**VARIELT SUITABILITY ASSESSMENT OF SUGARCANE UNDER RAINFED CONDITION IN HIGH BARIND TRACT WITH CHICKPEA AS INTERCROP**

MA Rahman, ML Kabir, MS Islam*, MM Hossain, HM Tarique and HM Al-Amin

### Abstract

An experiment was conducted under farmer’s condition during 2007-2008 and 2008-2009 cropping seasons to study the performance of six newly released sugarcane varieties viz. Isd 32, Isd 33, Isd 35, Isd 36, Isd 37 and Isd 38 at High Barind Tract of Rajshahi area under rainfed condition with chick pea as intercrop. The results revealed that Isd 37 showed the highest cane yield of 58.74 t ha\(^{-1}\) followed by Isd 38 (51.09 t ha\(^{-1}\)), Isd 35 (46.87 t ha\(^{-1}\)), Isd 36 (44.94 t ha\(^{-1}\)), Isd 32 (39.11 t ha\(^{-1}\)) and Isd 33 (38.59 t ha\(^{-1}\)) among the newly released varieties in 2007-2008 cropping season. Incase of cropping season 2008-2009 variety Isd 37 also produced the highest cane yield of 78.63 t ha\(^{-1}\) followed by Isd 32 (70.45 t ha\(^{-1}\)), Isd 38 (69.01 t ha\(^{-1}\)), Isd 33 (65.37 t ha\(^{-1}\)), Isd 36 (61.90 t ha\(^{-1}\)), and Isd 35 (57.43 t ha\(^{-1}\)). Highest adjusted cane yield of 78.74 t ha\(^{-1}\) and 99.03 t ha\(^{-1}\) was recorded from treatment T\(_5\) (Isd 37 + Chick pea) in cropping season 2007-2008 and 2008-2009 respectively. So there is a great scope to increase productivity of sugarcane by using newly released varieties in farmer’s fields in High Barind Tract of Rajshahi area under rainfed condition.

**Key words:** Varietal, suitability, sugarcane, rainfed, High Barind Tract.

### Introduction

Developed all sugarcane varieties of Bangladesh Sugarcane Research Institute do not perform equally in all Agro-Ecological Zones (Miah *et al.*, 1994). The yield of a particular variety depends upon the heredity potential of the genotype and environment where it is exposed to during the course of its life cycle (Yadava, 1993). It is an obscure and puzzling problem to scientists, growers and processors. Yield trial of newly developed sugarcane varieties in the different agro-ecological zones especially in the farmer’s field for commercially cultivation is very essential. The varieties grown in the sugar mill zones of Bangladesh are not showing production in farmers’ field equally (Paul *et al.*, 1994). Germination failure was the main constraint for rainfed sugarcane cultivation. Moisture becomes the most critical limiting factor for emergence, growths and yield of sugarcane. So moisture is very much important factor for successfully sugarcane cultivation in High Barind Tract area under rainfed condition. It is important to show the maximum yield potential of BSRI released cane varieties to increase cane productivity and economic benefit of the farmers for sustainable sugarcane cultivation under rainfed condition. Soil is important to screen out sugarcane varieties suitable for High Barind Tract. The information would be useful to sugar industry as well as to gur makers. Considering the fact, a study was undertaken at farmers’ field of the agro-ecological zone (High Barind Tract) to evaluate performance of those newly released varieties under rainfed condition with chick pea as intercrop.

### Materials and Methods

The experiment was conducted at High Barind Tract of Rajshahi area at farmers’ field under rainfed condition during the cropping season 2007-2008 and 2008-2009 with six newly released sugarcane varieties viz. Isd 32, Isd 33, Isd 35, Isd 36, Isd 37 and Isd 38. The experiment was laid out in a Randomized Complete Block (RCB) design with four replications. Plantation was done with two budded setts in last week of October 2007 and mid week of October 2008 respectively after a good shower, when the field was in “Zoe” conditions. The vacant space between two rows of sugarcane, Chickpea namely BARI chola-5 was sown as intercrop at the time of cane plantation. Before plantation, two budded sets were pre-germinated by hip method for ensuring germination. Plot size was 8m x 8m where row to row distance was maintained one meter. The following treatments were included in the study:

\[
T_1 = \text{Isd 32 + Chick pea (BARI chola-5)} \\
T_2 = \text{Isd 33 + Chick pea (BARI chola-5)} \\
T_3 = \text{Isd 35 + Chick pea (BARI chola-5)} \\
T_4 = \text{Isd 36 + Chick pea (BARI chola-5)} \\
T_5 = \text{Isd 37 + Chick pea (BARI chola-5)} \\
T_6 = \text{Isd 38 + Chick pea (BARI chola-5)}
\]

Necessary intercultural operations were done as and when required. Data were collected at different growth stage of crop. Brix reading was taken by hand refractometer from standing cane. Yield was taken at harvest in December, 2008 and 2009. The values of all parameters were statistically analyzed to compare different varieties under observation.

### Correspondence*

shafiq_43@gmail.com

Accepted by 31 March, 2014

---

**Address**

Bangladesh Sugarcane Research Institute (BSRI)
Ishurdi-6620, Pabna, Bangladesh

---

**Abstract**

An experiment was conducted under farmer’s condition during 2007-2008 and 2008-2009 cropping seasons to study the performance of six newly released sugarcane varieties viz. Isd 32, Isd 33, Isd 35, Isd 36, Isd 37 and Isd 38 at High Barind Tract of Rajshahi area under rainfed condition with chick pea as intercrop. The results revealed that Isd 37 showed the highest cane yield of 58.74 t ha\(^{-1}\) followed by Isd 38 (51.09 t ha\(^{-1}\)), Isd 35 (46.87 t ha\(^{-1}\)), Isd 36 (44.94 t ha\(^{-1}\)), Isd 32 (39.11 t ha\(^{-1}\)) and Isd 33 (38.59 t ha\(^{-1}\)) among the newly released varieties in 2007-2008 cropping season. Incase of cropping season 2008-2009 variety Isd 37 also produced the highest cane yield of 78.63 t ha\(^{-1}\) followed by Isd 32 (70.45 t ha\(^{-1}\)), Isd 38 (69.01 t ha\(^{-1}\)), Isd 33 (65.37 t ha\(^{-1}\)), Isd 36 (61.90 t ha\(^{-1}\)), and Isd 35 (57.43 t ha\(^{-1}\)). Highest adjusted cane yield of 78.74 t ha\(^{-1}\) and 99.03 t ha\(^{-1}\) was recorded from treatment T\(_5\) (Isd 37 + Chick pea) in cropping season 2007-2008 and 2008-2009 respectively. So there is a great scope to increase productivity of sugarcane by using newly released varieties in farmer’s fields in High Barind Tract of Rajshahi area under rainfed condition.

**Key words:** Varietal, suitability, sugarcane, rainfed, High Barind Tract.

### Materials and Methods

The experiment was conducted at High Barind Tract of Rajshahi area at farmers’ field under rainfed condition during the cropping season 2007-2008 and 2008-2009 with six newly released sugarcane varieties viz. Isd 32, Isd 33, Isd 35, Isd 36, Isd 37 and Isd 38. The experiment was laid out in a Randomized Complete Block (RCB) design with four replications. Plantation was done with two budded setts in last week of October 2007 and mid week of October 2008 respectively after a good shower, when the field was in “Zoe” conditions. The vacant space between two rows of sugarcane, Chickpea namely BARI chola-5 was sown as intercrop at the time of cane plantation. Before plantation, two budded sets were pre-germinated by hip method for ensuring germination. Plot size was 8m x 8m where row to row distance was maintained one meter. The following treatments were included in the study:

\[
T_1 = \text{Isd 32 + Chick pea (BARI chola-5)} \\
T_2 = \text{Isd 33 + Chick pea (BARI chola-5)} \\
T_3 = \text{Isd 35 + Chick pea (BARI chola-5)} \\
T_4 = \text{Isd 36 + Chick pea (BARI chola-5)} \\
T_5 = \text{Isd 37 + Chick pea (BARI chola-5)} \\
T_6 = \text{Isd 38 + Chick pea (BARI chola-5)}
\]

Necessary intercultural operations were done as and when required. Data were collected at different growth stage of crop. Brix reading was taken by hand refractometer from standing cane. Yield was taken at harvest in December, 2008 and 2009. The values of all parameters were statistically analyzed to compare different varieties under observation.
Results and Discussion

Germination

It is observed from the Table 1 and 2 that the germination was influenced by different varieties under rainfed condition in both the cropping season. In cropping season 2007-2008 and 2008-09 the highest germination (45.51% & 59.78% respectively) was found from treatment T5 which was significantly different from other treatments. Significantly the lowest (33.94%) germination was recorded from treatment T3 in cropping season 2007-08 whereas treatment T1 produced the lowest (47.01%) germination in cropping season 2008-09 which was also statically different from others.

Tiller

Significant difference was observed in tiller production in both cropping season (Table 1 and 2). The highest tiller production of 93.68x10^3 ha^-1 was obtained from T1 (Isd 37+Chick pea) followed by T5 (Isd 38+Chick pea), T3 (Isd 35+Chick pea), T4 (Isd 36+Chick pea) and T2 (Isd 33+Chick pea). The lowest tiller production was recorded from treatment T1 (Isd 32+Chick pea) which was statically at par with T2 and T4 but differed from T3 and T5 in cropping season 2007-08. Incase of cropping season 2008-09, the highest tiller production (131.70x10^3 ha^-1) was also recorded from treatment T5 (Isd 37+Chick pea) followed by T6 (Isd 38+Chick pea), T3 (Isd 35+Chick pea), T1 (Isd 32+Chick pea) and T2 (Isd 33+Chick pea). The lowest (46.51x10^3 ha^-1) number of millable cane was harvested from treatment T3 (Isd 32+chick pea) which is statistically differed from other treatment in cropping season 2007-08. Incase of cropping season 2008-2009, the highest (89.11x10^3 ha^-1) millable cane was found from treatment T3 (Isd 35+chick pea) which is statistically different from other treatments. Treatment T3 (Isd 37+chick pea) produced the second highest millable cane which is statistically similar with treatments T5(Isd 38+chick pea), T2(Isd 33+chick pea) and T1 (Isd 32+chick pea).

Table 1. Performance of BSRI latest varieties in respect of germination%, tiller, millable cane, cane yield, Brix%, intercrop yield, cane equivalent yield and adjusted cane yield in cropping season 2007-2008.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Germination (%)</th>
<th>Tiller (x10^3 ha^-1)</th>
<th>Millable cane (x10^3 ha^-1)</th>
<th>Yield of Cane (t ha^-1)</th>
<th>Brix</th>
<th>Yield of Intercrop (t ha^-1)</th>
<th>Cane Equivalent Yield of Intercrop (t ha^-1)</th>
<th>Adjusted Cane Yield (t ha^-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 = Isd 32 + Chick pea</td>
<td>35.33 cd</td>
<td>60.83 b</td>
<td>46.51 c</td>
<td>39.11 c</td>
<td>18.17d</td>
<td>0.68</td>
<td>18.13</td>
<td>57.24 c</td>
</tr>
<tr>
<td>T2 = Isd 33 + Chick pea</td>
<td>33.94 d</td>
<td>62.13 b</td>
<td>48.90 bc</td>
<td>38.59 c</td>
<td>21.75ab</td>
<td>0.69</td>
<td>18.40</td>
<td>56.99 c</td>
</tr>
<tr>
<td>T3 = Isd 35 + Chick pea</td>
<td>43.43 ab</td>
<td>77.02 a</td>
<td>60.56 bc</td>
<td>46.87 bc</td>
<td>20.40bc</td>
<td>0.66</td>
<td>17.55</td>
<td>64.42 bc</td>
</tr>
<tr>
<td>T4 = Isd 36 + Chick pea</td>
<td>36.57 cd</td>
<td>66.60 b</td>
<td>57.13 bc</td>
<td>44.94 bc</td>
<td>20.17c</td>
<td>0.59</td>
<td>15.87</td>
<td>60.81 bc</td>
</tr>
<tr>
<td>T5 = Isd 37 + Chick pea</td>
<td>45.51 a</td>
<td>93.68 a</td>
<td>76.86 a</td>
<td>58.74 a</td>
<td>21.40abc</td>
<td>0.74</td>
<td>19.73</td>
<td>78.47 a</td>
</tr>
<tr>
<td>T6 = Isd 38 + Chick pea</td>
<td>39.49 bc</td>
<td>79.83 a</td>
<td>63.22 ab</td>
<td>51.09 ab</td>
<td>22.13a</td>
<td>0.67</td>
<td>17.95</td>
<td>69.04 ab</td>
</tr>
<tr>
<td>LSD at 5%</td>
<td>5.34</td>
<td>21.71</td>
<td>15.78</td>
<td>11.67</td>
<td>1.47</td>
<td>NS</td>
<td>0.15</td>
<td>12.77</td>
</tr>
</tbody>
</table>

*In a column figures having similar letter do not differ significantly whereas figures with different letters differ significantly as per DMRT at 5% level of probability.

Table 2. Performance of BSRI latest varieties in respect of germination%, tiller, millable cane, cane yield, Brix%, intercrop yield, cane equivalent yield and adjusted cane yield in cropping season 2008-2009.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Germination (%)</th>
<th>Tiller (x10^3 ha^-1)</th>
<th>Millable cane (x10^3 ha^-1)</th>
<th>Yield of Cane (t ha^-1)</th>
<th>Brix</th>
<th>Yield of Intercrop (t ha^-1)</th>
<th>Cane Equivalent Yield of Intercrop (t ha^-1)</th>
<th>Adjusted Cane Yield (t ha^-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 = Isd 32 + Chick pea</td>
<td>47.01 b</td>
<td>90.32 bc</td>
<td>75.32 ab</td>
<td>70.45 b</td>
<td>18.38c</td>
<td>0.66</td>
<td>19.80 ab</td>
<td>90.25 b</td>
</tr>
<tr>
<td>T2 = Isd 33 + Chick pea</td>
<td>51.39 ab</td>
<td>88.58 bc</td>
<td>78.36 bc</td>
<td>65.37 bc</td>
<td>19.95bc</td>
<td>0.66</td>
<td>19.80 ab</td>
<td>85.17 bc</td>
</tr>
<tr>
<td>T3 = Isd 35 + Chick pea</td>
<td>54.64 ab</td>
<td>108.80 b</td>
<td>89.11a</td>
<td>57.43 d</td>
<td>22.25a</td>
<td>0.63</td>
<td>19.20 b</td>
<td>76.63 d</td>
</tr>
<tr>
<td>T4 = Isd 36 + Chick pea</td>
<td>51.65 ab</td>
<td>83.49c</td>
<td>69.21 b</td>
<td>61.90 cd</td>
<td>19.83bc</td>
<td>0.65</td>
<td>19.50 ab</td>
<td>81.80 cd</td>
</tr>
<tr>
<td>T5 = Isd 37 + Chick pea</td>
<td>59.78 a</td>
<td>131.70 a</td>
<td>84.92 ab</td>
<td>78.63 a</td>
<td>20.35abc</td>
<td>0.68</td>
<td>20.40 ab</td>
<td>99.03 a</td>
</tr>
<tr>
<td>T6 = Isd 38 + Chick pea</td>
<td>53.21 ab</td>
<td>110.60 ab</td>
<td>82.64 ab</td>
<td>69.01 b</td>
<td>21.63ab</td>
<td>0.71</td>
<td>21.30 a</td>
<td>90.31 b</td>
</tr>
<tr>
<td>LSD at 5%</td>
<td>9.67</td>
<td>22.01</td>
<td>16.45</td>
<td>7.06</td>
<td>2.08</td>
<td>NS</td>
<td>0.74</td>
<td>7.65</td>
</tr>
</tbody>
</table>

*In a column figures having similar letter do not differ significantly whereas figures with different letters differ significantly as per DMRT at 5% level of probability.

Eco-friendly Agr. J. 38
The significantly lowest (69.21 \times 10^3 \text{ ha}^{-1}) number of millable cane was harvested from treatment $T_3$ (Isd 36+chick pea). The variation of millable cane production among different varieties might be due to the higher number of tiller production compared to other varieties or different agronomical practices and climatological variations in two cropping seasons. Matin et al. (1989) and Paul et al. (1994) also reported similar results on millable cane production.

**Cane Yield**

Yield is the contribution of several attributes like number of millable stalk, stalk length, girth of cane etc. This is revealed from Table 1 that maximum cane yield of 58.74 t ha$^{-1}$ was obtained in treatment $T_5$ (Isd 37+chick pea) which was significantly different from others treatments and flowed by $T_6$ (Isd 38+chick pea), $T_4$ (Isd 35+chick pea), $T_7$ (Isd 36+chick pea), $T_1$ (Isd 32+chick pea). The lowest (38.59 t ha$^{-1}$) cane yield was harvested from treatment $T_2$ (Isd 33+chick pea) that was statistically similar with $T_1$ and significantly different from other treatments in cropping season 2007-08. In case of cropping season 2008-09 the highest (78.63 t ha$^{-1}$) cane yield was recorded from $T_3$ (Isd 37+chick pea) which was significantly different from other treatments (Table 2) and followed by $T_4$ (Isd 32+chick pea), $T_6$ (Isd 38+chick pea), $T_2$ (Isd 33+chick pea), $T_7$ (Isd 36+chick pea). The lowest (57.43 t ha$^{-1}$) cane yield was obtained from $T_1$ (Isd 35+chick pea) and that was significantly different from other treatments. The cane yield varied among the varieties due to variation in yield producing attributes like height, unit stalk weight, number of millable cane. The findings of the present experiment are in agreement with Singh et al. (1999) and Arvind et al. (1997) where they found variation in cane yield among different varieties. Number of tiller ha$^{-1}$ and stalk weight have some positive effect in increasing cane yield among the tested varieties. Yadava (1993) reported the strong relationship of among above factors for obtaining higher yield of sugarcane.

**Brix (%)**

Table 1 showed that significantly highest Brix of 22.13% was recorded from variety Isd 38 followed by Isd 33 (21.75%), Isd 37 (21.40%), Isd 35 (20.40%) and Isd 36 (20.17), while the lowest Brix (%) was calculated from Isd 32 (18.17%) in cropping season 2007-08. In case of cropping season 2008-09 the highest Brix of 22.25% was observed from variety Isd 35 followed by Isd 38 (21.63%), Isd 37 (20.35%), Isd 33 (19.95%) and Isd 36 (19.83%) whereas the lowest Brix of 18.38% was recorded from variety Isd 32 (Table 2). The variation of Brix % among different varieties might be due to different management practices and climatological variations in two cropping seasons.

**Yield of Intercrop**

No significant difference was observed in yield of intercrop (Chick pea, BARI Chola 5) among the treatments in both cropping seasons (Table 1 and 2). The highest intercrop yield (0.74 t ha$^{-1}$) was harvested from $T_5$ (Isd 37+chick pea) followed by $T_2$ (Isd 33+chick pea), $T_4$ (Isd 32+chick pea), $T_6$ (Isd 38+chick pea) and $T_3$ (Isd 35+chick pea) whereas the lowest yield (0.59 t ha$^{-1}$) was recorded from $T_4$ (Isd 36+chick pea) in cropping season 2007-2008. In case of cropping season 2008-09. Treatment $T_6$ (Isd 38+chick pea) produced the highest intercrop yield of 0.71 t ha$^{-1}$ followed by $T_5$, $T_3$, $T_1$ and $T_4$ whereas the lowest yield (0.63 t ha$^{-1}$) was obtained from $T_3$ (Table 2).

**Adjusted cane yield**

Adjusted cane yield is an important parameter for determining the total yield potentials of cane and intercrop (Alam et al. 2000). It is 1 revealed from Table that the significantly highest cane yield of 78.47 t ha$^{-1}$ was obtained from treatment $T_3$ (Isd 37+chick pea) followed by $T_6$ (Isd 38+chick pea), $T_4$ (Isd 35+chick pea), $T_1$ (Isd 36+chick pea) and $T_7$ (Isd 32+chick pea). The lowest adjusted cane yield of 56.99 t ha$^{-1}$ was observed from $T_2$ (Isd 33+chick pea) which was at per with $T_1$ in cropping season 2007-08. In case of cropping season 2008-09, significant difference in adjusted cane yield was observed among the treatments. Treatment $T_5$ (Isd 37+chick pea) showed the highest yield of 99.03 t ha$^{-1}$ which was significantly differed from other treatments and followed by $T_6$ (Isd 38+chick pea), $T_4$ (Isd 36+chick pea) and $T_1$ (Isd 32+chick pea). The lowest adjusted cane yield of 76.63 t ha$^{-1}$ was recorded in $T_1$ (Isd 35+chick pea) which was significantly differed from other treatments under rainfed condition. From the above findings, it may be concluded that Isd 32, Isd 33,Isd 35,Isd 36, Isd 37 and Isd 38 may be recommended for commercial cultivation in High Barind Tract Area under rainfed condition. But due to more profit farmers’ choice variety Isd 37, Isd 32 and Isd 38. On the other hand 0.59 t ha$^{-1}$ to 0.74 t ha$^{-1}$ Chickpea, variety BARI Chola-5 produced as intercrop which minimizes the production cost of sugarcane by increasing the monitory income.

**References**


Arvind M, Naidu KM and Mishra A. 1997. Performance of promising mid late and late
maturing sugarcane varieties under sub tropical conditions. Agricultural Science-Digest-Karnal, 17(2): 79-82.


