Performance of Six Rice Cultivars Under Direct Wet Seeded Conditions of Dera Ismail Khan

Gul Hassan, Muddasar Qureshi*, Nazeer Hussain Shah and Inayatullah Awan*
Agricultural Research Institute, Dera Ismail Khan,
*Department of Agronomy, Gomal University, D. I. Khan, Pakistan

Abstract
An experiment was conducted to evaluate the performance of 6 rice cultivars. The variety KS-282 produced the highest number of tillers per plants as compared to IR-6, Swat-I, JP-5, Swat-II, and DR-83, KS-282 was also the tallest among the cultivars, while the remaining cultivars were almost of the same height. Number of panicles/plant and spikelets/panicle were also the highest in KS-282. 1000-grain weight was also the highest in KS-282. Moreover, cultivar KS-282 outyielded all the cultivars in straw and paddy yield (12.15 and 6.31 t ha⁻¹, respectively). The highest partitioning of the assimilates towards the economic yield (37.43 %) was also recorded in the cultivar KS-282, while other cultivars possessed almost the same harvest index. The maximum normal kernels (%) were also observed in the cultivar KS-282 with a minimum sterility percentage, as compared to other cultivars, included in the trial.

Introduction
rice (Oryza sativa L.), the principal food crop in the world, belongs to the family Poaceae (Gramineae). It is grown most extensively in the tropical and subtropical regions of the world. Rice is the mainstay of the economy of Pakistan, as far as the earning of foreign exchange is concerned. Rice exports in 1997-98 amounted to Rs. 70 billions (The Daily Mashriq dated 12.3.1999). In the year 1994-95, the total area under rice cultivation was 5430 thousand ha and total production was 14318 thousand tons in Pakistan (Agricultural Statistics, 1994-95). In D. I. Khan rice was grown on an area of 8985 ha during 1998 (Personal Communication).

Shah et al. (1990) reported that the rice cv. Niger sail and mutant lines Mut NS-1 and Mut NS-5. Plant height and number of grains/panicle were greater in Mut NS-1 than in niger sail. Kurmi and Das (1993) conducted a field experiment on 5 rice cultivars directly sown on 12, 20 or 24 Sep. produced average grain yields of 2.14, 1.75 and 07 t ha⁻¹, respectively. CV IET 11432 (2.39, 1.84 and 72 t) and Heera (2.77, 2.59 and 1.92 t) produced reasonably stable yields across the sowing dates.

Datta et al. (1989) reported the recent advances in weed control technology for tropical low land rice with a special reference to method used in broadcast, flooded rice. They also reported of modern semi-dwarf rice varieties which respond to high fertilizer levels has led to an increasing burden of weeds as a result.

Shah et al. (1999) obtained the highest yield 8.3 t ha⁻¹ in KS-282 as compared to DR-83 and Lateefy in the studies under the transplanted conditions of D.I.Khan.

With the commissioning of Chashma Right Bank Canal in D. I. Khan, more and more acreage is under the high intensity and labour intensive crops like rice and sugarcane, whereas, the command areas are very sparsely populated with a consequently scarcity of labour. Therefore, the conventional transplant method has emerged as not only uneconomical, but also un-feasible this study was carried out to investigated the performance of 6 rice cultivars viz. KS-282 IR-6, Swat-I, JP-5, Swat-II and DR-83 under direct seeding conditions.

Materials and Methods
The experiment was carried out at the experimental area of the Gomal University, Dera Ismail Khan. The experiment was laid out in a randomized complete block design having four replications with a plot size of 4 x 3 m². A seed rate of 100 kg ha⁻¹ was used in a direct seeding system as recommended by Sheikh et al. (1971). Soaked seed was broadcast in a well prepared seed bed during early May. The recommended dose of 120 kg N, 90 P2O5 and 60K2O ha⁻¹ as Urea, Single Super Phosphate and Potassium Sulphate, respectively were applied. All P2O5 and K2O was applied before planting, while half of N was applied at planting time and another half was applied at the late tillering stage. Flood irrigation was maintained into the field throughout the growing period.

Maturity data of each variety was assessed at the number of days from seeding to maturity of panicles with some of the lower spikelets in the panicle still green. Plant height (cm) was measured at maturity from the base of the culm to the tip of the main panicle. Thousand grain weight (g) was determined by counting the randomly selected kernels.

To observe the occurrence of fertility/abortiveness (flowers which were fertilized but stopped development at an early stage) and opaquexness (kernels which attained full size but did not become translucent due to lack of proper carbohydrate development) in panicle, a common electric lamp and seed working board were used.

Ten panicles were randomly selected in each treatment and the sterility was
Table 1: Performance of 6 cultivars of rice for some agronomic traits under broadcast wet seeded conditions of D. I. Khan

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Tillers/panicle (No.)</th>
<th>Height (cm)</th>
<th>Panicles/panicle (No.)</th>
<th>Spikelets/panicle (No.)</th>
<th>1000-grain wt. (g)</th>
<th>Paddy yield (t ha⁻¹)</th>
<th>Straw yield (t ha⁻¹)</th>
<th>Harvest index</th>
<th>Normal kernel (%)</th>
<th>Sterility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KS-282</td>
<td>19.75a</td>
<td>110.00a</td>
<td>20.75a</td>
<td>11.00a</td>
<td>26.70a</td>
<td>6.13a</td>
<td>12.15a</td>
<td>37.43a</td>
<td>88.00a</td>
<td>12.00a</td>
</tr>
<tr>
<td>IR-IR-6</td>
<td>16.75b</td>
<td>85.75b</td>
<td>17.75b</td>
<td>9.75ab</td>
<td>26.58a</td>
<td>4.47b</td>
<td>11.10ab</td>
<td>26.87b</td>
<td>84.22ab</td>
<td>15.77b</td>
</tr>
<tr>
<td>Swat-I</td>
<td>15.25bc</td>
<td>82.25b</td>
<td>15.00c</td>
<td>9.50ab</td>
<td>25.17ab</td>
<td>3.85bc</td>
<td>10.71ab</td>
<td>26.44b</td>
<td>81.21bc</td>
<td>18.78bc</td>
</tr>
<tr>
<td>Swat-II</td>
<td>13.50cd</td>
<td>81.00b</td>
<td>11.75d</td>
<td>9.00b</td>
<td>23.98bc</td>
<td>2.76de</td>
<td>8.55bc</td>
<td>24.47b</td>
<td>77.21c</td>
<td>22.78bc</td>
</tr>
<tr>
<td>DR-83</td>
<td>12.50d</td>
<td>79.75b</td>
<td>11.25d</td>
<td>8.25b</td>
<td>23.37c</td>
<td>2.30e</td>
<td>7.47c</td>
<td>23.46b</td>
<td>75.78c</td>
<td>24.22c</td>
</tr>
<tr>
<td>C.D.₀.₀₀</td>
<td>2.502</td>
<td>5.88</td>
<td>2.668</td>
<td>1.547</td>
<td>1.481</td>
<td>0.772</td>
<td>2.596</td>
<td>8.150</td>
<td>5.085</td>
<td>5.082</td>
</tr>
</tbody>
</table>

³Means sharing a letter in the respective column, do not differ significantly by Least Significant Difference test at P<0.05

Results and Discussion

Tillers per plant (No.): The highest number of tillers were produced by the cultivar KS-282 (19.75). It was closely followed by IR-6 (16.75). The cultivar IR-6 was in turn at par statistically with Swat-I (15.25) and JP-5 (14.25). The cultivars Swat-I also produced statistically equal yield with JP-5 and Swat-II (13.50). The cultivar JP-5 in turn produced statistically equal yield with Swat-II and the worst performing cultivar DR-83 (12.50) [Table 1]. These results are in close conformity with those reported by Shah et al. (1999).

Plant height (cm): The data revealed that plant height at maturity was significantly influence due to varietal difference. The cultivar KS-282 was the tallest (110 cm). The remaining cultivars possessed statistically the same height. The highest numerical value in the remaining cultivars (85.75 cm) was possessed by IR-6, while the lowest plant height (79.75 cm) was possessed by the cultivars DR-83 (Table 1). Ilhamuddin et al. (1988) and Shah et al., also reported a varying height among the cultivars studied.

Panicles per plant (No.): The analysis of data revealed that the number of panicles per plant were influenced due to genotypic variation. The data of mean comparisons as presented in Table-1, indicate that the more number of panicles per plant were obtained in the cultivar KS-282 (20.75). It was closely followed by IR-6 (17.75). IR-6 was in turn closely followed by Swat-I (15.00) and JP-5 (12.5). The study of Table-1 further reveals that the cultivars Swat-I was at par statistically with JP-5. Moreover, the cultivar JP-5 produced statistically equal panicles per plant with cultivars Swat-II (11.75) and DR-83 (11.25).

1000-grain weight (g): The ANOVA manifested that 1000-grain weight was influenced due to varietal differences. The data presented in Table 1 show that the maximum 1000-grain weight was obtained in cultivar KS-282 (26.70). IR-6 (26.58g). Both the cultivars were equally bolder. The study further reveals that these cultivars were in turn at par statistically with Swat-I (25.17g). The cultivar Swat-II gave statistically equal sized grains with JP-5 (24.67g). Swat-II (23.98g). The cultivar JP-5 in turn produced grains of similar size with Swat-II (23.98g) and the lowest 1000-grain weight was recorded in DR-83 (23.37g) and 0.00 lowest 1000-grain weight was recorded in DR-83 (23.37g) [Table-1]. Analogous results were reported by Majid et al. (1983) and Khan et al. (1985), while working on rice.

Paddy yield (t ha⁻¹): The NOVA revealed difference paddy yield among the cultivars. The data presented Table-1 reveal that the cultivar KS-282 (16.13 t ha⁻¹) yielded rest of the cultivars included in the studies. It closely followed by IR-6 (4.47 T ha⁻¹). The perusal of data further indicates that the cultivar IR-6 was in turn at par statistically with Swat-I gave statistically equal yield with Swat-II (2.761 t ha⁻¹). The lowest paddy yield of plant basis was harvested in DR-83 (2.30 t ha⁻¹). These findings are in a great analogy with the work of Shah et al. (1999), who obtained higher yield in KS-282 as compared to DR-83.

Straw yield (t ha⁻¹): The analysis of data revealed that
straw yield was influenced due to varietal differences. The data presented in Table-1 reveal that the highest numerical straw yield was produced by the cultivar KS-282 (12.15). It was closely followed by IR-6 (11.10), Swat-I (10.71) and JP-5 (9.57). The cultivars IR-6, Swat-I and JP-5 also gave statistically equal yield with Swat-II (8.55). The cultivar JP-5 was in turn produced statistically equal yield with Swat-II and the worst performing cultivar DR-83 (4.47).

Harvest Index: The analysis of data reveals that harvest index was influenced due to varietal differences. The highest partitioning of the assimilates towards the economic yield (37.43%) was recorded in the cultivar KS-282 (Table 1). All other cultivars included in the trial possessed the same harvest index, statistically. The superiority of the cultivar KS-282 in transforming the photoassimilate to the paddy yield is an encouraging aspect for its exploitation in general cultivation and Rice Breeding Programmes for synthesizing superior genotypes.

Normal Kernel (%): The analysis of data reveals that the percentage of normal kernels was influenced due to varietal differences. The data presented in Table 1 reveals that the maximum normal kernels were observed in the cultivar KS-282 (88.00). It was closely followed by IR-6 (84.22%). The cultivar IR-6 was in turn at par statistically with Swat-I (81.21%) and JP-5 (79.00%). The cultivar Swat-I was at par statistically with JP-5 in fertility. The cultivar JP-5 in turn was statistically similar with the lowest producing cultivars Swat-II (77.21%) and DR-83 (75.78%) [Table-1].

Occurrence of Sterility (%): The ANOVA showed differential sterility among the cultivars. The minimum sterility percentage was found in cultivar KS-282 (12.00%) [Table-1]. It was closely followed by IR-6 (15.77%). IR-6 was in turn at par statistically with Swat-I (18.78%) and JP-5 (20.98%). The cultivar Swat-I was also at par statistically with JP-5 in sterility. The cultivar JP-5 in turn was statistically similar with the lowest producing cultivars Swat-II (22.78%) and DR-83 (24.22%).

References