PERFORMANCE OF DIFFERENT MILLET CULTIVARS FOR FODDER PRODUCTION UNDER RAINFED CONDITIONS OF ISLAMABAD


ABSTRACT

Ten indigenous, exotic cultivars and hybrids collected from Maize, Sorghum and Millet Programme, NARC and different seed companies were evaluated for green fodder yield and yield component during 2005 at NARC, Islamabad. Out of ten cultivars two were used as check i.e. Local Rawalpindi and MB-87. The cultivars differed significantly from one another with regard to leaf area (cm$^2$), plant height (cm), number of leaves per tiller and green fodder yield t ha$^{-1}$. Variety PARC-MS-6 excelled all other varieties in all characters except leaf area. There was positive correlation among plant height, leaves per tiller, tillers per plant and leaf area, contributing towards green fodder yield per hectare. It can be deduced from this study that PARC-MS-6 is the best cultivar for commercial cultivation in Islamabad area.

INTRODUCTION

In Pakistan, millet (Pennisetum typhoides L.) is grown on 593.3 thousand hectares with an annual production of 273.7 thousand tones, giving average green fodder yield of 508 kg per hectare. (Anonymous, 2003-04). It is one of the most important fodder and seed crops grown during summer season in Pakistan. It is cultivated throughout the world for the production of palatable and nutritious food and feed for consumption by human being and livestock. Millet fodder possesses oxalic acid, prussic acid to some extent like sorghum crop. The improved varieties of millet have potential to produce three-fold green fodder and could feed double the number of animals per unit area as against the traditional fodder crops in the region (Haqqani et al, 2003).

Although Pakistan has fertile soil and climate suitable for production of high yielding quality forage and fodder crops but average production per unit area is estimated to be ½ to 1/3 rd of the potential production. (Shakoor et al; 1983). Low yield of many fodder crops result directly from the varieties of low yield and quality. Shakoor et al. (1983) tested performance of 20 bajra varieties at NARC. Yield ranged from 13.82 t/ha for “HB-111” to 22.95 t/ha for “LYP-154”.

Genotype x environment interaction remained always a serious problem in crop production while recommending a variety for some region/area in the developing countries, especially environment for commercial cultivation cannot be changed but genotype can be modified by hybridization and biotech methods to suit to available soil and climate related environmental conditions. For this purpose breeders are always collecting and creating genetic variability in crops for development of varieties suitable for diverse agro-climative zones. One cultivar cannot be grown all over the country having multitude of environments. Crop outcome is a product of the genotype and the environment in which crop has been grown. Ideal variety is always one, which posses general adaptation with higher yield potential (Finlay and Wilkinson, 1963).Genotypes must be evaluated in a number of diverse environments, because dry matter yield and quality contents, which affect digestibility, are influenced by various ecological factors. There is need to obtain, identify and measure the differential response displayed by the millet genotype that respond well under favorable and unfavorable environments. Genotypic variation to soil and atmospheric environmental conditions has been observed in many field crops (Dadio 1975, Samson et al. 1978). Genotype mainly determines the nutrient composition of a feedstuff, but different factors like soil, fertility status of a soil, location, temperature, season and stage of maturity of a crop also influence the chemical composition of a feedstuff. (Harris, 1960).

Millet being a short duration crop fits well in existing cropping system of Islamabad area and could provide high quality fodder to the grower. Hence present study was conducted to determine (a) suitable, high yielding millet cultivar for pothowar and allied areas having similar environmental conditions. (b) to promote millet cultivation in Islamabad area to fulfill the fodder requirements.

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MATERIALS AND METHODS

Ten indigenous and exotic millet varieties and hybrids including local released variety “MB-87” and “Local Rawalpindi” as check 1 and check 2, respectively were evaluated for green fodder yield and yield components at NARC during 2005.

The material required for the trial was collected from the Maize, Sorghum and Millet Programme, NARC and from different seed companies. The varieties and hybrids were:

1. PARC-MS-2
2. PARC-MS-3
3. PARC-MS-6
4. DBR-3
5. 2KCB-092
6. Bajra Gold- 007
7. Bajra Multicut PL/101
8. MB-87 (Local released variety as check 1)
9. Local Rawalpindi (As check 2)
10. Graze Mill

The trial was conducted in RCBD with three replications. Plot size was $1.8 \times 6$ m$^2$ for each variety. Uniform seed rate of 10 kg ha$^{-1}$ was kept in all treatments. The recommended fertilizer dose of 60 N: 60 P kg ha$^{-1}$ was applied at the time of seed bed preparation. The crop was planted with the help of hand drill keeping 30 cm row to row spacing. Green fodder and dry matter yields were recorded at 50% flowering stage on 14th September, 2005. Fifty percent area of the plot was harvested to record green fodder yield. Data on various parameters like plant height, number of leaves per tiller, number of tillers per plant, leaf area was collected from three plants at the same time. One kg green fodder sample at harvesting time was collected at random for estimating dry matter yield from each plot. The collected samples were weighed, dried in an oven at 60°C up to a constant weight and again weighed to calculate the dry matter yield for each treatment.

The data collected was subjected to Fisher’s analysis of variance technique and LSD Test at 5% probability level was applied to compare the differences among treatments means (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

The results presented in the Table-1 are discussed as under:

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Plant Height (cm)</th>
<th>Leaves tiller$^{-1}$</th>
<th>Leaf Area (LXB)</th>
<th>Green Fodder Yield (t ha$^{-1}$)</th>
<th>Dry Matter Yield (t ha$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARC-MS-2</td>
<td>197 ab</td>
<td>10 bcd</td>
<td>324 a</td>
<td>63 a</td>
<td>13 b</td>
</tr>
<tr>
<td>PARC-MS-3</td>
<td>191 abc</td>
<td>10 abcd</td>
<td>307 a</td>
<td>54 abc</td>
<td>11 d</td>
</tr>
<tr>
<td>PARC-MS-6</td>
<td>206 a</td>
<td>12 a</td>
<td>304 a</td>
<td>65 a</td>
<td>14 a</td>
</tr>
<tr>
<td>DBR-3</td>
<td>182 abc</td>
<td>11 ab</td>
<td>278 ab</td>
<td>50 abc</td>
<td>10 e</td>
</tr>
<tr>
<td>2KCB-092</td>
<td>188 abc</td>
<td>9 d</td>
<td>260 abc</td>
<td>44 bc</td>
<td>9 g</td>
</tr>
<tr>
<td>Bajra Gold- 007</td>
<td>140 d</td>
<td>10 cd</td>
<td>197 cd</td>
<td>36 c</td>
<td>7 h</td>
</tr>
<tr>
<td>Bajra Multicut pl/101</td>
<td>170 c</td>
<td>11 abcd</td>
<td>168 d</td>
<td>59 ab</td>
<td>12 c</td>
</tr>
<tr>
<td>MB-87 (Check 1)</td>
<td>176 bc</td>
<td>9 cd</td>
<td>218 bcd</td>
<td>44 bc</td>
<td>9 g</td>
</tr>
<tr>
<td>Local Rawalpindi (Check 2)</td>
<td>183 abc</td>
<td>11 abc</td>
<td>215 bcd</td>
<td>47 bc</td>
<td>10 f</td>
</tr>
<tr>
<td>Graze Mill</td>
<td>184 abc</td>
<td>9 d</td>
<td>211bcd</td>
<td>44 bc</td>
<td>9 g</td>
</tr>
<tr>
<td>CV</td>
<td>8.26</td>
<td>7.65</td>
<td>18.93</td>
<td>21.31</td>
<td>1.81</td>
</tr>
<tr>
<td>LSD</td>
<td>26</td>
<td>1</td>
<td>81</td>
<td>19</td>
<td>0.33</td>
</tr>
</tbody>
</table>

**Plant Height (Cm)**

Plant height gets prime importance while determining the fodder yield. Significant differences were observed in plant height of different millet varieties, however PARC-MS-6 variety produced tallest plants (205.7 cm) followed by variety PARC-MS-2 (196.7 cm). The lowest plant height was recorded in variety Bajra Gold- 007 (140.0 cm). The greater the height, the greater is the fodder yield per unit area. Rodriguez (1973) also reported that plant height was significantly correlated with yield and leaf-stem ratio.

**Leaves Tiller$^{-1}$**

Number of leaves per tiller plays a vital role in enhancing fodder yield. Data presented in above Table-I indicate significant differences in number of leaves per tiller among varieties. PARC-MS-6 produced highest number of leaves (11.6) per tiller followed by DBR-3 (11.1) and Local Rawalpindi (10.7). The lowest number of leaves were recorded in 2KCB-092 and Graze Mill (9.3). Shakoor et al (1983) tested nineteen varieties of millet and reported that the varieties which were having significantly greater...
number of leaves per plant, yielded significantly higher fodder yield.

**Leaf Area (cm²)**

Data in Table- I indicate significant differences in leaf area of different millet varieties. Highest leaf area was recorded in variety PARC-MS-2 (323.7 cm²) whereas lowest (168.3 cm²) was seen in hybrid variety Bajra Multicut PI/101. It was observed that leaf area has positive and non significant association with green fodder yield and significant association with dry matter yield.

**Green Fodder Yield (t ha⁻¹)**

Data regarding green fodder yield showed significant differences among different varieties of millet. The millet cultivars and hybrids included in the study differed significantly from one another in green fodder yield. According to the results, the cultivar PARC-MS-6 produced significantly maximum green fodder yield with amount of 65.4 t/ha and followed by PARC-MS-2 producing green fodder yield 63.0 t ha⁻¹. The lowest green fodder yield was recorded in variety Bajra Gold- 007 (36.4 t/ha).

**Dry Matter Yield (t ha⁻¹)**

Dry matter is the most important component of animal diet for feeding livestock during lean periods and ensure efficient digestion. The new cultivars which produced maximum green fodder yield also gave maximum dry matter yield. Different millet varieties showed significant differences in dry matter yield. Highest dry matter yield was observed in PARC-MS-6 (13.5 t ha⁻¹) followed by PARC-MS-2 (13.1 t ha⁻¹). Lowest dry matter yield was recorded in variety Bajra Gold- 007 (7.4 t/ha).

<table>
<thead>
<tr>
<th>Table II</th>
<th>Pearson correlation coefficient between various parameters</th>
<th>Leaves tiller⁻¹</th>
<th>Leaf area</th>
<th>Green fodder yield</th>
<th>Dry matter yield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Plant height</td>
<td>0.26 NS</td>
<td>0.44*</td>
<td>0.31 NS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaves tiller</td>
<td>0.25 NS</td>
<td>0.45**</td>
<td>0.33 NS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaf area</td>
<td></td>
<td></td>
<td>0.43*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green fodder</td>
<td></td>
<td></td>
<td>0.74**</td>
</tr>
</tbody>
</table>

Pearson correlation co-efficient analysis revealed that plant height has positive but non significant association with leaves per tiller and green fodder yield (Table II). Plant height has positive and significant association with leaf area and highly significant association with dry matter yield. Leaf per tiller has positive and non significant association with leaf area and highly significant with green fodder and dry matter yield. Leaf area has positive and non significant association with green fodder yield and significant association with dry matter yield. Correlation also revealed that green fodder yield has positive and highly significant association with dry matter yield.

**CONCLUSION**

It can, therefore, be concluded that better performance of the new cultivars, PARC-MS-6 and PARC-MS-2 may be attributed to more plant height, number of leaves tiller⁻¹, leaf area, green fodder and dry matter yield. Hence, these two new cultivars are recommended for planting in irrigated and medium rainfall areas for maximum green and dry matter production under Islamabad conditions.
REFERENCES


