

## Nutrient Composition of Pearl Millet Varieties of Rajasthan

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**Abstract** : Evaluation of nine high yielding pearl millet hybrids or composites along with a local variety of Nagaur district, for proximate principles, namely, crude protein, crude fat, ash, crude fibre, carbohydrates and energy contents, and minerals, namely, calcium and iron contents, revealed that the varieties differed significantly with respect to all the characters. Though none of the high yielding varieties exceeded the local in all the components, the varieties namely ICTP-8203, MP-179, RHB-30, MP-171, WC-C75 and HHB-67 were superior than the local check with respect to proximate principles. Among the varieties, MP-171, MP-254, WC-C75, ICTP-8203 and MH-179 were also superior in mineral contents. Excepting fat with carbohydrate content and ash with calcium content, rest of the characters were either positively correlated or the correlation coefficient was nonsignificant, suggesting a possibility of their simultaneous improvement. Since a wide variability for quality traits has been reported to exist in germplasm, there is scope for development of varieties with better nutritional quality.

**Key words** : Nutrient composition, pearl millet hybrid varieties.

Pearl millet (*Pennisetum glaucum*) is one of the most popular cereals of Rajasthan, where it is cultivated over an area of 4.96 million hectares. However, its total production in the state is only 2.56 million tons. The productivity of pearl millet is very low (517 kg ha<sup>-1</sup>) (Anonymous, 1994-95). The production potential of the newly developed pearl millet hybrids and the composites is remarkably high (Gill, 1980). The plant breeders, as well as the extension agencies of the state have, therefore, expressed a dire need to launch a vigorous programme for the adoption of such newly released high yielding varieties in the state, as a major step in increasing the average yield. Consumers generally feel that the nutritional values of these high yielding varieties are poor as compared to the locals. Essentially it is important to ascertain that while increasing the yield potential there is no deterioration in the quality.

Improved varieties recommended for general cultivation in the state were evaluated for their nutritional value in comparison with a local variety.

### Materials and Methods

Seeds of varieties HHB-67, WC-C75, MH-320, RHB-30, ICTP-8203, MP-171, MP-254, MH-179 and MH-169 were obtained from ARS, Navgao, and those of Nagaur local were collected from a village of Ladnu tehsil. All the varieties were evaluated for proximate principles, namely crude protein, crude fat, ash, crude fiber and carbohydrate contents following the methods described in AOAC (1965), energy content following the method of Gopalan *et al.* (1982) and minerals Ca and Fe following Jackson (1967) and Elwell and Gridley (1967), respectively. The data were analyzed for variance using CRD and critical difference values were calculated to make comparisons. Correlation coefficients

for all the possible pairs of characters were worked out (Panse and Sukhatme, 1967).

### Results and Discussion

The crude protein content of varieties ranged from 10.71% in MH-320 to 13.77% in WC-C75, 12.68% being in local. Statistically, the WC-C75 and MH-169 had significantly higher protein content than the local check, while MH-320 had significantly lower value (Table 1). Rest of the varieties were similar to the local check. For fat content also the differences among varieties were significant, the highest fat content was recorded

in RHB-30 (10.94%) followed by MH-169 (9.50%), MP-254 (9.38%) and MP-171 (9.04%) which were significantly higher than the local check (8.21%). It was the lowest in WC-C75 (6.80%), rest of the varieties were at par to the local check (Table 1). The fat contents estimated in present study were on higher side which may be due to the method employed (Meena, 1996). The ash content ranged from 1.40% in the local variety to 1.71% in RHB-30 followed by 1.60% in HHB-67, 1.56% in WC-C75 and 1.55% in MH-320 and MH-179, which were significantly higher than the local variety (Table 1).

Table 1. Nutrient composition of pearl millet varieties

Varieties	Protein (%)	Fat (%)	Ash (%)	Fibre (%)	Carbohydrate (%)	Energy (kcal/100g)	Mean ranking	Calcium (mg/100g)	Iron (mg/100g)
HHB-67	12.00 (8)	8.66 (5)	1.60 (2)	1.24 (10)	71.01 (3)	409 (5)	— 5.50	41.66 (9)	8.03 (7)
WC-C75	13.77 (1)	6.80 (10)	1.56 (3)	1.74 (5)	70.58 (4)	398 (9)	— 5.33	66.66 (5)	8.94 (4)
MM-320	10.71 (9)	8.40 (6)	1.55 (4)	1.30 (9)	73.11 (1)	410 (4)	— 5.50	43.33 (8)	6.46 (9)
RHB-30	12.06 (7)	10.94 (1)	1.71 (1)	1.32 (8)	69.35 (9)	426 (1)	— 4.50	40.00 (10)	7.08 (8)
ICTP 8203	12.92 (3)	8.00 (9)	1.54 (5)	1.78 (3)	71.09 (2)	411 (3)	— 4.16	65.00 (6)	10.42 (2)
MP-171	12.68 (5)	9.04 (4)	1.51 (6)	1.50 (6)	70.27 (6)	412 (2)	— 4.83	73.33 (3)	8.76 (5)
MP-254	12.74 (4)	9.38 (3)	1.49 (7)	1.85 (1)	69.39 (8)	412 (2)	— 4.16	63.33 (7)	10.22 (3)
MH-179	13.72 (2)	8.22 (7)	1.55 (4)	1.80 (2)	70.57 (5)	407 (7)	— 4.50	76.66 (1)	10.95 (1)
MH-169	12.49 (6)	9.50 (2)	1.46 (8)	1.44 (7)	68.30 (10)	408 (6)	— 6.50	75.00 (2)	6.36 (10)
Local	12.68 (5)	8.21 (8)	1.40 (9)	1.77 (4)	69.46 (7)	402 (8)	— 6.83	70.00 (4)	8.33 (6)
S.Em±	0.300	0.346	0.596	1.202	0.518	2.962	—	5.477	0.534
CD at 5%	0.626	0.723	0.124	0.422	1.082	6.180	—	9.447	1.114
CV %	2.921	4.873	4.754	15.767	0.794	0.885	—	10.90	7.64

The figures in parenthesis indicate relative rankings.

Table 2. ANOVA for nutrient composition of pearl millet

Source	df	Mean sum of squares							
		Protein	Fat	Ash	Fibre	Carbo- hydrate	Energy	Calcium	Iron
Varieties	9	2.48*	3.62*	0.207*	0.171*	5.20*	164.18*	617.5*	7.96*
Error	20	0.13	0.18	0.005	0.061	0.40	13.16	45.0	0.42

\*Significant at  $P = 0.05$ .

Fibre content ranged from 1.24% in HHB-67 to 1.85% in MP-254 as against 1.75% in local. Only MP-254 had significantly higher fibre content than the local check, whereas, the varieties HHB-67, MH-320, RHB-30 had lower fibre content as compared to the local check (Table 1). Desirability of fibre content of the food material is controversial. It is nutritionally inert and also reported to interfere in absorption of some minerals. Its presence in the food material is being, however, considered desirable according to the recent advances in the food science as it has been considered effective in prevention of colon cancer and heart diseases (Anonymous, 1989). Carbohydrate content ranged from 68.30% in the MH-169 to 73.11% in MH-320 as against 69.46% in local check. The variety MH-320 followed by ICTP-8203 and HHB-67 had higher carbohydrate content but others are only at par with the local check (Table 1). Regarding the energy content, the value was lowest in WC-C75 (398 kcal/100 g) and highest in RHB-254, MH-320 and HHB-67 had significantly higher energy value compared to local check (Table 1). It is reported that the energy values of the varieties were also higher which may be expected in view of higher determinations for fat content (Meena, 1996).

Perusal of the data on proximate composition revealed that though none of the varieties exceeded the local check in all the components, however, varieties superior to

the local check in individual proximate components were identified. The mean values of relative ranking of varieties for individual components indicated that varieties namely ICTP-8203, MP-254, MH-179, RHB-30, MP-171, WC-C75 and HHB-67 were superior than the local check. Among these varieties ICTP-8203, MP-254 and MH-179 exceeded the local check in both the protein and the fat contents and also in the energy value (Table 1).

Calcium and iron are important nutrients but are usually deficient in the diets of low income group people, particularly for infants, preschool children and pregnant and lactating women. The calcium content varied from 40.0 mg/100 g in RHB-30 to 76.7 mg/100 g in MH-169 as against 70.0 mg/100 g in local check. The calcium content of the varieties RHB-30, HHB-67 and MH-320 was significantly lower than the local check (Table 1). The iron content ranged from 6.36 mg/100 g in MH-169 to 10.95 mg/100 g in MH-179, as against 8.33 mg/100 g in local check. Thus varieties MH-179 followed by ICTP-8203 and MP-254 had significantly higher iron contents than the local check, while MH-168, MH-320 and RHB-30 had lower values. As far as the calcium and iron content are concerned, the varieties MH-179, MP-171, MP-254, WC-C75 and ICTP-8203 were either superior or were at par with the local. Based on the results of this study it may be pointed out that some of the high yielding varieties are better than the local check, in terms of nutrient

Table 3. Simple correlations among different nutrient components

	Fat	Ash	Fibre	Carbohydrate	Energy	Calcium	Iron
Protein	-0.414	-0.188	0.759*	0.098	-0.434	0.722*	0.720*
Fat		0.356	-0.459	-0.740*	0.879**	-0.348	-0.393
Ash			-0.497	0.223	0.635**	-0.696*	-0.125
Fibre				0.041	-0.451	0.701*	0.805
Carbohydrate					-0.483	-0.170	0.080
Energy						-0.523	-0.217
Calcium							0.471

\* Significant at  $P=0.05$ . \*\* Significant at  $P=0.01$ .

composition, noteworthy among them are MH-179, MP-254, MP-171, WC-C75 and ICTP-8203 (Table 1).

The correlation coefficient of protein content was positive and significant with fibre, calcium and iron content. Similarly, the fat and energy contents were positively significantly correlated. Ash content was also positively and significantly correlated with energy content. Fibre content had positive and significant correlation with iron and calcium content (Table 3). These findings are in conformity with the earlier reports reviewed by Gupta (1980). For the characters which are positively associated with each other, their simultaneous improvement will be relatively easy. The correlation between fat and carbohydrate content and ash and calcium content were negative and significant (Table 3), which may complicate their simultaneous improvement.

It can thus be concluded that excepting for fat content with carbohydrates and ash with calcium content, the quality components can be improved simultaneously. A wider variability than observed here for the nutrient components has been reported in the pearl millet germplasm collections (Goswami *et al.*, 1969a, b, 1970a, b; Burton *et al.*, 1972; Gupta

*et al.*, 1971 and Dhillon *et al.*, 1974), which provides scope for the further improvement in the nutritional quality of the grains and suggest the possibility of developing high yielding varieties with still better quality.

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