EVALUATION OF DIFFERENT COWPEA VARIETIES FOR GREEN FODDER AND DRY MATTER YIELD UNDER RAINFED CONDITIONS OF POTHOWAR REGION

BY

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ABSTRACT
The study was conducted to evaluate six varieties of cowpea for higher fodder and dry matter yield under rainfed conditions at National Agricultural Research Centre, Islamabad during 2006. The experiment was laid out in randomized complete block design with three replications, keeping plot size of 1.8x6m. Cowpea was sown in first week of July 2006 in the pattern of 60 cm apart in rows. The parameters determined were plant height, number of branches per plant, leaf area, number of leaves per branch, green fodder yield and dry matter yield at 5% pod formation. Results revealed that the variety CP/V-2 produced significantly taller plants, highest leaf area, number of leaves, green fodder and dry matter yield. The highest green fodder and dry matter yield of 28.15 and 8.10 t ha⁻¹ respectively were obtained in the variety CP/V-2. Therefore CP/V-2 is recommended for obtaining optimum forage production under rainfed conditions of Pothowar region.

Keywords: cowpea, variety, growth, forage yield, dry matter yield, rainfed conditions

INTRODUCTION
Legume fodder is important for livestock production because it is rich in protein, minerals, phosphorus, calcium and vitamins (Rupela et al., 1997; Unkovich et al., 1997). Cowpea (Vigna unguiculata (Linn. Walp.) is a warm season leguminous crop which is grown for grain, vegetable, and fodder purposes in moderately humid areas of tropics and sub tropics, although, some varieties show a considerable drought resistance (Muhammad et al., 1993). It cannot withstand frost and excessive heat reduces its growth as well (Bogdan, 1977). Being a legume crop, it improves nitrogen status of the soil. Cowpea fodder is also a rich source of crude protein of 18.4% (Narayanan and Dabadghao, 1972). Cowpea is a multi purpose crop for the production of fodder, hay, grain or green manure while providing the rotational benefits of legumes (Bull and Mayfield 1992). Chaudhry and Hussain (1985) concluded that cowpea cultivar P-518 produced 16.3 % and 28.05 % more green fodder yield than standard cultivar. Chaudhry et al. (1991) reported that heritability plays significant role for dry matter and green fodder yield.

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 bio-tech methods to suit the 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-climatic 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 passes general adaptation with higher yield potential (Finlay and Wilkinson 1963).
No systematic research work appears to have been conducted on cowpea for its utility as a fodder crop in Pakistan. Therefore, the present study is designed to evaluate different varieties of cowpea on forage and dry matter yield and to promote cowpea cultivation in Pothowar region to fulfill the fodder requirements.

MATERIALS AND METHODS
The experiment was conducted to evaluate the different varieties of cowpea for maximum growth, development and yield under rainfed conditions at National Agricultural Research Center, Islamabad during 2006. Soil type was non-calcareous silty clay with pH 7.4, organic matter 1.75%, nitrogen (nitrate), extractable phosphorus and potassium 4.46, 17.26 and 121.30 mg kg$^{-1}$, respectively. The experiment was conducted in randomized complete block design (RCBD) with three replications. The plot size was 10.8 m$^2$. Cowpea varieties were planted during first week of July in this study. A seed rate of 40 kg ha$^{-1}$ was hand drilled by keeping 60 cm row-to-row spacing. Six varieties viz. No.1, IT84E-129, CP/V-2, CP/V-4, CP/V-7 and P-518 were planted. All the agronomic practices were kept uniform for all the varieties. The crop was harvested at 5% pod formation from each plot for estimation of green fodder yield. Five plants were selected at random in each plot at the time of 5% pod formation to measure plant height, number of branches plant$^{-1}$, leaf area, number of leaves branch$^{-1}$, green fodder yield and dry matter yield. 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 variety. The data collected were subjected to Fisher's analysis of variance technique and LSD Test at 5% probability level to compare the differences among treatments means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION
The data presented in Table-1 showed that significant differences were found among cowpea cultivars in respect of Plant height (cm), Number of branches plant$^{-1}$, Leaf area (cm), Number of leaves branch$^{-1}$, Branch height (cm), Green fodder and Dry matter yield (t ha$^{-1}$).

Plant Height (cm)
Plant height has a main contribution in green fodder yield and dry matter yield. There were significant differences for plant height between different cultivars. Cowpea cultivar CP/V-2 (69.550 cm) exhibited tallest plants followed by Cowpea cultivar No.1 (61.773 cm). The cultivar CP/V-7 (52.993 cm) produced significantly smallest plants than all the other cultivars.

Number of Branches Plant$^{-1}$
Number of branches plant$^{-1}$ has also effect on green fodder yield and dry matter yield. According to the Table-1, cowpea cultivar No.1 produced the highest number of branches per plant (7.17), whereas, lowest number of branches were observed in the case of cultivar CP/V-4 (5.25).

Leaf Area (cm)
The data presented in Table-1 showed that there were highly significant differences in the leaf area. Leaf area is the main contributor of the green fodder and dry matter yield. The data showed that the higher leaf area was found in CP/V-2 (87.660 cm). Among the tested cultivars, CP/V-7 attainted last position by having leaf area (65.55 cm). Highest leaf area in CP/V-2 variety might be due to its genetic character and best adaptation to local conditions as compared to other varieties.

Number of Leaves Branch$^{-1}$
Number of leaves branch$^{-1}$ plays a vital role in enhancing fodder yield. The data presented in Table-1 showed that there were highly significant differences among the number of leaves branch$^{-1}$ of different tested cowpea cultivars. Maximum number of leaves branch$^{-1}$ was found in CP/V-2 (13). Less number of leaves branch$^{-1}$ were observed in CP/V-4 (8).

Green Fodder Yield (t ha$^{-1}$)
Data presented in Table-1 showed that there were highly significant differences in green fodder yields of six different cowpea cultivars. According to results, the maximum green fodder yield (28.15 t ha$^{-1}$) was produced by the variety CP/V-2, whereas, the minimum fodder yield was obtained by the variety CP/V-4 (19.75 t ha$^{-1}$).
**Dry Matter Yield (t ha\(^{-1}\))**

Data presented in Table-1 showed that there were highly significant differences in Dry matter yields of six different cowpea cultivars. According to results, the maximum dry fodder yield (8.10 t ha\(^{-1}\)) was produced by the variety CP/V-2 and followed by IT 84E-129 (7.34 t ha\(^{-1}\)) and No. 1 (7.19 t ha\(^{-1}\)). The minimum dry matter yield was obtained by the variety CP/V-7 (5.69 t ha\(^{-1}\)).

**CONCLUSION**

It was concluded that the cowpea cultivar CP/V-2 produced the highest green fodder yield (28.15 t ha\(^{-1}\)) and dry matter yield (8.10 t ha\(^{-1}\)) than all the other cultivars of cowpea. Hence the cultivar CP/V-2 is recommended for the cultivation under the rainfed conditions of Pothowar region.

**Table-1**: Mean performance regarding Plant height, Number of branches plant\(^{-1}\), Leaf area, Number of leaves branch\(^{-1}\), Branch height, Green fodder and Dry matter yield of six Cowpea Varieties

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Plant height (cm)</th>
<th>No. of branches plant(^{-1})</th>
<th>Leaves area (cm)</th>
<th>No of leaves branch(^{-1})</th>
<th>Green fodder yield in (t ha(^{-1}))</th>
<th>Dry fodder yield (t ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.1</td>
<td>61.773AB</td>
<td>7.16 A</td>
<td>72.53 BC</td>
<td>9.000 B</td>
<td>24.773B</td>
<td>7.190 AB</td>
</tr>
<tr>
<td>CP/V-2</td>
<td>69.550 A</td>
<td>5.75 BC</td>
<td>87.660 A</td>
<td>13.000 A</td>
<td>28.153A</td>
<td>8.100 A</td>
</tr>
<tr>
<td>CP/V-4</td>
<td>58.330 B</td>
<td>5.25 C</td>
<td>65.553 C</td>
<td>8.000 B</td>
<td>19.753C</td>
<td>6.980 B</td>
</tr>
<tr>
<td>CP/V-7</td>
<td>52.993 B</td>
<td>6.33 ABC</td>
<td>75.747 B</td>
<td>8.333 B</td>
<td>20.023C</td>
<td>5.693 C</td>
</tr>
<tr>
<td>P-518 (Check)</td>
<td>60.773 AB</td>
<td>6.33 ABC</td>
<td>75.387 B</td>
<td>9.333 B</td>
<td>24.480B</td>
<td>7.033 B</td>
</tr>
<tr>
<td>LSD.o5</td>
<td>10.07 *</td>
<td>1.180 *</td>
<td>7.337 **</td>
<td>1.724 **</td>
<td>2.069 **</td>
<td>0.9133 **</td>
</tr>
</tbody>
</table>

* Significant at 5% level
** Significant at 1% level

**REFERENCES**


