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RESPONSE OF SORGHUM CULTIVARS TO NITROGEN UNDER DRY FARMING CONDITIONS

M. L. GUPTA*, K. K. JAIN, O. L. SHARMA and N. S. YADAVA

Three cultivars of sorghum (CSH-5, SPV-245 and Aspuri (local) were tried at four levels (0, 30, 60 and 90 kg/ha) of nitrogen. The experiment was conducted at Agricultural Res. Sub Station, Sukhadia University, Aklera (Jhalawar) during *Kharif* season of 1979, 1980 and 1981. Hybrid CSH-5 (23.08 q/ha) and variety SPV-245 (19.25 q/ha) yielded more grain than Aspuri (15.16 q/ha) but a reverse trend was observed for fodder yields. Every dose of nitrogen added significantly increased the grain and fodder yields.

In most parts of the world, sorgum is generally grown under less favourable conditions compared to other major food grains such as rice, wheat and maize. Sorghum when used predominately as a food crop in Asia and Africa is commonly grown in areas that are less suitable for other food grains whose performance is less reliable than that of sorghum (Singh *et al.* 1976). Sorghum is also an important *kharif* crop of southern and south eastern parts of Rajasthan with an area about 10lakh hectares. In these areas it is generally cultivated under rainfed conditions and fertilizer is rarely used-Singhal *et al.* (1977) reported that Jai (Aspuri) produced the highest yield among the five varieties tried at N levels ranging from 0 to 120 kg/ha under rainfed conditions in Kota region. But, Joshi and Bhatnagar (1976) reported superiority of CSH-5 over Aspuri (local) by a margin of 28.40 per cent at Kota. They confirmed the superiority of CSH-5 over Aspuri (local) on the basis of minikit trails also. However, the yield difference was not much in the trails conducted in Jhalawar district, the main sorghum growing district of Kota region. An experiment was therefore conducted for the comparison of the best hybrid (CSH 5) and local improved variety (Aspuri) under different levels of of nitrogen under dry farming conditions. SPV-245, a recently developed variety was also included.

MATERIALS AND METHODS

The experiment was conducted during rainy season (Kharif) of 1979, 1980 and 1981 at Agricultural Research Sub Station, Sukhadia University, Aklera (Jhalswar) which is situated in south eastern part of Rajasthan. The soil of the experimental field was clayey having pH. 7.4 and E c 0.98 mmhos/cm. The organic matter content was 0.6 per cent. The available nitrogen and P_2O_5 were 261 and 44.6 kg/ha, respectively. The average rain fall is about 1000 mm/year but most part of that is received from last week of June to first week of September. The distribution of rainfall is generally erratic. In the first year (1979) of experimentation, there was late break and early withdrawal of monsoon, in second year (1980) timely break and

Sukhadia University, Agricultural Research Sub Station, Aklera (Jhalawar) Rajasthan.

* Asstt. Professor (Agronomy), Rajasthan College of Agriculture, Udaipur (Raj)-313 001.

comparatively early cessation of monsoon, while in 1981 normal break and drought period for about 30 days were observed (fig 1).

Two cultivars CSH-5 and Aspuri were tried at four levels (0, 30, 60 and 90 kg/ha) of nitrogen in 1979 During 1980 and 1981, SPV-245 was also included in the trail. The experiment was conducted in randamised block design. A basal dose of 30 kg P_2O_5 and half dose nitrogen as per treatment was applied. The remaining dose of nitrogen was applied as top dressing at knee high and flowering stages. In 1979, the last dose i. e. at flowering could not be applied in view of drougnt conditions. The dates of sowing and harvesting for each variety during the three years of experimentation are given below ;

Variety	Date of showing			Date of harvesting		
	1979	1980	1981	1979	1980	1981
Aspuri	12 July	1 July	3 July	17 Dac.	21 Nov.	22 Nov.
CSH-5	12 July	1 July	3 July	26 Oct.	20 Oct.	19 Oct.
SPV-245	Not inclnded	1 July	3 July	Not included	20 Oct.	19 Oct.

DAYS AFTER CESSATION OF RAINFALL

FIG. 4. EVAPOTRANSPIRATION RATE UNDER DIFFRENT TREATMENTS AFTER CESSATION OF RAINFALL

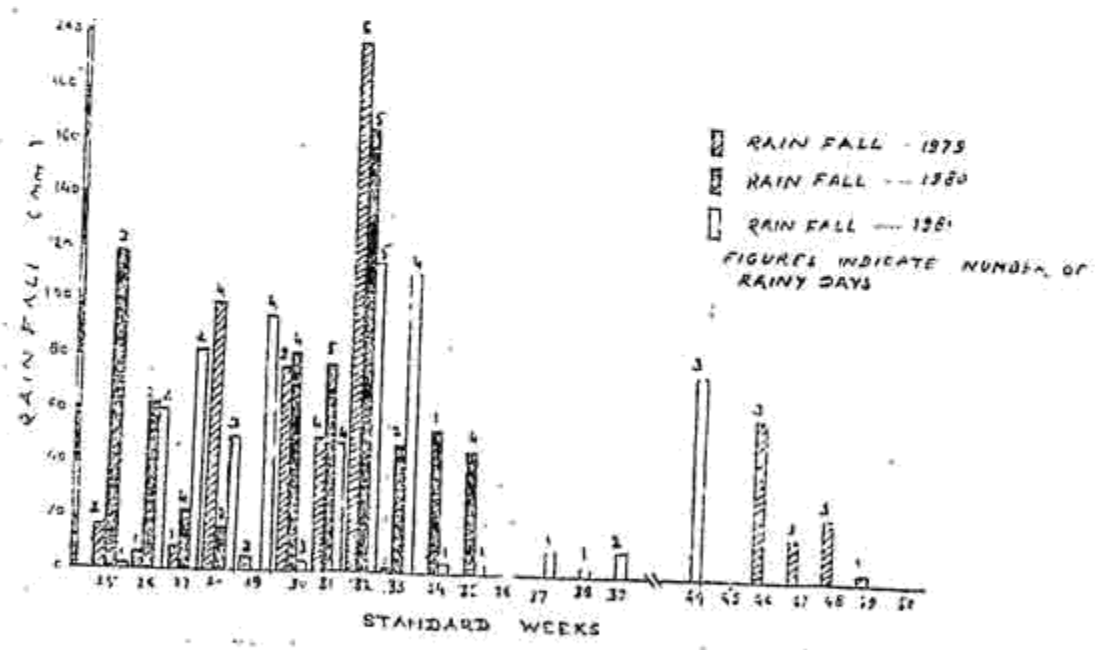

FIG. 1. WEEKLY RAINFALL DURING THE CROP SEASONS (1979, 80 and 81)

RESULTS AND DISCUSSION

On the mean yield basis it was observed that CSH-5 (23.08 q/ha) yielded more than Aspuri (15.16 q/ha) and SPV-245 (19.25 q/ha) (Table-1). Superiority of CSH-5 was also observed by Patil *et al.* (1978). Joshi and

Table 1 : Response of different varieties of sorghum to nitrogen under dry farming conditions.

Treatments	Grain yield (q/ha)					Fodder yield (q/ha)			
	1979	1980	1981	Mean	% increase over control	1979	1980	1981	Mean
Varieties									
V_1 = Aspuri	6.87	16.70	22.02	15.16		80.30	141.25	175.46	132.34
V_2 = CSH-5	16.48	22.96	29.80	23.08	52.20	47.68	77.36	97.27	74.10
V_3 = SPV-245	—	19.30	19.20	19.25	26.90	—	77.63	77.76	77.70
S.Em±	0.81	0.59	1.10	—	—	3.63	2.91	5.48	—
C.D. (0.05)	2.38	1.71	3.81	—	—	10.66	8.34	18.96	—
"N" levels (kg/ha)									
N_0 = 0	4.63	10.49	18.49	11.20		35.02	60.00	93.29	62.77
N_{30} = 30	10.58	16.10	21.34	16.00	42.85	60.96	85.53	112.08	86.19
N_{60} = 63	13.76	22.50	25.79	20.68	84.64	70.53	114.80	129.67	105.00
N_{90} = 90	17.73	29.39	29.07	25.39	126.69	89.46	134.63	132.29	118.79
S.Em.±	0.46	0.60	0.91	—	—	2.10	3.36	3.34	—
C.D. (0.05)	1.37	1.98	2.53	—	—	6.10	9.63	9.26	—

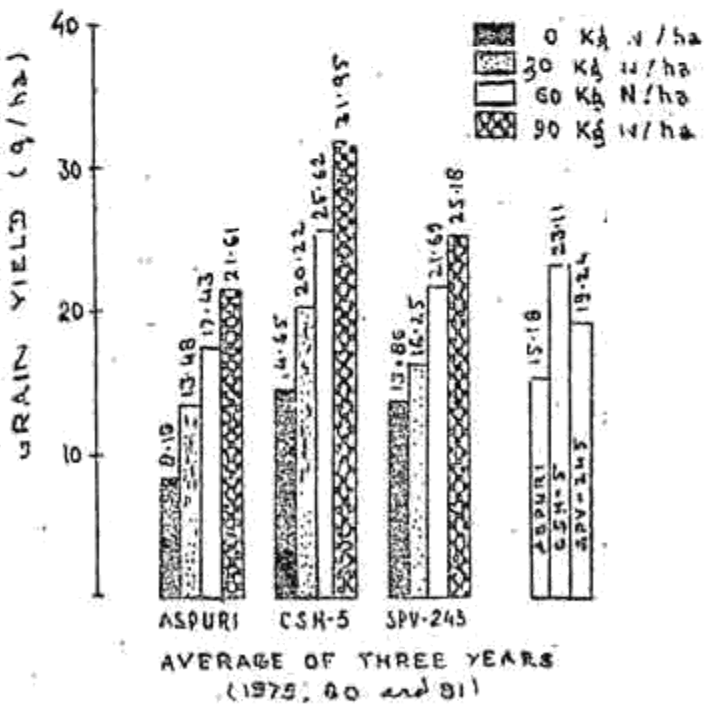

FIG. 2 RESPONSE OF DIFFERENT VARIETIES OF SORGHUM TO NITROGEN UNDER DRY FARMING CONDITIONS

Bhatnagar (1976) and Patil and Sinde (1979). The increase was 52.2 per cent over control (Aspuri). SPV-245 also yielded 26.9 per cent more grain, than Aspuri. In the year 1979 when rainfall was received only for a period of about 35 days, the yield of CSH-5 was about 139.9 per cent higher than Aspuri. In 1980, when comparatively normal monsoon was observed, Aspuri yielded less grain than the other two cultivars tried. However, in 1981 when there was drought at the time of flowering and grain filling stages of CSH-5 and SPV-245 and rainfall at the time of grain filling of Aspuri, (44th week), Asquri yielded more than SPV-245 but less than CSH-5. It was observed that CSH-5 was comperatively more drought tolerant and stable yielder. Data also revealed that Aspuri is more affected by erratic weather conditions.

Every dose of nitrogen applied significantly increased the grain of sorghum during all the three years of experimentation. On the mean data basis nitrogen application at the rate of 90 kg/ha gave the highest yield (25.39 q/ha). Response to nitrogen by different varieties is presented in figure-2.

Fodder yield : On the mean data basis it was observed that Aspuri, being a tall and long duration variety, yielded more fodder (132 3 q/ha) compered to CSH-5 (74.10 q/ha) and SPV-245 (77.70 q/ha) (Table-1). The same trend was observed during all the three years of experimentation. Fodder yields were also affected by pattern of rainfall. Fodder yield increased progressively with successive levels of nitrogen in all the years except in 1981. when 60 and 90 kg N/ha did not differ significantly. The highest fodder yield (118.79 q/ha) was obtained when 90 kg N/ha was applied and lowest in the control plot. (62,77 q/ha).

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