Effect of nutrient management on growth and grain yield of pearl millet 
(Pennisetum glaucum) in pearl millet–wheat (Triticum aestivum) 
cropping system

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A field experiment was conducted during the rainy (kharif) season of 1991 at 
Agronomy Research Farm, Hisar. The group of soil was sierozem having sand 58.95%, 
silt 24.01%, clay 17.04%, electrical conductivity 0.14 dS/m at 25°C, with pH 8.1. 
Available N, P and K were 130 kg/ha, 10.8 kg/ha and 510 kg/ha respectively. The 
experiment was laid out in randomized block design with 4 replications. There were 12 
treatments, viz. T1, no fertilizer and no organic manure (control) to kharif crop of 
pearl millet (L.) R. Br. emend. Stuntz] and no fertilizer and no organic manure (control) 
to winter (rabi) crop of wheat L. emend. Thell. Fiori & Paol.); T2, 50% recommended NP 
dose through fertilizers only to kharif crop and 50% recommended NP dose through 
fertilizers only to winter crop; T3, 50% recommended NP dose through fertilizers 
to kharif crop and 100% recommended NP dose through fertilizers to winter crop; T4, 75% 
recommended NP dose through fertilizers to kharif crop and 75% recommended NP dose 
through fertilizers to winter crop; T5, 100% recommended NP dose through fertilizers to 
kharif crop and 100% recommended NP dose through fertilizers to winter crop; T6, 50% recommended 
NP dose through fertilizers + 50% N through farmyard manure (FYM) to kharif 
crop and 100% recommended NP dose through fertilizers to winter crop; T7, 75% 
recommended NP dose through fertilizers + 25% N through FYM to kharif crop and 
75% recommended NP dose through fertilizers to winter crop; T8, 50% recommended 
NP dose through fertilizers + 50% N through wheat straw to kharif crop and 
100% recommended NP dose through fertilizers to winter crop; T9, 75% recommended NP 
dose through fertilizers + 25% N through wheat straw to kharif crop and 75% 
recommended NP dose through fertilizers to winter crop; T10, 50% recommended NP 
dose through fertilizers + 50% N through green-manure to kharif crop and 100% rec-
ommended NP dose through fertilizers to winter crop; T11, 75% recommended NP 
dose through fertilizers + 25% N through green-manure to kharif crop and 75% rec-
ommended NP dose through fertilizers to winter crop; and T12, conventional farmer’s 
practice (1 bag DAP + 1 bag urea/ha, given in 2 splits) to rainy-season crop. The recom-
manded dose of N, P2O5 and K2O was 120, 60 and 60 kg/ha respectively. ‘HHB 60’ pearl 
millet was drilled on 19 July 1991 @ 5 kg seed/ha, keeping intraline distance of 45 cm. 
As per treatments, the entire dose of P in the form of single superphosphate and half 
the quantity of N in the form of urea were
Table 1. Growth parameters and grain yield of pearlmillet as influenced by fertilizer treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Plant height (cm)</th>
<th>Tiller/m at harvest</th>
<th>Dry matter/plant (g) at harvest</th>
<th>Leaf area/leaf area (cm²) at 75 DAS</th>
<th>Grain yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>167.0</td>
<td>12.33</td>
<td>48.97</td>
<td>807</td>
<td>723</td>
</tr>
<tr>
<td>T₂</td>
<td>194.9</td>
<td>18.83</td>
<td>84.79</td>
<td>1,369</td>
<td>1,554</td>
</tr>
<tr>
<td>T₃</td>
<td>200.0</td>
<td>19.75</td>
<td>88.03</td>
<td>1,397</td>
<td>1,777</td>
</tr>
<tr>
<td>T₄</td>
<td>201.2</td>
<td>19.58</td>
<td>90.82</td>
<td>1,443</td>
<td>1,789</td>
</tr>
<tr>
<td>T₅</td>
<td>225.1</td>
<td>24.83</td>
<td>109.00</td>
<td>1,770</td>
<td>2,527</td>
</tr>
<tr>
<td>T₆</td>
<td>204.8</td>
<td>20.15</td>
<td>97.38</td>
<td>1,483</td>
<td>1,937</td>
</tr>
<tr>
<td>T₇</td>
<td>216.7</td>
<td>25.42</td>
<td>108.25</td>
<td>1,796</td>
<td>2,696</td>
</tr>
<tr>
<td>T₈</td>
<td>189.0</td>
<td>18.00</td>
<td>83.79</td>
<td>1,331</td>
<td>1,433</td>
</tr>
<tr>
<td>T₉</td>
<td>202.0</td>
<td>19.78</td>
<td>93.51</td>
<td>1,403</td>
<td>1,914</td>
</tr>
<tr>
<td>T₁₀</td>
<td>211.2</td>
<td>22.33</td>
<td>98.74</td>
<td>1,658</td>
<td>2,099</td>
</tr>
<tr>
<td>T₁₁</td>
<td>218.6</td>
<td>23.78</td>
<td>106.32</td>
<td>1,733</td>
<td>2,326</td>
</tr>
<tr>
<td>T₁₂</td>
<td>287.0</td>
<td>17.92</td>
<td>83.52</td>
<td>1,335</td>
<td>1,486</td>
</tr>
<tr>
<td>CD (P = 0.05)</td>
<td>13.9</td>
<td>3.59</td>
<td>10.81</td>
<td>283</td>
<td>568</td>
</tr>
</tbody>
</table>

Treatments detail are given in text
= At harvest; DAS, days after sowing

All the treatments resulted in significantly better growth parameters (plant height, number of tillers, dry-matter production and leaf area) and grain yield compared with the control (Table 1). The successive increase in NP application showed beneficial effect on growth parameters and grain yield. Application of 100% NP dose showed significant influence on growth and yield compared with 50 or 75% NP dose through fertilizer. But the differences amongst T₂, T₃, T₄ and T₁₂ were found non-significant.

The growth parameters and grain yield varied in different treatments, depending on the source of nutrients and proportionate replacement (%). Substitution of chemical fertilizer either through farmyard manure or green-manure up to 25% resulted in equal growth and yield as obtained with 100% recommended dose (T₁). However, 25% substitution through wheat straw recorded significantly poor growth and yield compared with to T₅ and 50% substitution through green-manure recorded growth parameters and yield at par to that of recommended dose (T₃). These findings are in agreement with those of Singh (1985), Sharma and Mittra (1990) and Pandey and Dwivedi (1992).

It was concluded that 25% nutrient requirement of pearlmillet can be replaced through farmyard manure or green-manure at 25 or 50% level for obtaining the yield at par with treatment receiving 100% recom-
mended dose through chemical fertilizers. Inclusion of wheat straw for substitution as N source is not comparable due to poor yields.

REFERENCES


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**Growth, yield and yield attributes of sunflower (*Helianthus annuus*) and greengram (*Phaseolus radiatus*) and blackgram (*P. mungo*) intercropping in different planting patterns**

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The possibility of intercropping of short-duration varieties of pulses, viz. greengram (*Phaseolus radiatus* L.) and blackgram (*P. mungo* L.) in spring-planted sunflower (*Helianthus annuus* L.) under irrigated conditions of northern plains was studied during 1992 at Kanpur. The soil was sandy loam with pH 7.0, low in organic carbon (0.30%) and available N (170.50 kg/ha), medium in P (14.30 kg/ha) and high in exchangeable K (545.00 kg/ha). Nine treatments were replicated thrice in randomized block design. The sowing was done on 14 March 1992 keeping spacing of 45 cm x 20 cm for sole crop of 'EC 68414' sunflower and 25 cm x 6 cm for sole crops of 'PDM 11' greengram and 'Pant U 19' blackgram. In 2 : 1 planting pattern, the sunflower rows were paired at 30/60 cm and 1 row of greengram or blackgram was taken in the inter-pair space (additive system), whereas in 2 : 2 and 2 : 3 planting patterns, the third row of sunflower was replaced by 2 and 3 rows of intercrops respectively in replacement series. A basal dose of 20 kg N + 40 kg P₂O₅/ha was applied uniformly at planting and remaining 40 kg N/ha for sunflower was given in 2 splits on area basis as top-dressing.

Leaf-area index (LAI) in greengram and blackgram under sole and that in intercropping was almost identical till 20 days after

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