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# Exploitation of Hybrid Vigour in Indian Mustard in Absence of a Restorer Line

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**ABSTRACT** Heterosis was exploited in Indian mustard [(*Brassica juncea* L.) Czern & Coss] using hybrid and line composite (HLC) method by growing blended population of sterile $F_1$ (Pusa Barani oxy CMS x PSR 7) and male fertile line (PSR 7). Seven populations of blended seed in the ratios of 100:00, 90:10, 80:20, 70:30, 60:40, 50:50, 00:100 and two cultivars Pusa Barani and Pusa Bold were included in the experiment. The seed yield was found superior in 80:20 blending ratio in comparison of Pusa Barani (background of sterile $F_1$) and other blending ratios. In general, seed yield increased with increase in the proportion of heterotic ($F_1$) plants in blended populations. Highest yield obtained in 100:00 (only sterile $F_1$) blending ratio is only possible if pollen is available adequately in or around the field for pollination. HLC method can be used with any good pollinator which synchronises well during flowering. In comparison to three-line hybrid, it gives 5-6% lower yield. In absence of a restorer system a scheme for exploitation of hybrid vigour in Indian mustard is suggested.

Keywords : *Brassica juncea*, pollination, hybrid vigour, honeybees.

In India, efforts to develop $F_1$ hybrids in *Brassica juncea*, though initiated earlier, were intensified subsequent to the start of ICAR project "Promotion of Research and Development Efforts on Hybrids in Selected Crops - Brassica" in 1989. Since then several cytoplasmic male sterility systems have been evaluated and some experimental hybrids were developed and tested. Considerable heterosis was reported in a number of cases. Heterosis of more than 100 per cent was recorded in Indian mustard [1]. Patnaik and Murty [2] reported 42.5 per cent heterosis in *B. compestris* var. *sarson*. Subsequently, male sterility system like *B. tournefortii* [3] *B. oxyrrhina* [4], *Diplotaxis siifolia* [5] and *B. rinata* [6] were developed in mustard. As many as ten CMS systems in mustard have been reported by several workers. Since reliable restorers are not available till date, commercial exploitation of heterosis by adopting three line method is not feasible. Efforts are being made for the development of suitable restorer line in *B. juncea* L. The best example is Trachy cytoplasm of *B. juncea* from *Trachystoma ballii* [7]. The commercial use of this restorer system in *B. juncea* L. is still in experimental stage. Renard [8] devised a method in France to exploit heterosis even without availability of fertility restorer genotypes using oguCMS. This method is called hybrid and line composite (HLC), and involves the blending of seeds of a male sterile $F_1$ hybrid and seeds of a male fertile line. In India, Anand *et al.* [9] suggested methodology for commercial exploitation of hybrid vigour in Indian mustard by blending seeds of male sterile $F_1$ hybrid and non-restorer male. The present investigation was planned to examine the feasibility of exploiting heterosis in Indian mustard in the absence of restorer system and to find out optimum blending ratio of sterile $F_1$ and non-restorer fertile line.

## MATERIALS AND METHODS

The genotypes MH-7 (sterile $F_1$ = Pusa Barani oxyCMS x PSR-7) and pollinator PSR-7, population of different blending ratios (sterile $F_1$ hybrid: pollinator) such as 100:00, 90:10, 80:20, 70:30, 60:40, 50:50, 00:100, and Pusa Bold and Pusa Barani as controls of Indian mustard [(*Brassica juncea* L.) Czern & Coss] were included in the study. The experiment was conducted in Randomized Block Design (RBD) with three replications. Each experimental plot had

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an area of 18m$^2$ having eight rows of five-meter length. To provide isolation for different blending ratios, all plots except, 100:00 (100 per cent sterile $F_1$ Hybrid) and 00:100 (100 per cent plants of pollinator PSR-7) were covered with insect proof nylon nets with the objective that the female plants of a particular blending ratio do not receive pollen from other plots. Pusa Bold and Pusa Barani were grown without nets. To confirm the results, the trials were conducted for three years. One colony of Italian honeybee *(Apis mellifera)* was placed inside each netted plot to facilitate pollination. In addition to the above experiment, one trial with all the above ratios and control cultivars was conducted in open (without nets) to study the effect of caging on honey bees and also to compare the yield of different blending ratios under net and open (without net) environment. As the seeds of male and female parents were blended in different ratios before sowing, it was necessary to record actual number of male and female plants in each ratio to record the effect of competitiveness between heterotic $F_1$ and non-heterotic male parent. Since there was no marker gene, identification of male and female plants was not possible at seedling stage. Therefore, male and female plants were identified at the time of flowering initiation. It was done looking closely at flowers. The flowers in male plants were showy; anthers were plump, yellowish and mass of pollen used to stick on fingertips, if touched. In contrast, the flowers on female plants were less attractive; anthers were whitish, shriveled and devoid of viable pollen. The red and yellow coloured labels were tied to male and female plants, respectively. The actual number of male and female plants was recorded in each blending ratio. The observations were made on ten plants chosen at random in each replication of the treatments. The observations were made on $F_1$ plants only in blending ratios 100:00, 90:10, 80:20, 70:30, 60:40 and 50:50), and on pollen plants in blending ratios 00:100 and control cultivars Pusa Barani and Pusa Bold. The data were collected for the characters like number of siliquae on terminal branch, siliqua index (number of siliquae on terminal branch/length of terminal branch in cm.), seeds per siliqua and seed yield (g) per plot. For calculation of seed yield per plot, yield from both hybrid plants and pollinator plants was considered.

## RESULTS

### A. Yield and yield attributes of sterile $F_1$ in different blending ratios and control cultivars

**1. Seed bearing siliquae per terminal branch:** The data showed that siliquae per terminal branch were significantly higher in 100:00 (not covered with net) for all three years (Table 1). This value was highest among all blending ratios. Significantly lower values were found in ratio 90:10. Number of siliquae gradually increased with increase in proportion of pollen plants in the blending ratios.

**2. Siliqua index:** Siliqua index was comparable between 100:00 and 50:50 blending ratio. The lowest value was found in 90:10 blending ratio. There was no significant difference among 80:20, 70:30 and 60:40 blending ratios. Highly significant difference was found between male parent and hybrid $F_1$ in all blending ratios. Hybrid was also found superior than Pusa Bold and Pusa Barani (Table 2).

**3. Seeds per siliqua.** Seeds per siliqua were found significantly higher (14.33, 14.67 and 15.36) on $F_1$ plants in 100:00 blending ratio than that found in 90:10 blending ratio. Seeds per siliqua were at par in 80:20, 70:30, 60:40 and 50:50 blending ratios. It is clear that $F_1$ plants in 80:20 blending ratio had almost same number of seeds per siliqua as recorded in $F_1$ plants in 100:00 and 50:50 blending ratios (Table 3).

**4. Seed yield (g) per plot (18m$^2$).** In all the three years, significantly higher yield was obtained in 100:00 blending ratio in comparison to all other ratios and control cultivars. Lowest yield was obtained in 90:10 blending ratio. In rest of the blending ratios, seed yield decreased with decrease in proportion of $F_1$ plants. In the year 1996-97 the seed yield in 80:20 blending ratio (3370.97g) was at par with that found in 70:30 (3290.00g) and 60:40 (3196.00g) but significantly higher than 50:50 (3071.00g). The seed yield of male parent was significantly lower (2942.33g) than that found in 100:00, 80:20 and 70:30 blending ratios. In 1997-98, seed yield was significantly higher (3280.00g) in 80:20 ratios than that obtained in 60:40 (3006.67g) and 50:50 (2942.00g) ratios. Seed yield in 80:20 and 70:30 was comparable. Seed yield of male parent was at par with 50:50 and 60:40 blending ratio but significantly lower than 80:20 and 70:30 ratios. During the year 1998-99, similar trend was obtained for seed yield (Table 4).

### B. Seed yield and its attributes of sterile $F_1$ in different blending ratios and control cultivars under open pollination.

Siliquae per terminal branch, siliqua index, seeds per siliqua and seed yield per plot (18m$^2$) were studied under this condition to find out whether yield attributes vary according to blending ratio since there was no control on pollinating agents like honeybees and minor insects, and they were free to collect pollen from pollen parent of any plot grown

**Table.1. Seed bearing siliquae per terminal branch of $F_1$ plants under different blending ratios and control cultivars**

| Blending ratio | Year 1996-97 | 1997-98 | 1998-99 | Mean |
|---|---|---|---|---|
| 100:00 | 48.00 | 45.53 | 57.00 | 50.18 |
| 90:10 | 31.33 | 32.33 | 34.67 | 32.78 |
| 80:20 | 42.00 | 39.66 | 53.26 | 44.97 |
| 70:30 | 43.33 | 40.20 | 54.33 | 45.95 |
| 60:40 | 43.33 | 40.93 | 54.86 | 46.37 |
| 50:50 | 44.67 | 42.20 | 55.47 | 47.45 |
| 00:100 | 40.00 | 43.73 | 52.67 | 45.47 |
| Pusa Barani | 34.20 | 38.47 | 36.13 | 36.27 |
| Pusa Bold | 36.80 | 38.87 | 41.75 | 39.40 |
| CD at P=0.05 | 1.92 | 6.65 | 6.45 | |

**Table.2. Siliqua index in different blending ratios and control cultivars**

| Blending ratio | Year 1996-97 | 1997-98 | 1998-99 | Mean |
|---|---|---|---|---|
| 100:00 | 0.73 | 0.66 | 0.80 | 0.73 |
| 90:10 | 0.47 | 0.46 | 0.48 | 0.47 |
| 80:20 | 0.68 | 0.63 | 0.79 | 0.70 |
| 70:30 | 0.68 | 0.62 | 0.78 | 0.69 |
| 60:40 | 0.69 | 0.65 | 0.77 | 0.70 |
| 50:50 | 0.70 | 0.66 | 0.88 | 0.75 |
| 00:100 | 0.61 | 0.66 | 0.70 | 0.66 |
| Pusa Barani | 0.54 | 0.62 | 0.54 | 0.57 |
| Pusa Bold | 0.56 | 0.60 | 0.61 | 0.59 |
| CD at P=0.05 | 0.03 | 0.12 | 0.09 | |

**Table 3. Seeds per siliqua in different blending ratios and control cultivars**

| Blending ratio | Year 1996-97 | 1997-98 | 1998-99 | Mean |
|---|---|---|---|---|
| 100:00 | 14.33 | 14.67 | 15.36 | 14.79 |
| 90:10 | 8.00 | 7.20 | 9.33 | 8.18 |
| 80:20 | 12.80 | 12.37 | 12.70 | 12.62 |
| 70:30 | 12.90 | 12.64 | 12.74 | 12.76 |
| 60:40 | 13.00 | 13.12 | 13.33 | 13.15 |
| 50:50 | 13.66 | 13.24 | 14.39 | 13.76 |
| 00:100 | 13.33 | 11.75 | 13.00 | 12.69 |
| Pusa Barani | 11.00 | 11.67 | 10.98 | 11.22 |
| Pusa Bold | 12.00 | 12.62 | 11.50 | 12.04 |
| CD at P=0.05 | 2.81 | 1.76 | 2.66 | |

in the experiment and also from the crop grown in the neighborhood. Seed yield and yield attributes were compared with values obtained from blending ratios grown under net. Siliquae per terminal branch were comparable in 100:00, 90:10, 80:20, and 70:30 blending ratios. Highest was recorded in 50:50 ratio which was at par with 60:40. Siliqua index was significantly higher in 50:50 ratios (0.81) in comparison to 100:00, 90:10 and 80:20 blending ratios. There was no significant difference for seeds per siliqua in $F_1$ (heterot ic) plants among all the blending ratios. The seed yield was at par in 100:00, 90:10, and 80:20 blending ratios. The seed yield in 100:00 ratio was significantly higher than 70:30, 60:40 and 50:50. In general, seed yield increased with increase in proportion of heterotic plants in blending ratios (Table 5).

**C. Competitiveness between plants of sterile heterotic ($F_1$) and pollen parent in different blending ratios.**

At the time of sowing, seeds of male and female were blended in different ratios. Thinning was done to maintain appropriate plant population. Actual plant population of hybrid (sterile $F_1$) and male (pollen parent) was counted at initiation of flowering and labeled with the labels of different colours. The data (Table 6) revealed that actual plant population of male and female ($F_1$) in blending ratios was not exactly same as the proportion of seeds blend before planting. When average plant population over three years was considered, it reflected no drastic change in plant population of male and female from actual blending ratios.

## DISCUSSION

Seed bearing siliquae per terminal branch directly indicate availability of pollen for pollination. During all the three years, this character in 100:00 blending ratios was significantly higher than the other ratios. Significantly lower values were found in 90:10 blending ratio, which indicated that the proportion of pollen plants was not enough for pollination. During two year observation, siliquae per terminal branch in 80:20, 70:30, 60:40 and 50:50 blending ratios were comparable. This revealed that proportion of pollen parent in 80:20 blending ratio was as good as in 50:50 blending ratio. Significantly lower number of siliquae on terminal branch of Pusa Barani than in $F_1$ plants in all blending ratios except in 90:10 showed heterosis for this character. Das and Rai (10) also reported heterosis for this character. The observations on other characters like siliqua index and seeds per siliqua also concluded that 20 per cent pollen plants in blended populations were as good as 50 per cent.

Seed yield is the manifestation of yield attributes described earlier. During all the three years seed yield was significantly higher in 100:00 ratio under open conditions (without net) since abundant pollen as well as pollinating agents mainly, honeybees were available. Seed yield in 80:20 was at par with seed yield in 70:30 blending ratio but significantly higher than that recorded in 60:40 and 50:50 ratios. Clearly, it happened due to decrease in heterotic plants in 60:40 and 50:50 ratios.

Seed yield as well as yield attributes observed under net were lower than that observed in open pollination experiment (1997-98). During all the three years, it was observed that honeybees when caged initially did not perform pollination and many of the bees spent much or all of their time trying to escape. Honeybees gathered near the corners of the net, fail to return to their hives and died. It indicated lesser activity of honeybees in cages and pollination was not as adequate as in open pollination. Free [11] recorded similar mortality of honeybees during initial days of caging. Nye [12] stated that mortality rate was greater when honeybee colonies were confined continuously rather than intermittently.

As stated earlier, among all the blending ratios, highest yield was recorded in 100:00 blending ratio. This yield is expected to be similar to that obtained from hybrid plants with fertility restorer gene. These plots were grown in open to facilitate the pollination from pollen grains available in the plots of the same experiment and the fields in the neighborhood. However, if farmers plant hectares of sterile $F_1$ hybrid only in their fields, there may not be enough amount of pollen in neighboring fields and the yield will be adversely affected in absence of adequate pollination. To avoid the risk of non-availability of sufficient amount of pollen in large area, blending of 20 per cent pollen parent is advisable and safer. It has been observed that 90:10 blending ratio is not suitable as all the yield attributes were drastically lower in sterile $F_1$ plants. The sterile $F_1$ plants in 90:10 blending ratio are nine times more than pollen parent plants and hence, one pollen plant is not enough to meet pollen requirements of nine sterile $F_1$ plants. Contrary to it, in 80:20 blending ratio sterile $F_1$ plants are four times to that of pollen parent and from our findings on yield attributes it becomes obvious that one plant of pollen parent is enough to meet pollen requirement of four sterile $F_1$ plants. For further clarification a comparison has been made for seed yield among different blending ratios and over Pusa Barani (Table 7). From the data it becomes clear that per cent gain over Pusa Barani was maximum in 100 per cent hybrid ($F_1$) plots continuously for three years. There was no gain in 90:10 blending ratio in comparison to Pusa Barani over three years studies. Among other blending ratios maximum gain was recorded in 80:20 blending ratio.

The present study showed that 100:00 (100 per cent heterotic plants) ratio gave 4026.02 g yield per plot (average three years). However, 80:20 blending ratio, which had 80 per cent heterotic plants and 20 per cent non-heterotic plants, gave 3534.21g yield per plot showing a loss of 12.29 per cent in yield over 100 per cent heterotic plants. Of course, cultivation of 100 per cent heterotic plants is possible only with restorer gene.

In 80:20 blending ratio the average gain in seed yield over Pusa Barani was 22.09 per cent as compared to 38.94 per cent in 100 per cent heterotic plants. In 80:20 blending ratio one can harvest 22.09 per cent more yield than Pusa Barani. The yield may be even more at farmer's fields as compared to what we obtained in present investigation due to adverse effect of netting on honeybee activities as well as the microclimate under net. As stated earlier 80:20 ratio was also grown in open field (without net) and yield attributes were compared with same ratio grown under net. We recorded 20.17 per cent more siliqua per terminal branch, 12.705 higher siliqua indexes, 21.16 per cent more seeds per siliqua and 6.71 per cent more seed yield in 80:20 ratio under open pollination as compared to the population covered by insect proof nylon net when compared with the same blending ratio. The seed yield in 80:20 ratio under open pollination condition was only 5.71 per cent lower than 100 per cent heterotic plants (100:00). Therefore, by blending heterotic sterile $F_1$ with non-heterotic, non-restorer pollen parent, the heterosis in Indian mustard may be exploited. Of course, net benefits will be lower (about 5 to 6%) in comparison of hybrid crop with fertility restorers. However, it is necessary to manage honeybee colonies for pollination. Introduction of bee hives in the crop fields to enhance pollination efficiency and in turn increased crop yield was known as early as 1892 [13]. This technology is being utilized extensively in USA [14].

In rapeseed Mc Vetty [15] suggested 90:10 ratio of A-line and R-line interplant in the field and harvesting in bulk. On the contrary in the present study we obtained lowest seed yield in 90:10 ratio. Renard *et al.* [16] observed that the difference in seed set and seed yield may be due to variation in CMS used, bee population and nectar production. Anand *et al.* [9] suggested a methodology to exploit hybrid vigour commercially in absence of restorer lines. Similarly, Renard [8] reported that hybrid line composite involving blending seeds of male sterile $F_1$ hybrids and seeds of a male fertile line in 80:20 proportions were registered in France. Since restorer line is specific to a particular sterile cytoplasm, it will take considerable time to develop restorer line for each sterile cytoplasm. On the contrary, advantage of blending can be obtained with the available good combiner non-restorer line, which synchronizes well for flowering with sterile $F_1$.

Based on present research findings of three years, we propose following scheme for exploitation of hybrid vigour in Indian mustard in absence of restorer system.

Step 1. Development of CMS line

oxyCMS x Pusa Barani

↓

six back crosses using Pusa Barani as a recurrent parent

Step 2. Hybrid seed production

*Pusa Barani CMS x PSR 7 (4:1 ratio)

↓

sterile $F_1$ hybrid

Step 3. Commercial hybrid crop cultivation

seed of sterile $F_1$ hybrid + seed of PSR 7

80% 20%

Mix thoroughly and market seed to farmers for commercial cultivation

* Hybrid seeds may be produced by mixing the Pusa Barani CMS and PSR-7 in 80:20 ratio, harvest it as mixed population, process it and supply to farmers for commercial cultivation. The data from the present study indicate that the competitiveness between heterotic $F_1$ and non-heterotic male parent nearly absent and proportion of male parent remains almost the same.

**Table 4. Seed yield (g) per plot in different blending ratios and control cultivars**

| | Year | | | |
|---|---|---|---|---|
| Blending ratio | 1996-97 | 1997-98 | 1998-99 | Mean |
| 100:00 | 3761.40 | 3620.00 | 4696.67 | 4026.02 |
| 90:10 | 2550.00 | 2400.00 | 2634.00 | 2528.00 |
| 80:20 | 3370.97 | 3280.00 | 3951.67 | 3534.21 |
| 70:30 | 3290.00 | 3106.00 | 3574.33 | 3323.44 |
| 60:40 | 3196.00 | 3006.67 | 3260.00 | 3154.22 |
| 50:50 | 3071.00 | 2942.00 | 3221.33 | 3078.11 |
| 00:100 | 2942.33 | 2805.00 | 3054.00 | 2933.78 |
| Pusa Barani | 2890.00 | 2780.00 | 3002.00 | 2890.67 |
| Pusa Bold | 2970.00 | 2890.00 | 3106.00 | 2988.67 |
| CD at P=0.05 | 286.56 | 214.27 | 446.57 | |

**Table 5. Yield and yield attributes of sterile $F_1$ under different blending ratios and control cultivars in open pollination**

| Blending ratio | Siliquae per terminal branch | Siliqua index | Seeds per siliqua | Seed yield per plot (g) |
|---|---|---|---|---|
| 100:00 | 46.20 | 0.69 | 15.00 | 3700.00 |
| 90:10 | 46.80 | 0.69 | 14.20 | 3613.00 |
| 80:20 | 47.66 | 0.71 | 15.00 | 3500.00 |
| 70:30 | 48.90 | 0.73 | 14.66 | 3280.00 |
| 60:40 | 51.30 | 0.76 | 15.20 | 3133.00 |
| 50:50 | 54.90 | 0.81 | 15.00 | 3006.00 |
| 00:100 | 43.88 | 0.63 | 13.00 | 2750.00 |
| Pusa Barani | 38.00 | 0.57 | 11.50 | 2705.00 |
| Pusa Bold | 38.88 | 0.58 | 12.00 | 2800.00 |
| CD at P=0.05 | 2.78 | 0.09 | 2.09 | 335.00 |

**Table 6. Plant population percentage of sterile $F_1$ and pollen parent in different blending ratios**

| | Actual plant population (%) of female and pollen parent | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Blending ratio | 1996-97 | | 1997-98 | | 1998-99 | | Mean | |
| | $F_1$ | P | $F_1$ | P | $F_1$ | P | $F_1$ | P |
| 100:00 | 100:00 | - | 100:00 | - | 100:00 | - | - | - |
| 90:10 | 90.50 | 9.50 | 88.70 | 11.30 | 91.50 | 8.50 | 90.23 | 9.77 |
| 80:20 | 77.70 | 22.30 | 82.10 | 17.90 | 77.00 | 23.00 | 78.93 | 21.07 |
| 70:30 | 68.20 | 31.80 | 67.50 | 32.50 | 73.20 | 26.80 | 69.63 | 30.37 |
| 60:40 | 62.33 | 37.67 | 59.00 | 41.00 | 63.00 | 37.00 | 61.44 | 38.56 |
| 50:50 | 51.67 | 48.33 | 53.50 | 46.50 | 49.50 | 50.50 | 51.56 | 48.44 |
| 00:100 | - | 100.00 | - | 100.00 | - | 100.00 | - | 100.00 |

$F_1$=Female parent P=Pollen parent

**Table 7. Comparative gain in yield (g) over Pusa Barani and loss over 100% hybrid ($F_1$) in different blending ratios**

| Blending Ratios | Yield per plot (g) | | | | Gain over Pusa Barani (female parent of hybrid) | | | | Loss in comparison of 100% hybrid ($F_1$) plants | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1996-97 | 1997-98 | 1998-99 | Mean | 1996-97 | 1997-98 | 1998-99 | Mean | 1996-97 | 1997-98 | 1998-99 | Mean |
| 100:00 | 3761.4 | 3620.00 | 4696.67 | 4026.02 | 871.40 (30.15) | 840.00 (30.22) | 1694.67 (56.45) | 1135.35 (38.94) | - | - | - | - |
| 90:10 | 2550.00 | 2400.00 | 2634.00 | 2528.00 | -340.00 (-11.76) | -380.00 (-13.67) | -368.00 (-12.25) | -362.66 (-12.56) | 1211.40 (32.20) | 1220.00 (33.70) | 2062.67 (43.91) | 1498.02 (36.60) |
| 80:20 | 3370.97 | 3280.00 | 3951.67 | 3534.21 | 480.97 (16.64) | 500.00 (17.99) | 949.67 (31.63) | 643.54 (22.08) | 390.43 (10.38) | 340.00 (9.33) | 745.00 (15.86) | 491.81 (11.85) |
| 70:30 | 3290.00 | 3106.00 | 3574.33 | 3323.44 | 400.00 (13.84) | 326.00 (11.73) | 573.33 (19.10) | 433.11 (14.89) | 471.40 (12.53) | 514.00 (14.20) | 1122.34 (23.90) | 702.58 (16.87) |
| 60:40 | 3196.00 | 3006.67 | 3260.00 | 3154.22 | 306.00 (10.59) | 226.67 (8.15) | 258.00 (8.60) | 263.55 (9.11) | 565.40 (15.03) | 613.33 (16.94) | 1436.67 (30.59) | 871.8 (20.85) |
| 50:50 | 3071.00 | 2942.00 | 3221.33 | 3078.11 | 181.00 (6.26) | 162.00 (5.83) | 219.00 (7.30) | 187.33 (6.46) | 690.40 (18.35) | 678.00 (18.73) | 1476.67 (31.44) | 948.35 (22.84) |
| 00:100 | 2942.33 | 2805.00 | 3054.00 | 2933.78 | 52.33 (01.81) | 25.00 (0.90) | 52.00 (1.73) | 43.11 (1.48) | 819.07 (21.87) | 815.00 (22.51) | 1642.67 (34.98) | 1092.24 (26.45) |
| Pusa Barani | 2890.00 | 2780.00 | 3002.00 | 2890.67 | - | - | - | - | 871.40 (23.17) | 840.00 (23.20) | 1694.67 (34.08) | 1135.35 (26.81) |

Figures in parentheses are percentage value

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