EVALUATION OF DIFFERENT SUGARCANE VARIETIES FOR QUALITY AND QUANTITY TRAITS UNDER TANDOJAM CONDITIONS

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ABSTRACT

A field experiment was conducted during the year 2008-09 to evaluate the growth and yield behavior of different sugarcane varieties collected from different Research Institutes of the country at the field of Sugarcane Section, Agriculture Research Institute, Tandojam. The results revealed that maximum cane yield of 123.80 tons ha−1 was recorded by the variety LRK-2004, followed by variety S-2000-CPSPG-1550 with average cane yield of 123.30 tons ha−1. Sugarcane varieties HOTH-326, S-2002-US-637, Gulabi-95, CP-80-1827 and HOTH-300 also performed better with average cane yield of 118.40, 119.20, 116.50, 114.70 and 114.20 tons ha−1, respectively. Variety 2000-CPSPG-1550 gave the maximum sugar yield of (12.28 tons ha−1), followed by LRK-2003 with average sugar yield of 12.01 tons ha−1, respectively. Sugarcane variety CPNIA-82-223 performed poor with lowest sugar yield of (7.81 t ha−1).

KEYWORDS: Sugarcane, National Uniform Varietal Yield Trial, cane yield, sugar yield, Tandojam

INTRODUCTION

Sugarcane is grown in tropical and sub-tropical regions of the world in a range of climates from hot dry environment near sea level to cool and moist environment at higher elevations. Besides sugar production, sugarcane produces numerous valuable byproducts like, alcohol used by pharmaceutical industry, ethanol used as a fuel, bagasse used for paper, and chip board manufacturing and press mud used as a rich source of organic matter and nutrients for crop production.

The sugarcane crop is the second major cash crop and is used as a raw material in the production of refined sugar and gur. Its share in value added in agriculture and GDP is 3.7 and 0.8 percent, respectively. Sugarcane was cultivated on an area of 1,0446 thousand hectares, 5.9 percent higher than last year’s level of 988 thousand hectares. Sugarcane production for the year 2011-12 is estimated at 58.0 million tons in contrast to last year’s production of 55.3 million tons. This shows an increase of 4.9 percent over the production of last year. The main factors contributing to the production are lucrative market prices of last year’s produce and timely availability of inputs encouraged the farmers to grow more sugarcane crop. However, the yield per hectare, if compared with last year, posted a negative growth (Anonymous, 2011).

Sugarcane is a commercially important crop that accounts for approximately 65% of the global sugar production. Sugarcane is the primary raw material for the production of sugar. Besides producing white sugar, a major component of cane is utilized in the production of “Gur”, “Shakkar”, and “Khandsari Sugar”. Since independence, the area under cultivation has increased more rapidly than any other major crop. It is one of the major crops in Pakistan cultivated over an area of around one million hectares.

About 99% of sugar in Pakistan is being made from this crop. Sugarcane plays very important role in the uplift of the growers and the country by earning foreign exchange (Rehman, et al., 2003) and (Sattar, et al., 2010). In Pakistan Sugarcane crop providing employment to numerous farm workers throughout the year (Hussain, et al., 2003).

The average per hectare yield in Pakistan is less than other major cane growing countries of the world (Sohu, et al., 2008). Among the various factors responsible for low yield of sugarcane in our country, the use of low yielding varieties is considered the major one (Majeedano, et al., 2004). It is fact that development of new sugarcane varieties is not feasible in our country due to insufficient breeding facilities or lack of infrastructure for cross breeding under artificial conditions. Therefore, sugarcane varietal development is dependent on import of germplasm and also through exotic or locally collected fuzz (Panhwar, et al., 2003). Unawareness of farmers in adaptation of new varieties is also the prime cause of low cane yield (Jamro, et al., 2000).
Our sugar yield i.e. cane yield x sugar recovery % cane is less than half of the developed cane growing countries of the world. Still it is not the lowest in the world. The goal of increasing sugar yield per unit area is difficult, time consuming and needs dedicated efforts of government, millers and the growers. Some of the measures to bring down the cost of cultivation and improve cane productivity include the selection of the right varieties, maintenance of soil health, quality planting material, nutrient management, the adoption of coping systems approach, weed management, water management, ratoon management and sound post harvest handling, according to the scientists (N.A Raja, 2011).

The National Uniform Varietal Yield Trial (NUVYT) on sugarcane was sown to evaluate the performance of different Sugarcane varieties under Tandojam (central Sindh) conditions.

MATERIALS AND METHODS
A well-worked friable fully pulverized seedbed was prepared in a three replicated Randomized Complete Block Design (RCBD), having net plot size (experimental unit) of 8 x 3 (24 m²). Following sugarcane varieties were included in the trial:

4. CP-85-1491 (Mardan)
5. CP-80-1827 (Mardan)
6. LRK-2003 (QAARI, Larkana)
7. LRK-2004 (QAARI, Larkana)
8. GANJBAKHSH (QAARI, Larkana)
10. S-2000-CPKSG-1550 (SSRI, Jhang)
11. HOTH-127 (NSCRI, Thatta)
12. HOTH-300 (NSCRI, Thatta)
13. HOTH-326 (NSCRI, Thatta)
14. CPNIA-82-223 (NIA, Tandojam)
15. CPNIA-82-1026 (NIA, Tandojam)
16. CPD-01-245 (DFSM, Thatta)
17. CPD-01-354 (DFSM, Thatta)
18. GT-11 (ARI, Tandojam)
19. GULABI-95(STD) (ARI, Tandojam)

The crop was planted on 20.09.2008. The NPK fertilizers were applied at recommended rate. For weed control hand weeding, interculturing and weedicide Geezapex combi were used at the rate of 1kg/acre. The different observations were recorded on different parameters like, sprouting percentage, cane height, tillers per plant, girth of cane (cm), internodes, cane yield (tons), commercial cane sugar percentage and sugar yield (tons) were recorded. The data recorded were analyzed statistically as suggested by Steel and Torrie (1980).

RESULTS AND DISCUSSION

Sprouting %
The data presented in Table-1 revealed that among the different sugarcane varieties the maximum sprouting of 58.23% was observed in HoTH-300 followed by variety CPD-01-354 with average sprouting percent of 56.47. Minimum sprouting percent was recorded in sugarcane variety Ganjbakhsh with sprouting of 47.05%. These results are in confirmation with those reported by Singh and Tyagi (1995).

Cane Height (cm)
The result shows that the maximum plant height of 208.67cm was observed in sugarcane variety CP-85-1491, whereas the plant height of 207.67cm was calculated in sugarcane variety HoTH-127. Variety CPNIA-82-223 has the minimum plant height of 182.33cm.

Tillers Plant⁻¹
Maximum number of tillers plant⁻¹ (5.78) was observed in variety Gulabi-95, followed by variety HoTH-300 with (5.74) tillers plant⁻¹. Whereas the minimum number of tillers plant⁻¹ (4.32) was recorded in variety CPNIA-82-223. Nadeem et al (2009) reported that there were significant differences among the varieties for number of tillers plant⁻¹.

Cane Girth (cm)
It was obvious from the results that the maximum cane girth of 3.22cm was recorded in the variety HoTH-326 followed by variety GT-11 having cane girth of 3.18cm. Whereas, the lowest cane girth of 2.84cm was
observed in variety LRK-2003. These results are in line with the findings by Atta et al. (1991) who reported that sugarcane variety CP-72/34 with higher cane girth as against check BL-4 in Faisalabad.

Internodes Cane

Sugarcane variety S-2002-US-637 has the maximum 23.67 internodes cane\(^{-1}\) followed by varieties HoTH-300 and HoTH-326 with 22.67 internodes cane\(^{-1}\) respectively and the lowest number 19.33 of internodes cane\(^{-1}\) was recorded in variety Ganjbakhsh. These results are in line with Khan et al. (2003), who reported that different varieties had different trend for number of internodes cane\(^{-1}\).

Yield tons ha\(^{-1}\)

The results indicated that when the yield of other eighteen varieties recorded and compared with commercial variety Gulabi-95 (116.50 tons ha\(^{-1}\)), it was found that varieties LRK-2004, S-2000-CPSG-1550, HoTh-326 and S-2002-US-637 gave higher yields as compared with commercial variety Gulabi-95 with average cane yield of 123.80, 123.30, 118.40 and 119.20 t ha\(^{-1}\), respectively. The lowest cane yield 97.42 tons ha\(^{-1}\) was recorded in variety CPNIA-82-1026. Similar trend was found by Bashir and Parvaiz (2011) and Majeedano et al. (2003).

CCS %

The real cane varietal quality is judged by its CCS%. Data presented in table showed that the higher value of CCS% was observed in variety LRK-2003, followed by variety HoTh-127 with CCS% of 10.33 and the lowest CCS% of (7.78) was recorded in variety CPNIA-82-223. Verma et al. (1997) reported the same facts.

Sugar yield tons ha\(^{-1}\)

Results presented in table showed that the sugar yield was highest in variety S-2000-CPSG-1550 (12.28 t ha\(^{-1}\)), followed by varieties LRK-2003 and LRK-2004 with sugar yield of 12.01 t ha\(^{-1}\) and 11.80 t ha\(^{-1}\). The lowest sugar yield was observed in variety CPNIA-82-223 with sugar yield of (7.81 t ha\(^{-1}\)). Same trend for different Varieties on the same pattern was also claimed by Hasabanis et al. (1991).

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**Table-1: Yield and Quality performance of sugarcane Varieties at Sugarcane Section ARI, Tandojam.**

<table>
<thead>
<tr>
<th>Name of Variety</th>
<th>Sprouting %</th>
<th>Cane height (cm)</th>
<th>Tillers/ plant</th>
<th>Girth of cane (cm)</th>
<th>Internodes cane(^{-1})</th>
<th>Cane yield (t/ha)</th>
<th>CCS %</th>
<th>Sugar yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-2002-US-650</td>
<td>52.78 cde</td>
<td>201.00 ide</td>
<td>4.63 def</td>
<td>3.08 bcd</td>
<td>21.33 bcd</td>
<td>113.80 cde</td>
<td>9.15  ij</td>
<td>10.41 gh</td>
</tr>
<tr>
<td>S-2002-US-637</td>
<td>53.44 bcd</td>
<td>195.00 fg</td>
<td>4.96 bcd</td>
<td>3.13 abc</td>
<td>23.67 a</td>
<td>110.80 def</td>
<td>9.57 ef</td>
<td>11.41 cde</td>
</tr>
<tr>
<td>S-2002-US-640</td>
<td>54.19 bcd</td>
<td>203.67 bc</td>
<td>5.39 abc</td>
<td>2.98 efg</td>
<td>20.67 cde</td>
<td>110.80 def</td>
<td>10.11 ab</td>
<td>12.20 de</td>
</tr>
<tr>
<td>CP-85-1491</td>
<td>50.64 ef</td>
<td>208.67 a</td>
<td>4.48 ef</td>
<td>2.94 fgh</td>
<td>20.33 def</td>
<td>110.30 ef</td>
<td>9.58 efg</td>
<td>10.57 fg</td>
</tr>
<tr>
<td>CP-80-1827</td>
<td>53.15 cd</td>
<td>188.33 hi</td>
<td>4.95 bcd</td>
<td>2.95 efg</td>
<td>19.67 f</td>
<td>114.70 c</td>
<td>8.75 kl</td>
<td>10.03 hi</td>
</tr>
<tr>
<td>LRK-2003</td>
<td>53.07 cd</td>
<td>196.67 efg</td>
<td>5.18 abc</td>
<td>2.84 hi</td>
<td>20.67 cde</td>
<td>114.80 c</td>
<td>10.47 a</td>
<td>12.01 ab</td>
</tr>
<tr>
<td>LRK-2004</td>
<td>53.15 cd</td>
<td>200.67 cde</td>
<td>5.47 ab</td>
<td>2.96 efg</td>
<td>22.33 ab</td>
<td>123.80 a</td>
<td>9.53 fgh</td>
<td>11.80 abc</td>
</tr>
<tr>
<td>GANJBAKSH</td>
<td>47.05 g</td>
<td>185.67 j</td>
<td>4.28 f</td>
<td>2.83 i</td>
<td>19.33 f</td>
<td>107.40 fg</td>
<td>9.10 jk</td>
<td>9.78 ij</td>
</tr>
<tr>
<td>S-2000-CPSG-449</td>
<td>49.07 fg</td>
<td>197.33 def</td>
<td>4.79 cde</td>
<td>3.00 def</td>
<td>20.00 ef</td>
<td>110.80 def</td>
<td>8.64 lm</td>
<td>9.37 j</td>
</tr>
<tr>
<td>S-2000-CPSG-1550</td>
<td>55.91 b</td>
<td>197.67 def</td>
<td>5.48 ab</td>
<td>3.12 abc</td>
<td>21.67 bcd</td>
<td>123.30 a</td>
<td>9.96 bcd</td>
<td>12.28 a</td>
</tr>
<tr>
<td>HOTH-127</td>
<td>55.15 bc</td>
<td>207.67 ab</td>
<td>5.35 abc</td>
<td>2.95 efg</td>
<td>22.67 ab</td>
<td>106.60 g</td>
<td>10.33 ab</td>
<td>11.01 ef</td>
</tr>
<tr>
<td>HOTH-300</td>
<td>58.23 a</td>
<td>202.00 cd</td>
<td>5.74 a</td>
<td>3.17 abc</td>
<td>22.67 ab</td>
<td>114.20 cd</td>
<td>10.23 abc</td>
<td>11.67 bcd</td>
</tr>
<tr>
<td>HOTH-326</td>
<td>52.27 de</td>
<td>198.00 def</td>
<td>5.68 a</td>
<td>3.22 a</td>
<td>22.67 ab</td>
<td>118.40 b</td>
<td>9.80 def</td>
<td>11.60 bcd</td>
</tr>
<tr>
<td>CPNIA-82-223</td>
<td>48.18 g</td>
<td>182.33 j</td>
<td>4.32 ef</td>
<td>2.89 gh</td>
<td>20.67 cde</td>
<td>100.30 hi</td>
<td>7.78 n</td>
<td>7.81 k</td>
</tr>
<tr>
<td>CPNIA-82-1026</td>
<td>52.65 de</td>
<td>184.33 j</td>
<td>4.52 ef</td>
<td>2.89 gh</td>
<td>20.33 def</td>
<td>97.42 i</td>
<td>8.16 m</td>
<td>7.95 k</td>
</tr>
<tr>
<td>CPD-01-245</td>
<td>53.54 cd</td>
<td>201.33 cde</td>
<td>4.80 cde</td>
<td>2.97 efg</td>
<td>20.67 cde</td>
<td>108.50 fg</td>
<td>9.48 ghi</td>
<td>10.28 ghi</td>
</tr>
<tr>
<td>CPD-01-354</td>
<td>56.47 ab</td>
<td>192.33 gh</td>
<td>4.33 ef</td>
<td>3.05 cde</td>
<td>21.67 bcd</td>
<td>107.10 fg</td>
<td>9.91 cde</td>
<td>10.62 fg</td>
</tr>
<tr>
<td>GT-11</td>
<td>48.35 g</td>
<td>197.00 def</td>
<td>4.62 de</td>
<td>3.18 ab</td>
<td>19.67 f</td>
<td>101.70 h</td>
<td>9.22 hij</td>
<td>9.38 j</td>
</tr>
<tr>
<td>GULABI-95</td>
<td>53.43 cd</td>
<td>203.67 bc</td>
<td>5.78 a</td>
<td>3.13 abc</td>
<td>22.00 bc</td>
<td>116.50 bc</td>
<td>9.78 def</td>
<td>11.39 cde</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>2.082</td>
<td>4.547</td>
<td>0.5591</td>
<td>0.1171</td>
<td>1.248</td>
<td>3.338</td>
<td>0.3740</td>
<td>0.4940</td>
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</table>
REFERENCES


