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Effect of Seed Rates and Cutting Stages on Forage Yield of Maize Varieties

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ABSTRACT

A field trial was conducted to study the effect of 3 seed rates (40, 50 and 60 kg/ha) and 3 cutg stages (Tasseling, Silking and Milk) on forage yield of two composite varieties of maize viz., Vijay d Moti during *kharif* 1978 and 1979 at the Gujarat Agricultural University, Anand (Gujarat). The sults indicated that Vijay Composite recorded higher green forage, dry matter and crude protein elds. A seed rate of 50 kg/ha in Vijay Composite and 60 kg/ha in Moti Composite resulted in gher fodder and crude protein yields. A seed rate of 60 kg/ha gave higher net increamental cost nefit ratio than that of 50 kg seed rate/ha. Harvesting of maize varieties at milk stage for fodder rpose was found to be ideal for higher dry matter and crude protein yields.

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INTRODUCTION

Maize (*Zea mays* L.) is an important ereal fodder crop on account of being rculent, sweet and palatable; and also free om toxicants. Different varieties need speci- agronomic and cultural practices to know eir best potential in term of yield and uality. Information on stage of cuttings ong with seed rates is very meagre of the arieties tested in the present study. Hence, ie present investigation was taken up.

MATERIALS AND METHODS

A field experiment was carried out at orage Research Farm, Gujarat Agricultural niversity, Anand (Gujarat) during *kharif* asons of 1978-79 and 1979-80 in a split-plot design. The treatment combinations of two composite maize varieties (Vijay and Moti) and three seed rates (40, 50 and 60 kg/ha) were assigned to the main plot, while three harvesting stages (Tassel, Silk and Milk) were alloted to sub plot. The gross and net plot areas were 12 m^2 and 6 m^2 respectively. The experimental soil is a deep well drained sandy olay loam having low amonut of available N (212.0 kg/ha), fairly rich in available phosphorus (62.0 kg P_2O_5/ha) rich in available potash (300.0 kg K_2O/ha.) A uniform basal dose of 50 kg N + 25 kg P_2O_5 + 25 kg K_2O per hectare was applied in furrow at the time of sowing and 50 kg N per hectare was top dressed after one month of sowing. The dry matter was estimated by drying the cut plant samples in oven at 70 to

80°C to a constant weight. Nitrogen content was estimated by modified Kjeldahl's method. Subsequently the protein content of dry matter was computed for each treatment by multiplying its nitrogen percentage with conversion factor 6.25. Crude protein per hectare was worked out by employing the following formula.

$$\text{Protein yield (q/ha)} = \frac{\text{Protein content in dry matte (per cent)} \times \text{Dry matter yield (q/ha)}}{100}$$

Recommended cultivation practices were followed for raising the crop.

RESULTS AND DISCUSSION

Varieties

The green forage yield of the two varieties did not differ significantly. However, Vijay Composite gave significantly higher dry matter yield than Moti Composite during 1979 and on pooled basis (Table 1). Vijay Composite also produced significantly higher crude protein yield than Moti Composite during 1979.It was also better on pooled basis. The yield was poor during 1978 as compared to 1979 due to high rainfall (576.9 mm in Aug. in 22 rainy days) was received after sowing of maize crop (27-7-88) and hence initial growth of crop was affected.

Seed rate

A seed rate of 60 kg/ha gave significantly higher green forage yield than 40 kg/ha during 1978 (Table 1). The pooled results

TABLE 1

Effect of seed rates and cutting stages on forage yields of maize varieties.

Treatments	*Yield (q/ha)*								
	Green forage			*Dry matter*			*Crude protein*		
	1978	*1979*	*Mean*	*1978*	*1979*	*Mean*	*1978*	*1979*	*Mean*
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*9.*	*10.*
Varieties (V)									
Vijay Comp.	242	324	283	46.0	73.0	59.5	3.88	5.75	4.82
Moti Comp.	226	306	266	42.4	66.3	54.4	3.93	4.55	4.23
S. Em. ±	12	7	7	2.2	1.9	1.5	0.19	0.14	0.48
C. D. at 5%	NS	NS	NS	NS	5.7	4.2	NS	0.42	NS

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Seed rate (R) (kg/ha)									
40	202	303	253	38.5	64.3	51.4	3.37	4.44	3.91
50	230	323	277	42.0	73.6	57.8	4.01	5.55	4.78
60	270	320	295	52.0	71.2	61.6	4.19	5.27	4.73
S. Em. ±	15	9	5	2.7	2.3	1.2	0.24	0.17	0.09
C. D. at 5%	44	NS	15	8.2	6.9	3.3	NS	0.51	0.25
Cutting stage (S)									
Tassel	300	321	312	46.6	50.8	48.7	4.58	4.18	4.38
Silk	210	330	270	39.0	70.0	54.5	3.39	4.72	4.06
Milk	192	291	241	47.0	88.1	67.6	3.65	7.39	5.03
S. Em. ±	8	6	25	1.5	1.7	9.5	0.13	0.12	0.79
C. D. at 5%	44	19	NS	4.4	4.9	NS	0.38	0.35	NS

also revealed that 60 kg seed rate/ha was significantly superior (295 q/ha) than other seed rates. Similarly, a seed rate of 60 kg/ha gave significantly higher dry matter yield than other seed rates during 1978 as well as on pooled basis. The highest production is the result of higher plant stand. Nehra *et al.* (1981) reported that the green forage and dry matter yields of maize were increased at 60 and 80 kg seed rate/ha over 40 kg seed rate/ha. A seed rate of 50 kg/ha was at par with 60 kg/ha for crude protein yield but it produced significantly higher yield than 40 kg seed rate/ha. A seed rate of 60 kg seed rate/ha gave higher net ICBR (1:1.15) as compared to 50 kg seed rate/ha (Table 3).

Cutting stage

The pooled green forage yield of maize did not differ significantly due to cutting stages. However, maize harvesting at tasseling stage gave significantly higher yield over silk and milk stages during 1978. Tassel stage was also found significantly superior than milk stage but it was at par with silk stage during 1979. Milk stage produced significantly higher dry matter yield than tassel and silk stage during 1978 and 1979 (except it was at par with tasseling stage during 1978). On average basis, the harvesting of maize at milk stage gave 38.8 and 24.0 % higher dry matter yield than tassel and silk stage respectively. Milk stage produced significantly higher crude protein yield than tassel and milk stages during 1979. On average basis also, milk stage produced 14.8 and 23.9 % higher yield than tassel and silk stage respectively. Chauhan *et al.* (1979) also reported that DM, DDM, CP, DCP and TDN yields were highest in crops harvested 60 days after sowing (Milking stage). Suresh Kumar *et al.* (1979) suggested that harvesting of maize varieties between 50 and 60 days after sowing was found to be ideal for better fodder yield with higher crude protein and mineral contents. Desai and Washko (1982) reported that the dry matter and crude protein yields increased

as the harvests were delayed from the boot and anthesis to milk and maturity stages. The corresponding dry matter yield at boot, anthesis, milk and mature stages were obtained 5.31, 6.93, 8.90 and 13.83 mt/ha, respectively. So these results suggested that maize crop should be harvested at milk stage to obtain maximum nutrients.

Variety x Seed Rate

Vijay composite coupled with 50 kg seed rate/ha produced significantly higher green forage (305 q/ha), dry matter (64.3 q/ha) and crude protein (5.34 q/ha) yields than other treatment combinations barring Vijay Composite coupled with 60 kg seed rate/ha (Table 2). This interaction had also recorded higher net ICBR of 1 : 2.82 (Table 3). Thus the present study suggested that maize variety Vijay Composite should be sown at the rate of 50 kg seed/ha and harvested at milk stage to obtain higher green forage, dry matter and nutrients as well as net realization.

TABLE 2

Effect of varieties x Seed rates on green forage, dry matter and crude protein yield (q/ha) on pooled basis.

Varieties	*Green forage yield (q/ha) Seed rates (kg/ha)*			*Dry matter yield (q/ha) Seed rates (kg/ha)*			*Crude protein yield (q/ha) Seed rates (kg/ha)*		
	40	*50*	*60*	*40*	*50*	*60*	*40*	*50*	*60*
Vijay Comp.	243	305	301	50.5	64.3	63.6	3.81	5.34	5.02
Moti Comp.	262	248	289	52.3	51.2	59.6	4.00	4.23	4.44
S. Em.		7.27			1.63			0.13	
C. D. at 5%		20.53			4.61			0.36	

TABLE 3

Relative profitability of maize as influenced by seed rates.

Treatments	*Green forage yield (q/ha)*	*Total return Rs/ha*	*Additional return over 40 kg N/ha (Rs/ha)*	*Additional cost Rs/ha*	*Net ICBR*
1.	*2.*	*3.*	*4.*	*5.*	*6.*
Seed rates (R) kg/ha					
40	253	2530	—	130.00	—
50	277	2770	240	162.50	1 : 0.48
60	295	2950	420	195.00	1 : 1.15

1.	2.	3.	4.	5.	6.
Interaction (V x R) Sig.					
Vijay Comp. x 40 kg	213	2430	—	130.00	—
Vijay Comp. x 50 kg	305	3050	620	162.50	1 : 2.82
Vijay Comp. x 60 kg	301	3010	530	195.00	1 : 1.97
Moti Comp. x 40 kg	262	2620	—	130.00	—
Moti Comp. x 50 kg	248	2480	—	162.50	—
Moti Comp. x 60 kg	289	2890	270	195.00	1 : 0.38

Cost calculated on the basis of Rs. 10/- per Q of green forage and Rs. 3.25 per one kg seed of maize.

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