 - 23.4 Mg/ha) at the high level of N. Leaf rate declined with use of N fertilizer. It was concluded that summer fodder grasses, especially the hybrid and Sudangrass are inexpensive and suitable as a fodder source at that time of year and during winter months when other fodder is too expensive or unavailable.

## KEYWORDS

Sorghum, Sudangrass, Hybrid, Second Crop, Yield, CP, Silage.

## INTRODUCTION

The poor rainfall distribution and generally very heavy grazing in many regions of Turkey result in patterns of pasture yield and quality that severely limit animal production, (Büyükburç 1993 and 1995). Pasture for summer, cereal straw for winter will remain for a long time the major source of ruminant feeding. It is thus necessary to find ways of reversing the trend and improving the situation. One of the options available for improving animal performance is the growing of fodder plants on field. Tropical summer fodder grasses such as sorghum, sudangrass and their hybrid could be the most viable fodder source on irrigated areas, naturally under second crop conditions (Tans• *et al.*, 1991, Aydın and Albayrak, 1995). But in Turkey's main crop production and rotation systems there is no place for the summer fodder crops on dry and irrigated fields.

This project aimed to investigate the growing possibility and biological characters of these grasses in the Tokat-Turkey area with the target of silage making under second (double) crop conditions with different N-levels.

## MATERIALS AND METHOD

The study was conducted at Tokat Agricultural Faculty Research Station located at an altitude of about 608 m. Average temperature in the growing months July - October is 19°C.

The field trials started on 20 - 21 July of 1994 and 1995 after the harvesting of the main wheat crop and was carried out on a completely randomized split plot with three replications. In the research the following summer fodder grasses: Sorghum, (*S. vulgare, bicolor*) (Early sumac), Sudangrass (*S. sudanense*) (Gözde 80) and Sorghum x Sudangrass Hybrid (Pioneer 988) and four different N-levels 0-40-80-120 kg/ha were used at split form, first half with sowing, the second half at the end of tillering as ammonium sulfate. Before sowing, a basal dressing of 100 kg/ha triple superphosphate was applied uniformly.

Until harvesting time, 27-28 October, at nearly the end of milk stage, the field was irrigated, on average, 4 times.

## RESULTS AND DISCUSSION

**Plant height:** This biological character of summer fodder grasses is very important for our farmer. Results showed that regular fertilizing increased plant height of grasses significantly, more than 40% on average (Table 1). At the end of the second growing season, Sudangrass reached at the highest N-level (120 kg/ha) 252.7 cm and hybrid 222.9 cm. Sorghum showed at all N-levels the lowest plant height (average 144.5 cm) compared with other grasses.

**Fresh Fodder Yield:** Two year experiment results indicated that N application influenced the forage yield positively. The reaction of grasses to N-levels differed. Sorghum and Sudangrass yields increased significantly firstly at 80 and 120 kg/ha N-levels but the hybrid, at the 40 kg/ha N-level. The hybrid (Pioneer-988) showed the highest fresh yield at all levels of N compared to other grasses (Table 1). On average a 100 ton/ha green forage production of hybrids under second crop condition for silage making is a very good result for farmers of this region.

**DM. Yield:** The yield response of summer fodder grasses to increasing increments of nitrogen for both years is shown in Table 1. Dry matter production increased significantly at the 1 % level linearly from no nitrogen to 120kg/ha N-application. The highest N-application (120kg/ha) showed an average over 30 % DM increasing with all grasses compared to the control.

As green fodder production results showed, the hybrid had the highest DM yield. Between the other grasses no differences, according to DM yield, were found (Table 1).

**Leaf percentage :** The leaf rates (dry plant) of all grasses at no nitrogen level were found to be between 26.7 - 29.9 %, average 28.8% (Table 2). With the use of N-application, the leaf rate of all grasses declined significantly till average 20.6%. This negative effect of N-fertilizer on leaf rate has been reported by other researchers (Roy and Wright, 1973, Tosun and Özbilen, 1991). After the two year observations, sudangrass had a little lower leaf rate compared to other grasses.

**Leaf CP content :** The importance of high leaf rate and CP content for animal nutrition has been reported by many researchers (Heath *et al.* 1985 and Tans• *et al.* 1991) CP content of leaves increased linearly and significantly with N rates, from average 13.2% to 16.0% (Table 2). The high CP level of leaf influenced, together with the high leaf rate, the quality of total harvested biomass, because the CP level of stover is generally between 2-5%. Between the grasses there was no difference between CP levels of their leaves.

**Whole Plant CP Content :** As it has been seen at leaf CP content, (Table 2). the whole CP level also increased significantly in all grasses with the increasing of N-level. Between the species, no differences, were found according to their CP level.

Since fodder yield was especially high, average CP content over the 9 % level of whole plants in all grasses at the milk stage provided a naturally high total CP yield.

## CONCLUSION

From this two years study it appears that the low level of N-fertilizer (40-120 kg/ha) increases the plant height, fresh fodder and DM yield, leaf and whole plant CP content, but decreases the leaf rate of all grasses. Maximum fresh yield (107.1 Mg/ha) and high average CP content (9.2 %) of hybrid (Pioneer 988) was very promising for silage under the second crop condition and before the beginning cool days and frosting.

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**Table 1**  
Plant Height, Fresh Forage and DM Yield.

N - Level	Plant Height Of Grasses (cm)			Average
	Sorghum	Sudangrass	Hybrid	
N0	120.2	174.9	176.7	157.2 d
N4	138.5	203.1	198.2	179.9 c
N8	153.3	228.0	216.3	199.2 b
N12	166.1	252.3	222.9	213.9 a
Average	144.5 b	203.6 a	203.5 a	

LSD 1 % for N-levels 13.2 ; Grasses 29.2

N - Level	Fresh Fodder Yield of Grasses (Mg/ha)			Average
	Sorghum	Sudangrass	Hybrid	
N0	62.84	68.34	80.09	70.42 c
N4	70.01	74.64	94.21	79.62 b
N8	75.81	78.04	103.76	85.87 ab
N12	81.68	83.88	107.11	90.89 a
Average	72.58 b	76.23 b	96.29 a	

LSD 1 % for N-levels 7.19 ; Grasses 17.34

N - Level	DM Yield of Grasses (Mg/ha)			Average
	Sorghum	Sudangrass	Hybrid	
N0	13.59	14.67	17.94	15.40 c
N4	15.43	17.22	21.08	17.91 b
N8	16.45	18.09	22.67	19.07 ab
N12	18.22	19.72	23.45	20.47 a
Average	15.92	17.42	21.29	

LSD 1 % for N-levels 1.78

**Table 2**  
Average Leave Rate, CP Content of Leaf and Whole Plant.

N-Level	Average Leaf Rate (%)				Average
	Sorghum	Sudangrass	Hybrid		
N0	29.9	26.7	29.7		28.8 a
N4	28.6	22.0	27.3		25.9 b
N8	22.2	20.9	24.1		22.4 c
N12	20.9	18.6	22.2		20.6 c
Average	26.7	22.1	25.8		

LSD 1 % for N-level 2.2

N - Level	CP Content of Leaf (%)				Average
	Sorghum	Sudangrass	Hybrid		
N0	13.8	12.3	13.5		13.2 c
N4	14.9	14.4	14.2		14.5 b
N8	15.6	15.8	14.9		15.5 ab
N12	16.3	16.2	15.7		16.1 a
Average	15.2	14.7	14.6		

LSD 1 % for N-level 1.1

N - Level	CP Content of Whole Plant (%)				Average
	Sorghum	Sudangrass	Hybrid		
N0	8.9	8.2	8.5		8.5 d
N4	9.3	8.8	9.0		9.0 c
N8	9.8	9.4	9.3		9.5 b
N12	10.4	10.3	9.9		10.2 a
Average	9.6	9.2	9.2		

LSD 1 % for N-level 1.1