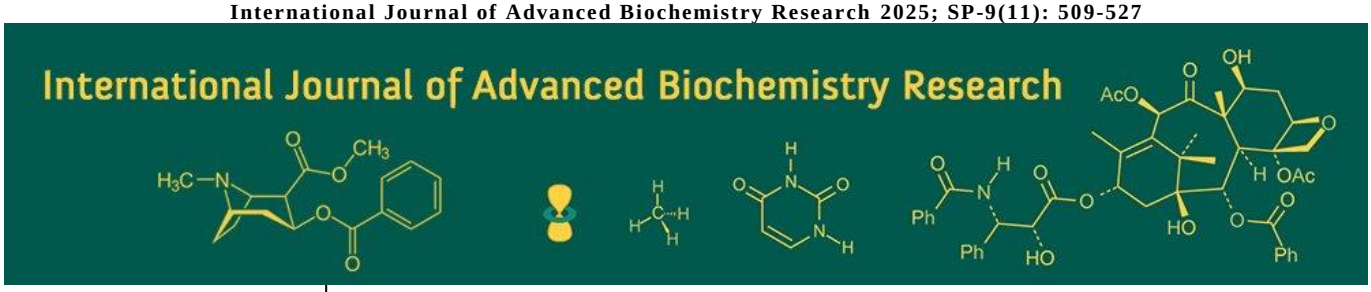

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Heterosis and inbreeding depression for grain yield and related traits in f_1 and f_2 populations of bread wheat (*Triticum aestivum* L.) under early and late sown conditions

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Abstract
The present investigation on heterosis and inbreeding depression was conducted on 16 genetically diverse parental lines and five testers following the line x tester mating design. During Rabi season 2023-24 and 2024-25, twenty-one parents, 80 F1s, and 80 F2s were sown (25 November) in normal and late (25 December) conditions in Randomized Block Design (RBD) with three replications at Nawabganj Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, (U.P.). Heterosis and inbreeding depression were studied for 13 yields and their contributing traits. Significant positive heterosis was observed for grain yield over the better parent for K-9351 × HD-2967 (51.97) and K-8962 × PBW-833 (55.57), and heterosis over the economic parent (K-1317) was observed for DBW-222 × PBW-833 (70.47) and PBW-644 × HD-2967 (73.48). Inbreeding depression was K-307 × DBW-187 (-32.88) and K-1006 × DBW-107 (-27.76) under early sown conditions. Significant positive heterosis was observed for grain yield over the better parent, K-9351 × HI-1563 (49.27), and K-9465 × PBW-833 (34.16). Heterosis over the economic parent (K-1317) was DBW-252 × DBW-187 (40.44) and K-9006 × DBW-187 (26.45). Inbreeding depression was lowest for DBW-222 × HD-2967 (-12.52) and DBW-252 × PBW-833 (-5.48) under late-sown conditions.

Keywords: Wheat, heterosis, inbreeding depression, yield, heterobeltiosis, standard heterosis

Introduction
Wheat (*Triticum aestivum* L.) is the staple food for nearly one-third of the world's population. It is the most popular cereal in the world due to its large acreage, high productivity, prominent position in the international food grain trade, agronomic adaptability to diverse climatic conditions, ease of grain storage, conversion into flour for making edible, palatable, and a variety of other food items, and the fact that it provides 20% of the world's diet. Wheat is a remarkable gift from nature to mankind as a healthy complement for the nutritional requirements of the human body since it provides 12% protein, 1.8% lipids, 1.8% ash, 2% reducing sugar, 59.2% starch, 70% total carbohydrates, and 314 kcal/100 g of food (Iqbal *et al.*, 2017) [11]. India's wheat production was anticipated to be 113.29 million tonnes from an area of 31.83 million ha, with an average productivity of 35.87 kg per ha. Uttar Pradesh, Madhya Pradesh, Punjab, Haryana, and Rajasthan are the top wheat-producing states in terms of both area and yield. Uttar Pradesh is the leading producer of wheat among these states, yielding 36.24 million tonnes from an area of 9.59 million ha (ICAR-IIWBR, 2025) [10]. One of the goals of combining ability analysis is to find the optimal parent/cross combination, which can be accomplished by using heterosis. The utilisation of heterosis is a watershed moment in contemporary agriculture, and it is regarded as one of the foundations of global food security. The use of heterosis in a self-pollinated crop, such as wheat, is mostly determined by its direction and size. The research on heterosis and inbreeding depression has a direct impact on the breeding procedures employed for varietal improvement. Heterosis, defined as the mean superiority of the F_1 mid parent over the better and more economical parent, is thus a significant metric in such investigations.

It refers to the allelic or non-allelic interaction of genes in response to a certain environment. Heterosis breeding has emerged as a critical component of crop improvement programmes aimed at increasing yield. The first critical step in using heterosis is to determine its magnitude and direction. Due to the lack of a stable male sterile line on a commercial scale, hybrid vigour has not been widely exploited in self-pollinated crops such as wheat, or in cross-pollinated ones. However, heterosis as a means of enhancing productivity has been the subject of much study in wheat. The estimates of heterosis over F_1 hybrids in real sense, decides whether. Though, the production (Briggle, 1963), yet the practical approach of this concept needs further exploration and perfection (Willson, 1967) [27]. Bailey *et al.*, 1980 [4] observed that F_2 performance was a good indication of predicting F_2 hybrids in wheat with this objective inbreeding depression in F_2 generation has also been studied.

Material and Methods

The basic material for the present investigation comprised of 16 parental lines *viz*, K-307, K-9465, K9644, K-402, K-1616, HI-1620, K-8962, K-607, K-9351, K-1006, K-9006, HD-3086, PBW-644, K-1317, DBW-222, DBW-252 and five testers *viz*., DBW-107, DBW-187, HD-2967, PBW-833 and HI-1563 following line x tester mating design. During Rabi season 2024-25, Twenty-one parents, 80 F_1s and 80 F_2s were sown (25 November) in Normal and Late (25 December) condition, in Randomized Block Design (RBD) with three replications at Nawabganj Farm, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, (U.P.). Each parent and F_1 were planted in single row while each F_2 was planted in two rows of three-meter length with inter and intra-row spacing of 20x10 cm, respectively. Recommended cultural practices were applied to raise good crop. Observations were recorded on plot basis for days to 50% heading, days to anthesis, days to maturity, plant height, flag leaf area, productive tillers per plant. total tillers per plant, number of spikelets per ear, number of grains per spike, biological yield, harvest index, thousand grain weight and grain yield per plant, were recorded on 5 randomly selected plants for parents, 80 F_1 and 80 F_2 's plants. The term "heterosis," created by Shull (1914) [20], refers to the phenomenon in which the F_1 generation produced by crossing two genetically different gametes or people exhibits increased or decreased vigour over the better parent or the mid parental value. Jinks (1955) [12] suggested that non-allelic interactions, rather than specific relationships between genes along the same lines, could be the cause of heterosis. Meredith and Bridge used the phrase "useful heterosis" in 1972 [16]. It refers to F_1's dominance over traditional commercial cheque varieties. It's also known as economic heterosis. This sort of heterosis has direct practical applications in plant breeding. Inbreeding depression is a decline in fitness and vigour caused by inbreeding. The degree of inbreeding is measured by the inbreeding coefficient. The data recorded were subjected to analysis of variance according to Steel *et al.*, (1997) [22].

Results and Discussion

Heterosis means superiority of F1 over parents or economic variety, while inbreeding depression describe the reduction in performance of progeny due to inbreeding. In wheat crop finding heterosis is very tedious job. Heterosis in wheat crop is desirable in negative direction for traits *viz*., days to 50% heading and days to anthesis in early conditions, but under late sown condition is positive direction. In present investigation, heterosis was estimated in F1 generation over better parent (Heterobeltiosis) and standard check i.e. K-1317 (Economic heterosis). The findings of heterosis and inbreeding depression is depicted in Table 1a to 1g.

Days to 50% heading

In the early-sown environment, heterosis over the superior parent for days to 50% heading ranged from -9.96 to 3.08 days. Among the 80 crosses tested, 39 exhibited considerably negative heterosis, 30 were negative but not significant, and 11 were positive but non-significant. The prevalence of negative and considerable heterosis suggested a strong genetic predisposition to early onset. DBW-222 × PBW-833 (-9.96**), K-1317 × DBW-187 (-8.40**), K-1317 × PBW-833 (-8.40**), PBW-644 × PBW-833 (-8.37**), and K-1317 × HD-2967 (-8.02**), were the most promising crosses for early heading, with all showing highly substantial negative heterosis. Heterosis over the economic parent (K-1317) varied from -13.74 to -4.58 days. All 80 crosses exhibited strong negative heterosis. The optimal combinations were DBW-222 × PBW-833 (-13.74**), PBW-644 × PBW-833 (-12.21**), K-1317 × DBW-187 (-8.40**), K-1317 × PBW-833 (-8.40**), and K-1317 × HD-2967 (-8.02**). The inbreeding depression under early-sown conditions ranged from -3.08 to 2.50. Out of all hybrids, 36 showed negative scores, while none showed substantial positive inbreeding depression. The top five crosses with the largest positive inbreeding depression were K-1006 / HI-1563 (2.50), HD-3086 / HI-1563 (2.48), K-9351 / HI-1563 (2.04), HI-1620 / HD-2967 (2.06) and *K*-402 / DBW-187 (2.06), indicating significant heterozygosity conserved for earliness in these hybrids.

In late-sown conditions, heterosis over the superior parent for days to 50% heading ranged from -10.13 to 13.02 days. Of the 80 crosses examined, 39 had considerably negative heterosis, 19 were negative but non-significant, and 22 were positive but non-significant. The presence of significantly negative heterosis indicated a high potential for earliness among the hybrids. The best crosses for early heading were DBW-222 × DBW-187 (-10.13**), DBW-222 × HI-1563 (-10.13**), DBW-222 × HD-2967 (-9.70**), DBW-222 × PBW-833 (-9.28**), and K-8962 × DBW-107 (-8.86**). These crosses had the highest significant negative heterosis. Heterosis over the economic parent (K-1317) varied from -1.84 to 11.98 days. Out of 80 crossings, 27 were negative but not non-significant, 35 were significantly positive, and 18 were positive but non-significant, demonstrating that the majority of hybrids headed earlier than the economic parent. The best combinations were DBW-222 × DBW-187 (-1.84**), DBW-222 × HI-1563 (-1.84**), DBW-222 × HD-2967 (-1.38*), DBW-222 × PBW-833 (-0.92*), and K-8962 × DBW-107 (-0.46). A total of 21 hybrids showed positive inbreeding depression, while 56 had negative results. The top five crosses with the most positive inbreeding depression were K-307 / HD-2967 (4.39), K-9351 / HD-2967 (3.07), HD-3086 / DBW-107 (3.90) and K-9351 / HI-1563 (3.86). Similar types of findings for this trait were reported by Reddy *et al.*, (2025) [19] for different crosses.

Days to anthesis: In the early-sown environment, heterosis over the better parent for days to anthesis ranged from -

10.15 to 3.32 days, demonstrating wide variation between crossings. Out of all the combinations tested, 39 had significantly negative heterosis, 34 were negative but non-significant, and 7 were positive but non-significant, indicating that the majority of the crossovers inclined toward earliness. The five most desirable crosses with the highest significant negative heterosis were DBW-222 × PBW-833 (-10.15**), PBW-644 × PBW-833 (-9.77**), K-1317 × DBW-187 (-8.76**), K-1317 × PBW-833 (-8.39**), and K-1317 × HD-2967 (-7.30**), which exhibited superior earliness compared to their respective better parents. Heterosis over the economic parent (K-1317) varied from -13.14 to -1.82 days. Among 80 crosses, all of them had significantly negative heterosis. The predominance of significant negative heterosis demonstrated that most hybrids flowered earlier than their typical economic parent. The most promising crosses included PBW-644 × DBW-187 (-13.14**), DBW-222 × HI-1563 (-13.14**), PBW-644 × PBW-833 (-12.41**), K-607 × HI-1563 (-12.41**), and DBW-222 × PBW-833 (-12.77**). The inbreeding depression varied from -4.20 to 2.73, with 21 hybrids exhibiting positive inbreeding depression. 44 of the 80 crossings showed substantial positive inbreeding depression, while none of the hybrids showed significant negative. The top five crossings with the highest positive inbreeding depression were HI-1620 / HD-2967 (2.73), K-1006 / PBW-833 (2.73), HD-3086 / HD-2967 (2.69), K-402 / DBW-187 (2.34), and DBW-252 / DBW-107 (2.23).

In the late-sown environment, heterosis over the better parent for days to anthesis ranged from -10.36 to 10.30 days, demonstrating a broad range of variability between crosses. Out of all combinations, 26 had significantly negative heterosis, 17 had significantly positive heterosis, 18 were negative but non-significant, and 19 were positive but non-significant, indicating that the majority of crosses showed earlier blooming tendencies. The most desirable and substantially earlier crosses were DBW-222 × DBW-187 (-10.36**), DBW-222 × HI-1563 (-9.96**), DBW-222 × HD-2967 (-9.96**), DBW-222 × PBW-833 (-9.16**), and K-8962 × DBW-107 (-9.52**). All of these demonstrated high and negative heterosis, demonstrating their superiority for early anthesis. Heterosis over the economic parent (K-1317) ranged from -1.84 to 11.98 days. Among 80 crosses, 27 had negative but non-significant heterosis, 35 were considerably positive, and 18 were positive but non-significant, showing that the majority of hybrids flowered before the standard check. The best crosses were DBW-222 × DBW-187 (-1.84**), DBW-222 × HI-1563 (-1.84**), DBW-222 × HD-2967 (-1.38**), DBW-222 × PBW-833 (-0.92), and K-8962 × DBW-107 (-0.46). The inbreeding depression ranged from -4.44 to 4.39, with 39 crossings showing positive IBD values and the remainder (61) exhibiting negative inbreeding depression. Five crossings with positive inbreeding depression were K-307 / HD-2967 (4.39), HD-3086 / DBW-107 (3.90), K-9351 / HI-1563 (3.86), K-9351 / HD-2967 (3.07), and K-1006 / HD-2967 (2.22), demonstrating partial dominance effects and residual heterozygosity under heat stress. Similar results were also reported by Yadav *et al.*, (2017), Swelam *et al.*, (2022) [23, 28].

Days to Maturity

Under early-sown conditions, heterosis over the superior parent for days to maturity ranged between -4.25 and 3.46, indicating that the hybrids were both early and late. Out of 80 crosses, 21 had considerably negative heterosis, 39 were negative but not significant, and 20 were positive but non-significant. Crosses with considerable negative heterosis for earliness include HI-1620 × DBW-107 (-4.25**), K-1006 × HD-2967 (-3.77**), K-9006 × HD-2967 (-3.77**), K-9351 × HD-2967 (-3.50**) and DBW-252 × HD-2967 (-3.23**). These crosses promote early maturity. Heterosis over the economic parent (K-1317) ranged from -0.28 to 13.69, indicating significant variation between crossings. Of the 80 hybrids, 32 showed considerably positive heterosis, 5 showed strongly negative, and 43 were positive but non-significant. The most desired crosses with significant negative economic heterosis were K-1006 × HD-2967 (-0.28*), K-9006 × HD-2967 (-0.28*), K-1317 × HD-2967 (-0.28*), K-9006 × DBW-107 (-0.28*), and K-9351/HD-2967 (0.001). The inbreeding depression (IBD) ranged between -10.36 and 4.39. Out of 80 crossings, 27 showed positive inbreeding depression, with no hybrids indicating negative inbreeding. The five crosses with the highest positive inbreeding depression were K-307 / HI-1563 (4.39), K-307 / PBW-833 (4.11), K-307 / DBW-107 (3.93), K-8962 / HI-1563 (2.46), and K-8962 / HD-2967 (2.45), indicating partial dominance effects and heterosis maintenance in the F_2 generation during early sowing.

Under late-sown conditions, heterosis over the superior parent for days to maturity ranged between -6.94 and 8.70, indicating the occurrence of both early and late maturing hybrids. Of the 80 crosses, 37 showed considerably negative heterosis, 06 were strongly positive, 24 were negative but non-significant, and 13 were positive but non-significant. The top five preferred crosses with the most significant negative heterosis were DBW-222 × DBW-187 (-6.94**), DBW-222 × HD-2967 (-6.17**), DBW-222 × PBW-833 (-5.66**), DBW-222 × HI-1563 (-4.63**) and DBW-222 × DBW-107 (-4.63**), suggesting their superiority for early maturity under heat stress. Heterosis over the economic parent (K-1317) ranged between 0.01 to 8.70, indicating moderate genetic heterogeneity across the hybrids. Of the 80 crosses, 57 had considerably positive heterosis, 19 were positive but not significant, and 5 were negative but non-significant. The top five crosses with negative heterosis were K-9465/HI-1563 (-1.74**), K-607/ PBW-833 (-0.01), K-8962 × HI-1563 (-0.01), K-607/ DBW-107 (-0.01) and K-9465/ PBW-833 (-0.01). The inbreeding depression (IBD) ranged between -4.64% and 5.87%. Inbreeding depression was found to be positive in 50 of the 80 crosses and negative in 30. The top five crossings with the largest positive inbreeding depression were K-9644 / HD-2967 (5.87), K-9351 / HD-2967 (5.79), K-9644 / DBW-187 (1.60), K-1317 / DBW-107 (3.23), and PBW-644 / HI-1563 (3.52), indicating their potential for considerable heterotic retention under stress. Nager *et al.*, (2019) [17] analysed that 78 F_1 and F_2 crosses in wheat under Indian conditions, and among the traits.

Plant height (cm)

Under early-sown conditions, heterosis over the better parent for plant height ranged from -23.92 to 23.33, indicating both significant decreases and increases in plant height among hybrids. Out of 80 crosses, 41 were significantly negative, 14 showed considerably positive heterosis, 6 were positive but non-significant, and 19 were negative but non-significant. K-1317 × PBW-833 (-

23.92**), HI-1620 × HI-1563 (-19.63**), HI-1620 × PBW-833 (-17.24**), K-607 × DBW-187 (-15.23**), and DBW-252 × DBW-187 (-17.35**) were the five most desirable crosses with significant negative heterosis over the superior parent, indicating reduced plant stature. Heterosis over the economic parent (K-1317) ranged from -9.50 to 33.74. Of the 80 crosses, 32 had considerably positive heterosis, 9 had significantly negative heterosis, 23 were positive but non-significant, and 28 were negative but non-significant. The crosses with the most desirable substantial negative economic heterosis were K-1317 × PBW-833 (-9.50**), K-1317 × HD-2967 (-7.93**), DBW-252 × HD-2967 (-8.21**), DBW-222 × DBW-107 (-8.99**), and HI-1620 × HI-1563 (-9.22**). Inbreeding depression varied from -14.39 (HI-1620 × HI-1563) to 7.07 (K-9644 × HD-2967). Out of 80 crossings, 65 had a significant negative value, whereas 15 had a significant positive value for inbreeding depression. The five crosses with the highest positive IBD were K-307 × HD-2967 (7.07), HI-1620 × DBW-107 (4.15), DBW-252 × DBW-107 (3.44), K-1616 × HD-2967 (5.06), and K-9644 × DBW-107 (2.64).

Under late-sown conditions, heterosis over the better parent ranged between -46.18 and 27.00. Among the 80 crosses, 4 had considerably positive heterosis, 58 had significantly negative heterosis, 7 were positive but non-significant, and 11 were negative but non-significant. HI-1620 × PBW-833 (-46.18**), K-8962 × PBW-833 (-35.32**), K-607 × DBW-187 (-26.17**), HI-1620 × HI-1563 (-30.63**), and K-402 × PBW-833 (-25.92**) were the five most desirable crosses with significant negative heterosis over the better parent. Economic heterosis varied from -41.87 to 31.28, with four crosses considerably positive, 36 strongly negative, ten positive but non-significant, and thirty negative but non-significant. The five attractive crossings with the largest negative economic heterosis were HI-1620 × PBW-833 (-41.87**), K-8962 × PBW-833 (-30.14**), K-607 × DBW-187 (-16.03**), K-402 × PBW-833 (-19.99**), and HI-1620 × HI-1563 (-26.18**). Inbreeding depression varied from -40.31 to 16.69. Among all crossings, 22 had significant negative inbreeding depression, while 58 did not. The top five crossings with the highest positive IBD were HI-1620 × HD-2967 (16.69), K-9644 × DBW-107 (5.17), K-9465 × HD-2967 (8.59), K-9465 × DBW-107 (7.19), and K-9351 × HD-2967 (4.01), indicating a partial loss of hybrid Vigor from F_1 to F_2. Similar results were also reported by Kumari *et al.*, (2022), Khan *et al.*, (2023) [13, 15].

Flag leaf area (cm^2)

Under early-sown conditions, heterosis over the superior parent for flag leaf area ranged from -50.25 to 33.48, indicating that the hybrids showed both desirable decreases and increases in leaf area. Out of 80 crosses, 8 showed considerably positive heterosis, 50 were significantly negative, 9 were positive but non-significant, and 13 were negative but non-significant. The top five crosses with the most significant positive heterosis were K-402 × DBW-187 (33.48**), K-9006 × HD-2967 (24.89**), K-9644 × HD-2967 (20.87**), K-9644 × DBW-187 (20.60**), and K-1006 × DBW-187 (17.06**), indicating superiority in producing larger flag leaves under early-sown conditions. Heterosis over the economic parent ranged between -16.32 and 78.47. Among all crosses, 56 had considerably positive heterosis, 2 had significantly negative heterosis, 21 were positive but non-significant, and 1 was negative but not significant. The top five crosses with significant positive economic heterosis were K-402 × DBW-187 (78.47**), K-9644 × DBW-107 (66.61**), K-1317 × PBW-833 (64.98**), K-307 × DBW-187 (63.03**), and K-1006 × DBW-187 (62.71**). Inbreeding depression varied from -21.56 (K-9351 × HI-1563) to 26.82 (K-1317 × HD-2967). Among the 80 crosses, 30 were significantly positive and 30 were significantly negative. The top five crosses with the lowest desired negative IBD values were K-9351 × HI-1563 (-21.56**), K-9644 × DBW-107 (-15.54**), K-1006 × DBW-107 (-13.28**), HI-1620 × DBW-107 (-11.48**), and K-9644 × PBW-833 (-9.94**), indicating improved stability and inheritance of bigger leaf area in the F_2 generation.

Under late-sown conditions, heterosis over the better parent ranged from -64.35 to 27.56, indicating significant genetic heterogeneity and environmental influence on leaf expansion. Out of 80 crosses, three had considerably positive heterosis, 67 had significantly negative heterosis, four were positive but non-significant, and six were negative but not significant. The top most crosses with the most significant positive heterosis were K-9644 × DBW-187 (27.56**), PBW-644 × DBW-187 (26.22**), K-1006 × HD-2967 (8.31**), and K-9465 × HD-2967 (9.99**), indicating their ability to sustain larger flag leaves. Economic heterosis ranged between -51.42 and 50.57. Among the 80 crosses, 21 had considerably positive heterosis, 33 had significantly negative heterosis, 8 were positive but non-significant, and 18 were negative but non-significant. The top most crosses with the highest significant positive economic heterosis were PBW-644 × DBW-187 (50.57**), K-9644 × DBW-187 (50.03**) and K-9465 × HD-2967 (48.94**) which performed excellently in maintaining higher flag leaf area and photosynthetic potential under late planting. The range of inbreeding depression under late-sown conditions was -31.25 to 19.32. Out of all crosses, 40 showed substantial positive inbreeding depression, while 40 showed significant negative. The five most desirable crosses with the lowest negative IBD were PBW-644 × DBW-107 (-31.25), K-8962 × PBW-833 (-26.08), HI-1620 × HI-1563 (-22.28), K-402 × HI-1563 (-24.64), and K-9351 × DBW-107 (-20.45), indicating that these hybrids retained stable flag leaf area from F_1 to F_2 generations even under late-sown condition. These findings are supported by Mishra *et al.*, (2025) [3].

Productive tillers per plant

Under early-sown conditions, heterosis between the better parent and productive tillers per plant ranged from -8.93 to 98.61, indicating the occurrence of both negative and positive heterotic responses. Out of 80 crosses, 52 had significantly positive heterosis, 24 were positive but not significant, and 4 were negative but non-significant. The top five crosses with the highest positive heterosis over the better parent were DBW-222 × PBW-833 (98.61**), PBW-644 × PBW-833 (83.10**), K-1616 × PBW-833 (72.60**), PBW-644 × HD-2967 (52.08**), and K-8962 × HD-2967 (50.00**), indicating their superiority for increased tiller production. Heterosis over the economic parent (K-1317) varied from 0.52 to 52.88, indicating a wide heterotic range. Of the 80 crossings, 61 were significantly positive, while 29 were positive but non-significant heterosis. The top five crosses exhibiting the highest positive economic heterosis were PBW-644 × HD-2967 (52.88**), K-8962 × HD-2967 (50.79**), DBW-222 × PBW-833 (49.74**), HI-1620 × PBW-833 (40.31**), and PBW-644 × PBW-833 (36.13**),

highlighting their potential in improving productive tiller number compared to the economic check. Inbreeding depression varied from -77.66 to 19.19, demonstrating both reduction and improvement in tiller number between F_1 and F_2 generations. Out of 80 crosses, 32 were significantly positive and 48 were significantly negative in terms of inbreeding depression. The top five crosses with the most favourable negative IBD were K-9465 × PBW-833 (-77.66), K-307 × Hi-1563 (-27.78), K-1317 × PBW-833 (-41.67), DBW-222 × HD-2967 (-32.58), and K-9006 × HD-2967 (-29.83), indicating good stability for tiller number in the future generation.

Under late sown conditions, heterosis over the better parent ranged from -20.00 to 31.82, indicating substantial variability. Out of 80 crosses, two were significantly positive, 42 were positive but not statistically significant, three were significantly negative, and 33 were negative but non-significant. The top five crosses with the highest positive heterosis over the better parent were K-307 × DBW-187 (31.82**), K-9351 × PBW-833 (10.45*), K-9006 × DBW-187 (22.73**), K-1006 × DBW-187 (22.73**), and K-1616 × PBW-833 (10.45**), suggesting their improved adaptation to heat stress. Heterosis over the economic parent (K-1317) ranged from -15.94 to 26.09. Among all crosses, two showed significantly positive heterosis, 43 were positive but not significant, and 35 were negative but non-significant. The top five crosses with the highest positive economic heterosis were K-307 × DBW-187 (26.09**), K-9465 × DBW-107 (21.74**), K-9006 × DBW-187 (17.39*), K-1006 × DBW-187 (17.39*), and HI-1620 × PBW-833 (13.04*). Inbreeding depression under late-sown conditions ranged from -39.72 to 32.39, demonstrating that hybrids behave differently. Out of 80 crosses, 13 showed significantly negative IBD, 60 showed significant positive, and 20 crossed sow very negative. The top five crosses with acceptable negative IBD were K-9351 × DBW-107 (-39.72), K-9006 × DBW-187 (-18.52), K-1317 × DBW-107 (-12.69), K-9465 × HD-2967 (-32.85), and K-307 × PBW-833 (-8.57), indicating consistent performance from F_1 to F_2 generations. These findings are supported by Abdel-Moneam *et al.*, (2021), Vikash *et al.*, 2025 [1, 26].

Total tillers per plant

Under early-sown conditions, heterosis over the better parent for total tillers per plant ranged from -19.84 to 79.76, indicating significant diversity across the hybrids. Out of 80 crosses, 48 had significantly positive heterosis, two were strongly negative, 20 were positive but non-significant, and ten were negative but non-significant. The top five crosses with the highest positive heterosis over the better parent were DBW-222 × PBW-833 (79.76**), PBW-644 × PBW-833 (77.11**), K-1616 × PBW-833 (64.20**), HI-1620 × PBW-833 (53.12**), and DBW-252 × PBW-833 (52.27**), highlighting their superior tillering ability and heterotic potential under timely-sown environments. Heterosis over the economic parent (K-1317) ranged from -24.81 to 18.80. Among the 80 crosses, 11 had significantly positive heterosis, 15 were positive but non-significant, 30 were significantly negative, and 24 were negative but non-significant. The top five crosses with the highest positive economic heterosis were: PBW-644 × HD-2967 (18.80**), PBW-644 × DBW-187 (15.79**), K-9006 × HI-1563 (15.04**), PBW-644 × HI-1563 (12.78**), and K-8962 × HD-2967 (12.78**). Inbreeding depression (IBD) values ranged from -77.66 to 19.19, indicating both inbreeding depression and advantage effects. Out of 80 crossings, 56 were significantly negative and 24 were significantly positive in terms of inbreeding depression. The top five crosses with desired (negative) IBD values were K-9465 × PBW-833 (-36.50), K-402 × HD-2967 (-35.65), PBW-644 × PBW-833 (-38.09), K-1616 × HI-1563 (-5.31), and HI-1620 × HI-1563 (-33.05).

Under late-sown conditions, heterosis over the better parent ranged from -20.00 to 24.24, indicating substantial variability under stress. Out of 80 crosses, 9 had considerably positive heterosis, 8 had significantly negative heterosis, 32 were positive but non-significant, and 31 were negative but not significant. The top five crosses with the highest positive heterosis over the better parent were PBW-644 × DBW-107 (24.24**), PBW-644 × DBW-187 (22.67**), K-307 × DBW-187 (18.52**), HI-1620 × DBW-107 (18.18*), and K-1616 × DBW-107 (16.90*), indicating their potential for producing more tillers under heat stress conditions. Heterosis over the economic parent (K-1317 varied between -15.94 and 33.33, Among the 80 crosses, 26 showed significantly positive heterosis, 48 were positive but not significant, and 6 were negative but non-significant. The five crosses with the highest positive economic heterosis were K-307 × DBW-187 (33.33**), PBW-644 × DBW-187 (27.78**), DBW-252 × HI-1563 (27.78**), K-1616 × PBW-833 (26.39**), and K-9465 × PBW-833 (23.61**). Inbreeding depression ranged between -61.72 and 32.39. Of the 80 crossings, 15 had considerably negative IBD, 59 had significant positive IBD, and 28 had significant negative inbreeding depression. The top five crosses with desirable negative IBD values were K-9351 × DBW-107 (-61.72), K-307 × PBW-833 (-14.30), K-9465 × HD-2967 (-22.10), K-9465× PBW-833 (-30.34), and HI-1620 × PBW-833 (-32.60), indicating good stability of total tillers from F_1 to F_2. Thomas *et al.*, 2017 [24] reported that, 10 parents and their 45 F1's in wheat under normal and heat stress condition.

Number of spiklets per Ear

Under early-sown conditions, heterosis over the better parent for the number of spikelets per ear ranged between -14.80 and 46.91. Out of 80 crosses, 42 had significantly positive heterosis, two had significantly negative heterosis, 27 were positive but non-significant, and 9 were negative but non-significant. The top five crosses with the highest significant positive heterosis over the better parent were DBW-222 × PBW-833 (46.91**), K-9006 × PBW-833 (43.20**), K-1616 × PBW-833 (26.62**), PBW-644 × PBW-833 (26.92**), and K-9644 × HD-2967 (22.66**), indicating strong heterotic expression for spikelet number and potential for yield improvement. Heterosis over the economic parent (K-1317) ranged between -7.50 and 27.50. Out of 80 crosses, 35 showed highly positive heterosis, 28 positive but non-significant, and 17 negative but non-significant. The top five crosses with the highest positive economic heterosis were: DBW-222 × PBW-833 (27.50**), K-9006 × PBW-833 (26.07**), PBW-644 × PBW-833 (23.75**), K-1616 × HI-1563 (21.43**), and K-1317 × HD-2967 (20.36**). Inbreeding depression ranged from -34.46 to 31.56. Of all crossings, 48 exhibited substantial positive and 32 showed significant negative inbreeding depression. The top five crosses with the most desirable negative IBD values were HI-1620 × DBW-187 (-34.46), DBW-222 × DBW-187 (-23.35), DBW-222 × HI-1563 (-7.69), K-1006 ×

DBW-107 (-8.90), and K-9351 × DBW-187 (-8.15), indicating high genetic stability and efficient spikelet number transmission from F_1 to F_2 generations.

Under late-sown conditions, the better-parent heterosis varied from -28.11 to 33.18. Among the 80 crosses, 9 showed significantly positive better-parent heterosis, 21 showed significantly negative, 18 were positive but non-significant, and 32 were negative but non-significant. The top five crosses with the highest positive heterosis were K-1616 / HD-2967 (33.18**), K-9465 / PBW-833 (21.38**), K-9465 / HD-2967 (18.95**), K-307 / HD-2967 (17.90**), and K-9644 / HD-2967 (19.48**), demonstrating a significant heterotic advantage for spikelet number under heat stress. The economic heterosis ranged between -27.76 and 47.58. Out of all the crossings, 28 were significantly negative, 35 positive non-significant, and 17 negative non-significant. The top five crosses with the most favourable and substantial economic heterosis were K-9465 / PBW-833 (47.58**), K-9465 / DBW-107 (44.05**), K-402 / HI-1563 (29.96**), K-402 / HD-2967 (28.63**), and K-402 / DBW-187 (28.63**). The inbreeding depression under late-sown conditions ranged from -36.60 to 30.27. Among all crossings, 41 showed substantial positive inbreeding depression, whereas 39 showed significant negative inbreeding depression. The top five crosses with the lowest negative IBD values were DBW-252 / PBW-833 (-36.60), DBW-222 / HI-1563 (-34.40), DBW-252 / HI-1563 (-33.05), PBW-644 / PBW-833 (-33.99), and DBW-252 / DBW-107 (-33.01), indicating inbreeding depression caused by the fixation of harmful alleles. These findings are supported by Kumar *et al.*, (2011) [14].

Number of grains per spike

Under early-sown conditions, heterosis over the superior parent ranged between -20.09 and 46.10. Out of 80 crosses, 29 had significantly positive heterosis, 7 had significantly negative heterosis, 27 were positive but non-significant, and 17 were negative but non-significant. The top five crosses with the most significant positive heterosis over the better parent were DBW-222 / PBW-833 (46.10**), K-9006 / PBW-833 (29.47**), K-9351 / HD-2967 (27.67**), K-9644 / HD-2967 (27.27**), and PBW-644 / HD-2967 (26.20**). Heterosis over the economic parent (K-1317) ranged between -20.94 and 18.25. Of the 80 crosses, 11 showed significantly positive heterosis, 13 were significantly negative, 28 were positive but non-significant, and 28 were negative but non-significant. The top five crosses with the most significant positive heterosis over the economic parent were DBW-222 / PBW-833 (18.25**), K-9351 / HD-2967 (11.70**), PBW-644 / HD-2967 (10.41**), DBW-252 / DBW-187 (10.29**), and K-1616 / PBW-833 (10.88**). Inbreeding depression ranged from -38.33 to 34.15. Out of 80 crossings, 50 showed considerable positive inbreeding depression, while 30 showed significant negative depression. Inbreeding depression scores were lowest (most desirable) in HI-1620 / DBW-187 (-38.33), DBW-222 / DBW-187 (-28.69), K-9006 / PBW-833 (-16.80), HD-3086 / HI-1563 (-16.34), and K-9644 / PBW-833 (-0.13), indicating stable performance from F_1 to F_2 generations.

Under late-sown conditions, heterosis over the better parent ranged between -38.34 and 27.98. Out of 80 crosses, 13 displayed significantly positive heterosis, 30 strongly negative, 25 positive but non-significant, and 12 negative but non-significant. The top five acceptable crosses with the most significant positive heterosis were K-9465 / DBW-107 (27.98**), K-607 / HD-2967 (26.97**), K-9465 / PBW-833 (26.42**), K-1317 / HD-2967 (25.07**), and K-607 / DBW-107 (18.79**), suggesting improved adaptation to heat stress. The range of heterosis over the economic parent under late-sown conditions was -33.97 to 35.68. Out of 80 crosses, 31 had significantly positive heterosis, 13 had significantly negative heterosis, 18 were positive but non-significant, and 18 were negative but non-significant. The top five crosses with the most significant positive economic heterosis were K-9465 / DBW-107 (35.68**), K-9465 / PBW-833 (34.21**), K-9006 / DBW-187 (31.86**), K-9351 / HI-1563 (28.49**), and K-607 / HD-2967 (27.90**). The range of inbreeding depression under late-sown conditions was from -50.00 to 36.48. Inbreeding depression was shown in 39 crosses to be significantly positive, while 41 crosses were significantly negative. The top five acceptable crosses with low positive or near-zero IBD values are K-9644 / HD-2967 (1.06), DBW-222 / DBW-187 (1.38), DBW-222 / PBW-833 (-1.96), K-9351 / HD-2967 (-2.21), and K-9351 / DBW-187 (-2.77), suggesting steady performance from F_1 to F_2 generations. Similar findings were also reported by Devi *et al.*, (2013) [7].

Biological yield per plant (g)

Under early-sown conditions, heterosis over the superior parent ranged from -33.72 to 68.55, indicating that hybrids differed greatly in terms of biological yield per plant. Out of 80 crosses, 47 had significantly positive heterosis, 14 had significantly negative heterosis, 12 were positive but non-significant, and 7 were negative but not significant. The top five crosses with the highest significant positive heterosis over the better parent were PBW-644 × PBW-833 (68.55**), HI-1620 × PBW-833 (53.61**), K-1616 × PBW-833 (51.89**), PBW-644 × HI-1563 (50.15**), and K-9644 × PBW-833 (44.07**), all demonstrating superior performance in biomass accumulation. For economic heterosis (over K-1317), the results ranged from -33.84 to 46.85, indicating moderate to high heterotic effects. 31 of the crosses showed significantly positive heterosis, 16 were significantly negative, 21 were positive but non-significant, and 12 were negative but non-significant. The top five crosses with the highest positive economic heterosis were K-9351 × HD-2967 (46.85**), HI-1620 × PBW-833 (29.01**), DBW-222 × PBW-833 (30.08**), K-1616 × PBW-833 (23.44**), and DBW-252 × PBW-833 (20.82**). These hybrids have high potential for improving biological yields. The inbreeding depression levels varied from -66.53 to 40.94. Out of 80 crosses, 43 showed significantly positive and 37 showed significant negative inbreeding depression. The crosses with the lowest inbreeding depression values were DBW-252 × DBW-107 (-66.53), K-9465 × PBW-833 (-50.82), HI-1620 × HI-1563 (-15.25), K-307 × HI-1563 (-26.57), and K-1006 × DBW-107 (-32.24), indicating superior yield performance stability from F_1 to F_2 generations.

Under late-sown conditions, heterosis over the superior parent ranged from -52.85 to 71.88, indicating a strong environmental influence on hybrid performance. Of the 80 crosses, 19 showed considerably positive heterosis, 42 were significantly negative, 10 were positive but non-significant, and 9 were negative but non-significant. The top five crosses with the highest positive heterosis were K-307 × DBW-187 (71.88**), K-607 × DBW-107 (56.60**), DBW-

252 × DBW-187 (57.22**), K-9351 × HI-1563 (45.99**), and K-9465 × PBW-833 (47.13**), indicating strong potential for increasing biological yield under stress conditions. Economic heterosis (over K-1317) ranged from -49.44 to 43.73, with substantial variance between crosses. Out of 80 crosses, 12 had significantly positive heterosis, 48 were significantly negative, 4 were positive but non-significant, and 15 were negative but non-significant. The top five crosses with the highest significant positive economic heterosis were K-307 × HD-2967 (43.73**), K-9465 × PBW-833 (39.92**), HI-1620 × DBW-107 (30.03**), PBW-644 × HI-1563 (5.01**), and DBW-252 × DBW-187 (41.32**). These combinations show promise for yield improvement under late-sown conditions. Inbreeding depression scores were from -90.66 to 54.52, with significant variation among hybrids. A total of 46 hybrids exhibited significantly positive inbreeding depression, while 34 crosses indicated significant negative. The top five crosses with the lowest (most negative) IBD values were K-1317 × DBW-107 (-90.66), PBW-644 × HD-2967 (-58.46), HD-3086 × DBW-187 (-5.13), DBW-252 × PBW-833 (-5.71), and HI-1620 × DBW-187 (-41.14), indicating superior genetic stability and better transmission of yield traits in subsequent generations. These findings are supported by Ahamd *et al.*, (2023) [2].

Harvest Index (%)

Under early-sown conditions, heterosis over the superior parent for harvest index ranged from -19.05 to 27.98, indicating significant variation across hybrids in terms of grain partition efficiency. Eight of the 80 crosses showed considerably positive heterosis, eleven were significantly negative, 34 were positive but non-significant, and 27 were negative but non-significant. The top five crosses with the highest significant positive heterosis over the better parent were K-8962 × HI-1563 (27.98**), HD-3086 × HI-1563 (22.31**), K-1317 × DBW-187 (18.59**), HD-3086 × DBW-187 (16.51**), and K-8962 × DBW-187 (16.98**), indicating their superiority for improving harvest efficiency and assimilate translocation to grains. The values for economic heterosis (K-1317) under early-sown conditions ranged from 4.46 to 34.91, indicating a high degree of positive heterotic expression among the hybrids. Of the 80 crosses, 77 had significantly positive heterosis, two were positive but non-significant, and one was negative but non-significant. The top five crosses with the highest positive economic heterosis were HI-1620 × DBW-187 (34.91**), K-1616 × DBW-107 (34.00**), DBW-222 × HD-2967 (34.01**), K-9351 × HI-1563 (25.26**), and HD-3086 × HI-1563 (33.06**), indicating their potential to improve overall harvest index under favourable conditions. The values for inbreeding depression (IBD) ranged from -25.53 to 24.72, exhibiting both positive and negative responses across crosses. Out of 80 hybrids, 43 showed significant positive inbreeding depression, while 37 showed significant negative. The five crosses with the lowest (most desirable) negative IBD values were K-307 × HD-2967 (-25.53), K-402 × PBW-833 (-12.61), K-307 × PBW-833 (-11.83), K-402 × HI-1563 (-12.35), and K-9465 × PBW-833 (0.38), indicating their genetic stability and consistency from F_1 to F_2 generations for efficient resource utilization.

Under late-sown conditions, heterosis over the better parent for harvest index ranged from -35.38 to 5.22, indicating that most crosses exhibited negative heterosis due to stress effects during late sowing. Out of 80 crosses, 34 had significantly negative heterosis, 33 were negative but not significant, and 13 were positive but non-significant. The five most desirable crosses with the highest positive heterosis values were K-402 × PBW-833 (5.22**), DBW-222 × DBW-187 (3.41**), HD-3086 × PBW-833 (3.43**), K-9351 × PBW-833 (2.03**), and K-8962 × DBW-187 (3.14**), indicating better partitioning efficiency even under late-sown heat stress conditions. Economic heterosis (over K-1317) under late-sown conditions ranged from -34.06 to 3.39, suggesting that relatively few hybrids outperformed the standard parent. Among the 80 crosses, 36 had significantly negative heterosis, 39 were negative but non-significant, and 5 were positive but non-significant. The top five crosses with the largest positive economic heterosis were K-9006 × DBW-187 (3.39*), DBW-222 × DBW-187 (-0.71), K-402 × PBW-833 (-2.88*), K-9351 × PBW-833 (-3.81*), and HD-3086 × PBW-833 (-4.53*), indicating a slight improvement with delayed sowing. In late-sown conditions, inbreeding depression (IBD) ranged from -16.03 to 50.32, demonstrating varying genetic fixing of harvest index characteristics in F_2. Out of 80 crossings, 60 showed significantly positive inbreeding depression, while 20 showed significant negative. The five crosses with the best negative IBD values were DBW-222 × HD-2967 (-16.03), DBW-222 × PBW-833 (-0.84), HD-3086 × HI-1563 (-1.75), DBW-252 × PBW-833 (-0.40), and K-402 × HI-1563 (-0.42), indicating good genetic stability and efficient inheritance of harvest index under late-sown stress conditions. By exploiting heterosis for this attribute, many researchers found that this trait has direct contribution for increased grain yield in wheat by Tiwari *et al.*, (2025) [25].

Thousand grain weight (g)

Under early-sown conditions, heterosis over the better parent for thousand grain weight ranged from -21.40 to 23.14, indicating that grain weight improved and decreased over crosses. Out of 80 crosses, 15 showed significantly positive heterosis, 26 were strongly negative, 16 were positive but non-significant, and 23 were negative but non-significant. The top five crosses with the most significant positive heterosis over the better parent were: DBW-252 × PBW-833 (23.14**), DBW-252 × DBW-107 (18.16**), PBW-644 × PBW-833 (16.69**), K-402 × DBW-107 (10.75**), and K-8962 × DBW-187 (9.85**). Heterosis over the economic parent (K-1317) ranged from -12.38 to 21.74, with 26 crosses exhibiting significantly positive heterosis, ten strongly negative, 18 positive but non-significant, and 26 negative but non-significant. The top five crosses with the highest positive economic heterosis were PBW-644 × DBW-187 (21.74**), DBW-252 × PBW-833 (17.80**), K-8962 × DBW-187 (19.28**), HI-1620 × HD-2967 (13.53**), and DBW-222 × HD-2967 (19.26**). Inbreeding depression varied from -37.40% to 21.39%. Of the 80 crossings, 29 exhibited significantly positive and 51 showed significant negative inbreeding depression. The top five crosses with the lowest inbreeding depression scores were K-9351 × DBW-107 (-37.40), K-402 × HI-1563 (-21.46), K-9006 × HD-2967 (-26.18), K-307 × HD-2967 (-11.96), and DBW-222 × HI-1563 (-16.83).

Under late-sown conditions, heterosis over the better parent ranged between -21.23 and 23.35, indicating a broad range of variability for this feature. Of the 80 crosses, 19 showed considerably positive heterosis, 15 showed significantly

negative, 24 were positive but non-significant, and 22 were negative but non-significant. The top five crosses with the most desirable significant positive heterosis under late-sown conditions were HD-3086 × HI-1563 (23.35**), K-9351 × HI-1563 (22.77**), DBW-222 × PBW-833 (11.17**), K-1006 × DBW-187 (15.72**), and PBW-644 × PBW-833 (15.91**), highlighting their capacity to maintain higher seed weight even under heat-stress conditions. Economic heterosis over the typical parent ranged from -20.80 to 15.16. Of the 80 crosses, 17 showed significantly negative economic heterosis, 7 indicated significantly positive, 18 were negative but non-significant, and 36 were positive but non-significant. The top five crosses with significant positive economic heterosis were K-607 × PBW-833 (15.16**), PBW-644 × PBW-833 (10.05**), K-8962 × DBW-107 (10.94**), HD-3086 × DBW-107 (8.24**), and DBW-222 × DBW-187 (7.14**). Inbreeding depression ranged from -18.26 to 19.78, demonstrating that hybrid Vigor fixation varies moderately. Out of all crosses, 50 showed significant positive and 30 showed significant negative inbreeding depression. The top five crosses with the best low negative IBD were DBW-222 × DBW-107 (-18.26), HI-1620 × HD-2967 (-7.61), K-1616 × DBW-187 (-5.64), K-9351 × DBW-187 (-5.88), and K-9351 × HD-2967 (-4.15). Farooq *et al.*, (2004) [9] observed a wide range of heterosis and inbreeding depression for this trait.

Grain yield per plant (g)

Under early-sown conditions, heterosis over the superior parent for grain production per plant ranged between -31.23 and 73.78. Out of 80 crosses, 55 had considerably positive heterosis, 3 had significantly negative heterosis, 12 were positive but non-significant, and 10 were negative but non-significant. The top five crosses with the most significant positive heterosis over the superior parent were: DBW-222 × PBW-833 (73.78**), K-9351 × HD-2967 (51.97**), K-8962 × PBW-833 (55.57**), PBW-644 × PBW-833 (61.97**), and K-9006 × HI-1563 (71.39**), indicating exceptional heterotic effects on yield potential. Heterosis over the economic parent (K-1317) varied from -16.90 to 84.50, indicating a wide range of yield improvement prospects. Out of 80 crosses, 63 had significantly positive heterosis, 1 had significantly negative heterosis, ten were positive but non-significant, and six were negative but non-significant. The top five crosses with the highest significant positive heterosis over economic heterosis (K-1317) were K-9351 × HD-2967 (84.50**), DBW-222 × HD-2967 (81.87**), K-8962 × HD-2967 (70.49**), DBW-222 × PBW-833 (70.47**), and PBW-644 × HD-2967 (73.48**). These hybrids outperformed the standard economic parent in early-sown conditions. Inbreeding depression ranged from -68.34 to 38.74. Of the 80 crossings, 33 exhibited substantial negative and 47 showed significant positive inbreeding depression. The five crosses with the lowest desirable (negative) IBD values were DBW-252 × DBW-107 (-68.34), K-9465 × PBW-833 (-50.46), PBW-644 × PBW-833 (-32.11), K-307 × DBW-187 (-32.88), and K-1006 × DBW-107 (-27.76), indicating greater grain yield stability from F_1 to F_2 generations.

Under late-sown conditions, heterosis over the better parent ranged between -52.98 and 61.56. Of the 80 crosses, 14 had significantly positive heterosis, 40 had significantly negative heterosis, 13 were positive but non-significant, and 13 were negative but non-significant. The top five crosses with significant positive heterosis were K-9006 × DBW-187 (61.56**), K-607 × DBW-107 (54.56**), DBW-252 × DBW-187 (52.89**), K-9351 × HI-1563 (49.27**), and K-9465 × PBW-833 (34.16**). Heterosis over the economic parent (K-1317) ranged between -52.74 and 40.44. Of the 80 crosses, 10 showed significantly positive heterosis, 55 were significantly negative, 5 were positive but non-significant, and 10 were negative but non-significant. The top five crosses with the most significant positive heterosis were DBW-252 × DBW-187 (40.44**), K-9006 × DBW-187 (26.45**), K-607 × DBW-107 (36.94**), K-9351 × HI-1563 (20.49**), and K-9465 × PBW-833 (16.80**), indicating that these combinations retained a yield advantage under stress. Inbreeding depression varied between -40.31 and 55.29. Among 80 crossings, 23 showed significant negative inbreeding depression, while 57 showed significant positive depression. The five crosses with the best negative IBD values were PBW-644 × HD-2967 (-40.31), K-9465 × HD-2967 (-38.34), K-307 × HI-1563 (-26.33), DBW-222 × HD-2967 (-12.52), and DBW-252 × PBW-833 (-5.48). These crosses showed minimal inbreeding depression and good genetic stability for yield across generations. The significant and desirable heterosis as well as inbreeding depression for grain yield per plant was also reported by Chaudhary *et al.*, (2023), Raja *et al.*, (2025), Singh *et al.*, (2004) [6, 18, 21].

Table 1a: Heterosis and Inbreeding Depression

SN	Hybrids	1. Days to 50% Heading						2. Days to Anthesis					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	-2.48	-9.92 **	-1.69	4.61 **	4.61 **	-2.64	-1.19	-9.12 **	-1.61	5.19 **	4.61 **	-2.64
23	K-307 / DBW-187	-2.47	-9.54 **	-0.84	-2.63	2.30	-0.45	-1.96	-8.76 **	-0.40	-3.31 *	2.30	-0.45
24	K-307 / HD-2967	-2.48	-9.92 **	-0.42	5.56 **	5.07 **	4.39	-2.38	-10.22 **	-0.41	3.43 *	5.07 **	4.39
25	K-307 / PBW-833	-5.98 **	-9.92 **	-1.27	2.78	2.30	-1.35	-7.89 **	-10.58 **	-2.86	2.16	2.30	-1.35
26	K-307 / HI-1563	-1.65	-9.16 **	0.00	1.86	0.92	0.46	-0.79	-8.76 **	-0.40	1.32	0.92	0.46
27	K-9465 / DBW-107	-0.41	-6.87 **	0.82	-1.38	-1.38	-0.94	-1.17	-7.66 **	-0.79	-2.16	-1.38	-0.94
28	K-9465 / DBW-187	-2.86	-9.16 **	-0.42	-5.26 **	-0.46	2.78	-1.95	-8.39 **	-0.80	-5.37 **	-0.46	2.78
29	K-9465 / HD-2967	-2.86	-9.16 **	1.26	1.39	0.92	2.28	-2.73	-9.12 **	1.20	0.86	0.92	2.28
30	K-9465 / PBW-833	-4.38 **	-8.40 **	1.25	4.17 **	3.69 *	-4.44	-5.64 **	-8.39 **	0.80	3.45 *	3.69 *	-4.44
31	K-9465 / HI-1563	-2.45	-8.78 **	-0.84	1.86	0.92	-0.91	-2.34	-8.76 **	-0.80	1.31	0.92	-0.91
32	K-9644 / DBW-107	-0.43	-10.69 **	-1.28	-1.38	-1.38	0.00	-0.81	-10.22 **	-2.03	-1.73	-1.38	0.00
33	K-9644 / DBW-187	-2.06	-9.16 **	0.84	-4.82 **	0.00	1.38	-1.96	-8.76 **	0.40	-4.55 **	0.00	1.38
34	K-9644 / HD-2967	0.85	-9.54 **	-0.42	-1.84	-1.84	-3.76	1.21	-8.39 **	0.40	-2.15	-1.84	-3.76
35	K-9644 / PBW-833	-4.78 **	-8.78 **	0.00	-0.46	-0.46	-2.32	-4.89 **	-7.66 **	0.00	-0.86	-0.46	-2.32
36	K-9644 / HI-1563	1.28	-9.16 **	1.26	7.83 **	7.83 **	1.28	1.21	-8.39 **	1.20	7.39 **	7.83 **	1.28
37	K-402 / DBW-107	-2.76	-5.73 **	1.21	-0.44	5.07 **	-3.51	-1.89	-5.11 **	1.54	-0.41	5.07 **	-3.51

38	K-402 / DBW-187	-4.33 **	-7.25 **	2.06	0.87	6.45 **	-3.46	-3.40 *	-6.57 **	2.34	0.41	6.45 **	-3.46
39	K-402 / HD-2967	-5.12 **	-8.02 **	0.83	2.62	8.29 **	-2.98	-3.02 *	-6.20 **	1.56	1.64	8.29 **	-2.98
40	K-402 / PBW-833	-4.72 **	-7.63 **	-0.41	3.93 **	9.68 **	-0.42	-4.89 **	-7.66 **	-0.79	2.46	9.68 **	-0.42
41	K-402 / HI-1563	-4.72 **	-7.63 **	0.00	-1.31	4.15 **	-2.21	-2.26	-5.47 **	0.77	-1.64	4.15 **	-2.21
42	K-1616 / DBW-107	2.08	-6.49 **	0.41	-0.92	-0.92	-0.46	1.57	-5.84 **	0.78	-2.99 *	-0.92	-0.46
43	K-1616 / DBW-187	0.00	-7.25 **	-0.82	-5.70 **	-0.92	0.47	0.39	-6.57 **	-1.56	-5.79 **	-0.92	0.47
44	K-1616 / HD-2967	2.08	-6.49 **	-1.22	-1.84	-1.84	0.00	1.97	-5.47 **	-1.16	-3.85 *	-1.84	0.00
45	K-1616 / PBW-833	-3.59 *	-7.63 **	-0.83	-1.84	-1.84	-2.82	-4.14 **	-6.93 **	-0.39	-3.42 *	-1.84	-2.82
46	K-1616 / HI-1563	0.83	-7.63 **	0.41	0.92	0.92	-2.28	-0.79	-8.03 **	0.00	-0.85	0.92	-2.28
47	HI-1620 / DBW-107	-4.69 **	-6.87 **	1.23	-4.44 **	-0.92	-2.79	-3.37 *	-5.84 **	0.39	-4.60 **	-0.92	-2.79
48	HI-1620 / DBW-187	-3.91 *	-6.11 **	0.41	-5.26 **	-0.46	-0.93	-3.00 *	-5.47 **	-0.39	-5.37 **	-0.46	-0.93
49	HI-1620 / HD-2967	-5.08 **	-7.25 **	2.06	-2.67	0.92	-3.20	-4.12 **	-6.57 **	2.73	-1.67	0.92	-3.20
50	HI-1620 / PBW-833	-4.69 **	-6.87 **	-0.41	-4.89 **	-1.38	0.00	-4.87 **	-7.30 **	-0.79	-5.02 **	-1.38	0.00
51	HI-1620 / HI-1563	-4.30 **	-6.49 **	1.63	-5.33 **	-1.84	0.94	-3.75 **	-6.20 **	1.95	-5.86 **	-1.84	0.94
52	K-8962 / DBW-107	-3.32	-11.07 **	-1.29	-8.86 **	-0.46	-3.24	-3.54 *	-10.58 **	-2.45	-9.52 **	-0.46	-3.24
53	K-8962 / DBW-187	-2.47	-9.54 **	-0.84	-2.53	6.45 **	-3.46	-1.57	-8.39 **	-0.40	-2.38	6.45 **	-3.46
54	K-8962 / HD-2967	-1.66	-9.54 **	0.84	-0.84	8.29 **	-3.83	-1.18	-8.39 **	1.59	-1.19	8.29 **	-3.83
55	K-8962 / PBW-833	-6.77 **	-10.69 **	-0.86	1.27	10.60 **	-1.67	-7.52 **	-10.22 **	-1.63	1.19	10.60 **	-1.67
56	K-8962 / HI-1563	-1.24	-9.16 **	0.84	0.00	9.22 **	-2.53	-1.57	-8.76 **	-0.40	0.00	9.22 **	-2.53
57	K-607 / DBW-107	-0.43	-10.69 **	-2.14	0.00	5.07 **	-2.63	-0.81	-10.22 **	-2.85	-0.82	5.07 **	-2.63
58	K-607 / DBW-187	-4.53 **	-11.45 **	-1.29	-3.07 *	1.84	0.91	-5.10 **	-11.68 **	-2.07	-4.12 **	1.84	0.91
59	K-607 / HD-2967	3.08	-10.69 **	0.43	-3.95 **	0.92	-2.28	2.49	-9.85 **	0.81	-3.29 *	0.92	-2.28
60	K-607 / PBW-833	-7.97 **	-11.83 **	-2.16	-2.63	2.30	-1.35	-7.89 **	-10.58 **	-1.63	-2.06	2.30	-1.35
61	K-607 / HI-1563	0.44	-12.98 **	-2.63	-5.26 **	-0.46	-2.32	-0.41	-12.41 **	-2.92	-5.35 **	-0.46	-2.32
62	K-9351 / DBW-107	-2.79	-6.87 **	-0.41	1.33	5.07 **	-2.19	-2.67	-6.93 **	-0.78	2.10	5.07 **	-2.19
63	K-9351 / DBW-187	-2.39	-6.49 **	2.04	3.95 **	9.22 **	-1.27	-1.91	-6.20 **	1.17	4.13 **	9.22 **	-1.27
64	K-9351 / HD-2967	-3.59 *	-7.63 **	1.24	1.33	5.07 **	3.07	-3.05 *	-7.30 **	1.18	0.84	5.07 **	3.07
65	K-9351 / PBW-833	-3.98 *	-8.02 **	0.83	5.33 **	9.22 **	-2.95	-4.14 **	-6.93 **	0.78	5.46 **	9.22 **	-2.95
66	K-9351 / HI-1563	-3.19	-7.25 **	0.82	3.56 *	7.37 **	3.86	-1.15	-5.47 **	1.93	3.78 *	7.37 **	3.86
67	K-1006 / DBW-107	-1.65	-8.78 **	1.26	9.22 **	9.22 **	-1.69	-1.56	-8.03 **	-0.40	6.81 **	9.22 **	-1.69
68	K-1006 / DBW-187	-2.47	-9.54 **	-0.42	1.75	6.91 **	-3.02	-2.73	-9.12 **	-1.20	2.07	6.91 **	-3.02
69	K-1006 / HD-2967	-2.06	-9.16 **	-1.26	3.69 *	3.69 *	2.22	-0.78	-7.30 **	0.00	2.13	3.69 *	2.22
70	K-1006 / PBW-833	-3.98 *	-8.02 **	1.24	10.60 **	10.60 **	-1.25	-3.76 **	-6.57 **	2.73	8.51 **	10.60 **	-1.25
71	K-1006 / HI-1563	-1.23	-8.40 **	2.50	1.84	1.84	-1.81	-1.95	-8.39 **	1.59	-0.85	1.84	-1.81
72	K-9006 / DBW-107	-2.98	-12.98 **	-1.75	-1.38	-1.38	-2.34	-2.42	-11.68 **	-0.83	-2.16	-1.38	-2.34
73	K-9006 / DBW-187	-4.12 *	-11.07 **	-0.86	-5.26 **	-0.46	-2.32	-2.75	-9.49 **	-0.40	-4.55 **	-0.46	-2.32
74	K-9006 /HD-2967	0.44	-12.21 **	0.44	1.39	0.92	-1.37	1.24	-10.95 **	1.23	0.00	0.92	-1.37
75	K-9006 / PBW-833	-7.17 **	-11.07 **	-0.86	8.33 **	7.83 **	-1.28	-6.39 **	-9.12 **	1.20	7.33 **	7.83 **	-1.28
76	K-9006 / HI-1563	2.62	-10.31 **	0.85	0.94	-0.92	0.47	3.32 *	-9.12 **	1.61	0.88	-0.92	0.47
77	HD-3086 / DBW-107	-3.92 *	-6.49 **	1.22	1.76	6.45 **	3.90	-3.37 *	-5.84 **	1.16	1.67	6.45 **	3.90
78	HD-3086 /DBW-187	-2.35	-4.96 **	0.40	-3.07 *	1.84	-2.26	-2.62	-5.11 **	0.39	-2.89 *	1.84	-2.26
79	HD-3086 / HD-2967	-3.53 *	-6.11 **	2.03	1.32	5.99 **	-0.43	-2.62	-5.11 **	2.69	1.25	5.99 **	-0.43
80	HD-3086 / PBW-833	-4.71 **	-7.25 **	-0.82	2.64	7.37 **	-3.00	-3.37 *	-5.84 **	0.00	3.33 *	7.37 **	-3.00
81	HD-3086 / HI-1563	-5.10 **	-7.63 **	2.48	6.17 **	11.06 **	-2.08	-4.87 **	-7.30 **	1.58	5.83 **	11.06 **	-2.08
82	PBW-644 / DBW-107	-0.85	-11.07 **	0.43	10.60 **	10.60 **	-2.50	-0.81	-10.22 **	0.81	9.01 **	10.60 **	-2.50
83	PBW-644 / DBW-187	-5.76 **	-12.60 **	-1.75	3.95 **	9.22 **	-0.42	-6.67 **	-13.14 **	-3.36	4.13 **	9.22 **	-0.42
84	PBW-644 / HD-2967	-1.71	-12.21 **	-2.17	11.11 **	10.60 **	-1.67	-1.21	-10.58 **	-1.22	9.01 **	10.60 **	-1.67
85	PBW-644 / PBW-833	-8.37 **	-12.21 **	-1.30	9.72 **	9.22 **	-1.69	-9.77 **	-12.41 **	-2.08	7.30 **	9.22 **	-1.69
86	PBW-644 / HI-1563	-1.28	-11.83 **	0.87	13.02 **	11.98 **	-0.82	-1.61	-10.95 **	0.82	10.30 **	11.98 **	-0.82
87	K-1317 / DBW-107	-7.63 **	-7.63 **	1.24	9.68 **	9.68 **	-1.68	-7.30 **	-7.30 **	1.97	8.62 **	9.68 **	-1.68
88	K-1317 / DBW-187	-8.40 **	-8.40 **	-0.42	-6.58 **	-1.84	-0.47	-8.76 **	-8.76 **	-1.20	-5.79 **	-1.84	-0.47
89	K-1317 / HD-2967	-8.02 **	-8.02 **	0.83	-0.46	-0.46	1.85	-7.30 **	-7.30 **	0.79	-1.72	-0.46	1.85
90	K-1317 / PBW-833	-8.40 **	-8.40 **	0.42	2.30	2.30	-2.70	-8.39 **	-8.39 **	-0.80	2.16	2.30	-2.70
91	K-1317 / HI-1563	-8.02 **	-8.02 **	2.07	-1.84	-1.84	-3.29	-6.57 **	-6.57 **	1.95	-2.16	-1.84	-3.29
92	DBW-222 / DBW-107	-1.70	-11.83 **	-0.87	-8.86 **	-0.46	-2.78	-4.33 **	-11.31 **	-0.82	-7.97 **	-0.46	-2.78
93	DBW-222 / DBW-187	-4.12 *	-11.07 **	-0.43	-10.13 **	-1.84	-3.76	-3.53 *	-10.22 **	0.00	-10.36 **	-1.84	-3.76
94	DBW-222 / HD-2967	0.87	-11.07 **	0.43	-9.70 **	-1.38	-1.40	-3.15 *	-10.22 **	0.41	-9.96 **	-1.38	-1.40
95	DBW-222 / PBW-833	-9.96 **	-13.74 **	-0.44	-9.28 **	-0.92	0.47	-10.15 **	-12.77 **	-0.42	-9.16 **	-0.92	0.47
96	DBW-222 / HI-1563	-1.73	-13.36 **	-3.08	-10.13 **	-1.84	-1.88	-6.30 **	-13.14 **	-4.20	-9.96 **	-1.84	-1.88
97	DBW-252 / DBW-107	-3.47 *	-4.58 **	-0.40	-0.45	0.92	-0.46	-0.74	-1.82	2.23	-1.28	0.92	-0.46
98	DBW-252 / DBW-187	-4.25 **	-5.34 **	0.81	-3.95 **	0.92	-2.28	-3.32 *	-4.38 **	1.53	-3.72 *	0.92	-2.28
99	DBW-252 / HD-2967	-5.79 **	-6.87 **	1.23	2.27	3.69 *	2.67	-4.43 **	-5.47 **	0.77	1.70	3.69 *	2.67
100	DBW-252 / PBW-833	-5.02 **	-6.11 **	0.81	-2.27	-0.92	1.40	-5.17 **	-6.20 **	0.39	-2.98 *	-0.92	1.40
101	DBW-252 / HI-1563	-3.47 *	-4.58 **	0.40	0.91	2.30	-0.90	-2.21	-3.28 *	1.51	0.00	2.30	-0.90
SE ±		1.39			1.04			1.18			0.87		
CD at 5%		2.72			2.04			2.31			1.71		
CD at 1%		3.58			2.69			3.04			2.25		

Table 1b: Heterosis and Inbreeding Depression

SN	Hybrids	3. Days to Maturity						4. Plant height					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	1.60	6.70 **	3.93	-4.37 **	1.45	1.71	0.00	4.48	-0.89	-9.28	-6.22	1.11
23	K-307 / DBW-187	1.06	6.15 **	2.63	-0.27	5.80 **	2.19	0.03	13.36 **	-6.58	-0.98	12.61 *	-2.21
24	K-307 / HD-2967	1.33	6.42 **	2.36	-4.10 **	1.74	0.57	-18.11 **	-7.89 *	7.07	16.56 **	16.19 **	1.03
25	K-307 / PBW-833	3.46 **	8.66 **	4.11	-4.10 **	1.74	0.85	-8.74 **	8.56 *	-6.37	0.20	8.21	-2.03
26	K-307 / HI-1563	2.93 *	8.10 **	4.39	-4.37 **	1.45	-1.14	10.60 **	24.92 **	-6.40	1.72	8.24	0.98
27	K-9465 / DBW-107	0.00	1.96	-0.55	-0.28	2.32	1.42	-5.89	-1.68	1.16	4.87	8.40	7.19
28	K-9465 / DBW-187	-1.10	0.84	-1.94	-2.75 *	2.61 *	3.39	-0.23	13.07 **	-13.13	-11.36 *	0.80	6.46
29	K-9465 / HD-2967	-1.89	1.68	0.82	-4.92 **	0.87	-0.58	6.20	19.46 **	-9.61	11.88 *	7.32	8.59
30	K-9465 / PBW-833	0.27	2.23	1.64	-4.70 **	-0.01	-1.74	7.26 *	27.58 **	-6.93	-1.77	6.09	5.19
31	K-9465 / HI-1563	0.27	2.23	1.37	-4.24 **	-1.74	-0.88	-3.81	8.65 *	-4.31	19.84 **	27.53 **	5.05
32	K-9644 / DBW-107	-0.27	3.63 **	-0.27	3.70 **	5.51 **	-1.10	15.37 **	20.54 **	2.64	27.00 **	31.28 **	5.17
33	K-9644 / DBW-187	-1.88	1.96	-2.19	3.02 **	8.70 **	1.60	-18.12 **	-7.21	-6.37	-18.84 **	-7.70	2.44
34	K-9644 / HD-2967	-1.08	2.79 *	-0.27	2.46 *	8.70 **	5.87	13.70 **	27.89 **	-3.77	-2.64	-3.18	11.51
35	K-9644 / PBW-833	-2.96 *	0.84	-3.32	-3.31 **	1.45	-2.86	-12.39 **	4.21	-4.16	-11.51 *	-4.43	7.56
36	K-9644 / HI-1563	-2.15	1.68	-2.20	2.84 *	4.93 **	1.11	11.92 **	26.42 **	-6.89	-14.42 **	-8.93	15.78
37	K-402 / DBW-107	-0.55	1.40	1.10	0.56	3.48 **	1.40	15.78 **	20.97 **	-9.92	-13.98 **	-11.08 *	5.79
38	K-402 / DBW-187	-0.55	1.40	0.28	-3.02 **	2.32	2.83	5.80	19.90 **	3.45	-20.52 **	-9.61	7.70
39	K-402 / HD-2967	0.00	3.63 **	2.16	-4.37 **	1.45	-2.29	-3.37	8.69 *	1.63	0.57	-0.96	10.66
40	K-402 / PBW-833	-1.64	0.28	-1.95	-0.55	4.35 **	0.28	-14.98 **	1.13	-2.75	-25.92 **	-19.99 **	-1.72
41	K-402 / HI-1563	0.55	2.51 *	-0.55	-0.28	2.61 *	0.57	0.10	13.07 **	-1.55	-23.41 **	-18.50 **	0.13
42	K-1616 / DBW-107	1.11	1.68	0.27	2.00	3.48 **	3.92	-7.70 *	-3.56	1.11	-7.40	-4.28	13.43
43	K-1616 / DBW-187	-0.27	1.68	1.10	-1.37	4.06 **	2.23	-4.18	8.59 *	-4.89	-19.29 **	-8.21	4.38
44	K-1616 / HD-2967	-1.89	1.68	0.82	-4.92 **	0.87	1.72	-1.41	10.90 **	5.06	-11.72 *	-15.33 **	5.19
45	K-1616 / PBW-833	-1.37	0.56	-0.28	-1.38	3.48 **	3.36	12.43 **	33.74 **	-4.54	-21.18 **	-14.88 **	9.26
46	K-1616 / HI-1563	1.11	1.68	0.27	-0.85	1.16	2.01	-8.90 **	2.91	-9.66	-21.83 **	-16.82 **	1.57
47	HI-1620 / DBW-107	-4.25 **	6.98 **	-1.30	-4.92 **	0.87	0.00	11.67 **	21.11 **	4.15	-12.68 *	-7.67	12.56
48	HI-1620 / DBW-187	-2.00	9.50 **	-1.53	-1.91	4.06 **	0.56	-18.85 **	-8.03 *	-6.55	-28.54 **	-18.73 **	0.83
49	HI-1620 / HD-2967	-2.25 *	9.22 **	-1.53	-3.01 **	2.90 *	1.97	-10.65 **	0.50	-2.72	-1.52	4.14	16.69
50	HI-1620 / PBW-833	-3.00 **	8.38 **	-2.32	-4.10 **	1.74	1.71	-17.24 **	-1.56	-4.11	-46.18 **	-41.87 **	-40.31
51	HI-1620 / HI-1563	-2.75 *	8.66 **	-2.06	-2.46 *	3.48 **	3.64	-19.63 **	-9.22 *	-14.39	-30.63 **	-26.18 **	13.31
52	K-8962 / DBW-107	-0.54	2.23	1.91	1.41	4.35 **	3.61	-6.11	-1.90	-0.07	-4.78	-1.57	4.73
53	K-8962 / DBW-187	-2.45 *	0.28	-0.28	-1.10	4.35 **	4.44	15.91 **	31.36 **	-5.14	-14.61 **	-2.89	6.57
54	K-8962 / HD-2967	-1.08	2.51 *	2.45	-1.64	4.35 **	3.61	-11.23 **	-0.14	-5.67	-23.05 **	-26.19 **	5.48
55	K-8962 / PBW-833	-1.90	0.84	0.00	-1.38	3.48 **	2.80	12.33 **	33.61 **	-1.57	-35.32 **	-30.14 **	12.20
56	K-8962 / HI-1563	-0.54	2.23	2.46	-2.82 *	-0.01	-0.87	-4.42	7.96 *	-1.40	-37.18 **	-33.16 **	5.47
57	K-607 / DBW-107	-0.27	2.23	-1.09	-3.09 **	-0.01	-0.58	-2.26	2.12	-4.01	-18.23 **	-15.47 **	10.04
58	K-607 / DBW-187	-0.82	1.68	-1.92	-3.02 **	2.32	1.13	-15.23 **	-3.94	-7.19	-26.17 **	-16.03 **	10.56
59	K-607 / HD-2967	-2.70 *	0.84	-0.83	-2.46 *	3.48 **	3.92	-9.33 **	1.99	-0.74	2.95	-1.25	11.57
60	K-607 / PBW-833	-2.72 *	-0.28	-0.84	-4.70 **	-0.01	-2.90	-15.09 **	1.00	1.16	-14.83 **	-8.01	-0.13
61	K-607 / HI-1563	-1.63	0.84	-0.28	-0.28	2.90 *	1.13	-6.98 *	5.07	-7.53	-29.81 **	-25.31 **	-2.37
62	K-9351 / DBW-107	1.11	1.40	1.10	2.00	3.48 **	1.96	23.33 **	32.36 **	-5.39	-20.54 **	-17.86 **	-6.24
63	K-9351 / DBW-187	-1.37	0.56	0.83	-1.65	3.77 **	3.63	10.66 **	25.41 **	-2.78	-18.61 **	-7.43	-6.64
64	K-9351 / HD-2967	-3.50 **	0.00	-0.28	-0.82	5.22 **	5.79	-8.22 *	3.24	-3.40	-16.33 **	-16.18 **	4.01
65	K-9351 / PBW-833	-0.82	1.12	0.55	0.83	5.80 **	2.74	-9.32 **	7.86 *	2.75	-17.70 **	-11.12 *	-2.24
66	K-9351 / HI-1563	0.00	0.28	-0.84	2.27	4.35 **	1.94	-13.91 **	-2.75	-8.64	-21.79 **	-16.77 **	-7.71
67	K-1006 / DBW-107	-0.82	0.84	0.28	0.29	1.16	0.86	-6.45	-1.30	1.50	-8.86	-5.79	-8.98
68	K-1006 / DBW-187	-1.64	0.28	-0.56	-2.75 *	2.61 *	1.98	-13.96 **	-2.50	-3.98	-30.05 **	-20.44 **	-2.61
69	K-1006 / HD-2967	-3.77 **	-0.28	-1.68	-2.46 *	3.48 **	2.24	-7.92 *	3.58	-2.57	-8.53	-12.26 *	0.92
70	K-1006 / PBW-833	-1.64	0.28	-1.39	-0.28	4.64 **	3.88	-16.73 **	-0.96	-6.18	-7.61	-0.21	-5.34
71	K-1006 / HI-1563	0.82	2.51 *	1.09	-1.99	0.00	-4.64	-6.34	5.79	-4.89	-13.82 **	-8.29	-7.06
72	K-9006 / DBW-107	-3.51 **	-0.28	-3.64	1.15	1.74	2.28	-1.38	3.54	-1.41	-32.84 **	-30.44 **	0.83
73	K-9006 / DBW-187	-2.43 *	0.84	-1.66	-2.47 *	2.90 *	1.97	7.66 *	22.01 **	-4.72	-35.29 **	-26.41 **	1.49
74	K-9006 /HD-2967	-3.77 **	-0.28	-3.64	-3.28 **	2.61 *	2.26	-3.05	9.05 *	-0.55	-17.54 **	-14.60 **	9.91
75	K-9006 / PBW-833	-1.35	1.96	-0.55	-2.21	2.61 *	1.13	-10.39 **	6.58	-1.96	-22.86 **	-16.68 **	6.92
76	K-9006 / HI-1563	-1.89	1.40	-0.83	2.27	4.35 **	-1.67	-18.85 **	-8.34 *	-7.03	-15.46 **	-10.04	7.15
77	HD-3086 / DBW-107	-1.00	10.34 **	-2.28	-1.11	3.48 **	-1.96	-10.79 **	1.86	-0.51	-10.96 *	2.24	7.69
78	HD-3086 /DBW-187	-0.75	10.61 **	-0.25	-3.02 **	2.32	-1.70	-12.25 **	0.20	-2.79	-22.60 **	-11.12 *	1.50
79	HD-3086 / HD-2967	0.25	11.73 **	-1.00	-3.28 **	2.61 *	-2.26	-5.70	7.68 *	-2.90	-27.05 **	-16.23 **	-3.97
80	HD-3086 / PBW-833	0.50	12.01 **	-0.25	-1.10	3.77 **	-1.12	-16.82 **	-1.05	-5.37	-34.00 **	-24.21 **	1.58
81	HD-3086 / HI-1563	-1.00	10.34 **	-1.52	0.83	5.51 **	0.00	10.05 **	25.66 **	1.87	-16.03 **	-3.58	4.41
82	PBW-644 / DBW-107	0.27	5.31 **	0.53	8.70 **	8.70 **	3.47	-9.49 **	2.20	-2.56	1.90	6.01	4.51
83	PBW-644 / DBW-187	0.00	5.03 **	1.06	-1.10	4.35 **	-0.56	-5.64	6.93	-1.44	-15.05 **	-3.40	-1.55
84	PBW-644 / HD-2967	-0.27	4.75 **	0.53	-2.46 *	3.48 **	-0.28	-13.64 **	-2.48	-4.39	-30.24 **	-27.43 **	4.92
85	PBW-644 / PBW-833	-2.13	2.79 *	-0.54	-4.14 **	0.58	-0.86	-14.21 **	2.04	-1.94	-30.76 **	-25.22 **	3.29

86	PBW-644 / HI-1563	-1.60	3.35 **	-0.27	4.83 **	6.96 **	3.52	-4.94	7.37	-1.57	-28.75 **	-24.18 **	-1.14
87	K-1317 / DBW-107	0.56	0.56	-8.89	7.83 **	7.83 **	3.23	3.96	8.62 *	0.33	-22.73 **	-20.12 **	2.87
88	K-1317 / DBW-187	-1.92	0.00	-9.22	-1.92	3.48 **	0.84	-12.12 **	-0.41	-7.33	-25.67 **	-15.47 **	1.18
89	K-1317 / HD-2967	-3.77 **	-0.28	-10.36	-2.46 *	3.48 **	-0.56	-18.15 **	-7.93 *	-5.16	-8.44	-8.44	-2.99
90	K-1317 / PBW-833	-1.64	0.28	-7.80	-0.83	4.06 **	-1.11	-23.92 **	-9.50 *	-7.25	-15.08 **	-8.28	4.50
91	K-1317 / HI-1563	2.79 *	2.79 *	-5.43	0.57	2.61 *	-1.13	-8.57 *	3.28	-3.25	-22.05 **	-17.06 **	-5.00
92	DBW-222 / DBW-107	0.25	13.41 **	-1.23	-4.63 **	7.54 **	-1.08	-20.47 **	-8.99 *	-12.33	-34.49 **	-23.80 **	2.30
93	DBW-222 / DBW-187	-0.49	12.57 **	-3.47	-6.94 **	4.93 **	-2.76	-20.13 **	-8.60 *	-3.88	-23.07 **	-10.52 *	-3.04
94	DBW-222 / HD-2967	0.49	13.69 **	-1.47	-6.17 **	5.80 **	-2.74	-4.02	9.84 **	-5.64	-18.60 **	-5.32	4.96
95	DBW-222 / PBW-833	-0.49	12.57 **	-2.73	-5.66 **	6.38 **	-2.45	-4.29	13.85 **	0.94	-20.05 **	-7.00	7.67
96	DBW-222 / HI-1563	-0.49	12.57 **	-2.98	-4.63 **	7.54 **	-1.08	-0.01	14.43 **	-4.90	-18.25 **	-4.92	3.50
97	DBW-252 / DBW-107	-2.96 *	0.84	-1.66	-1.65	3.77 **	-0.56	-14.11 **	2.42	3.44	-10.69 *	-7.68	0.24
98	DBW-252 / DBW-187	-2.42 *	1.40	-2.48	-2.47 *	2.90 *	-2.25	-17.35 **	-1.43	-9.68	-13.88 **	-2.06	1.19
99	DBW-252 / HD-2967	-3.23 **	0.56	-4.17	-1.37	4.64 **	-0.55	-23.03 **	-8.21 *	-2.17	10.36	5.86	2.83
100	DBW-252 / PBW-833	-1.88	1.96	-3.29	0.00	5.51 **	0.00	-17.73 **	-1.89	-3.77	-13.52 **	-6.60	-1.11
101	DBW-252 / HI-1563	-2.42 *	1.40	-3.31	2.20	7.83 **	0.54	-13.64 **	2.98	-2.18	-10.41 *	-4.66	-0.34
SE ±		1.48			1.37			3.31			4.86		
CD at 5%		2.89			2.69			6.49			9.53		
CD at 1%		3.81			3.54			8.55			12.55		

Table 1c: Heterosis and Inbreeding Depression

SN	Hybrids	5. Flag leaf area						6. Productive tillers per plant					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	5.18	57.53 **	0.55	0.32	36.73 **	8.65	11.36	2.62	-9.18	-4.55	-8.70	-17.45
23	K-307 / DBW-187	21.93 **	63.03 **	-4.62	-12.89	-8.21	4.87	-5.83	1.57	-41.22	31.82 **	26.09 **	-2.29
24	K-307 / HD-2967	-1.28	21.71 *	-8.05	-14.78 *	-13.30	-3.66	2.08	2.62	-3.06	5.33	14.49	5.07
25	K-307 / PBW-833	-41.55 **	13.20	11.10	-50.44 **	-12.65	-4.68	33.73 **	16.23 *	-9.01	4.48	1.45	-8.57
26	K-307 / HI-1563	-16.84 **	21.08 *	-2.22	-32.56 **	-7.49	-2.96	8.00	13.09 *	-27.78	-1.52	-5.80	3.07
27	K-9465 / DBW-107	-32.10 **	35.31 **	0.30	-29.66 **	-4.13	-19.18	11.11	15.18 *	5.45	15.07	21.74 *	14.29
28	K-9465 / DBW-187	-36.54 **	26.46 **	-3.71	10.85 *	50.10 **	-3.99	5.83	14.14 *	-11.92	4.11	10.14	2.64
29	K-9465 / HD-2967	-45.29 **	9.02	7.09	9.99	48.94 **	10.89	7.07	10.99	-40.55	-6.67	1.45	-32.85
30	K-9465 / PBW-833	-48.31 **	3.01	9.29	-45.03 **	-3.13	5.84	4.04	7.85	-77.66	-2.74	2.90	-39.45
31	K-9465 / HI-1563	-45.16 **	9.28	-4.80	-38.92 **	-16.22 *	9.37	25.00 **	30.89 **	-5.60	-1.37	4.35	12.50
32	K-9644 / DBW-107	11.24	66.61 **	-15.54	-40.69 **	-19.16 **	6.04	31.82 **	21.47 **	8.61	2.94	1.45	-21.43
33	K-9644 / DBW-187	20.60 **	61.25 **	0.66	27.56 **	50.03 **	17.03	-4.85	2.62	-10.21	4.41	2.90	0.00
34	K-9644 / HD-2967	20.87 **	36.48 **	-3.84	-26.31 **	-13.33	-18.15	17.71 **	18.32 **	-16.82	-2.67	5.80	-6.84
35	K-9644 / PBW-833	-36.45 **	23.08 **	-9.94	-30.35 **	22.75 **	7.11	25.00 **	9.95	-33.33	-2.94	-4.35	13.64
36	K-9644 / HI-1563	8.32	57.70 **	-5.34	-35.79 **	-11.93	0.76	8.00	13.09 *	-13.89	2.94	1.45	15.73
37	K-402 / DBW-107	10.54	65.55 **	-1.76	-41.90 **	-20.82 **	17.68	19.32 **	9.95	-30.47	-15.38	-4.35	22.73
38	K-402 / DBW-187	33.48 **	78.47 **	-8.31	-21.35 **	-17.12 *	4.61	22.33 **	31.94 **	15.87	-8.97	2.90	12.68
39	K-402 / HD-2967	-10.16	14.23	-6.90	-18.32 **	-15.50 *	13.87	2.08	2.62	-23.48	-6.41	5.80	20.55
40	K-402 / PBW-833	-37.07 **	21.88 *	17.86	-54.50 **	-19.81 **	0.58	31.17 **	5.76	-14.85	-7.69	4.35	25.00
41	K-402 / HI-1563	-14.91 *	23.88 **	14.75	-42.49 **	-21.11 **	-24.64	7.00	12.04	-27.11	-6.41	5.80	16.44
42	K-1616 / DBW-107	-42.77 **	-14.29	14.53	-44.02 **	-23.71 **	-7.08	10.23	1.57	-6.19	14.29	4.35	11.10
43	K-1616 / DBW-187	-28.16 **	-3.95	3.04	-0.68	31.33 **	11.09	2.91	10.99	-10.37	0.00	-4.35	7.57
44	K-1616 / HD-2967	-15.32 *	6.82	8.55	-10.80 *	17.95 *	12.87	17.71 **	18.32 **	-4.43	-20.00 *	-13.04	17.50
45	K-1616 / PBW-833	-23.39 **	48.37 **	17.45	-49.79 **	-11.52	-3.01	72.60 **	31.94 **	3.96	10.45	7.25	24.33
46	K-1616 / HI-1563	-23.05 **	12.03	-5.52	-34.83 **	-10.61	6.09	17.00 **	22.51 **	-13.68	-3.17	-11.59	9.84
47	HI-1620 / DBW-107	-29.54 **	5.53	-11.48	-47.98 **	-24.79 **	3.57	40.22 **	35.08 **	8.52	12.70	2.90	11.26
48	HI-1620 / DBW-187	-1.81	40.18 **	13.38	-40.62 **	-14.15	-11.19	1.94	9.95	11.43	9.09	4.35	8.33
49	HI-1620 / HD-2967	-22.19 **	11.08	14.51	-46.14 **	-22.13 **	16.72	25.00 **	25.65 **	2.50	-6.67	1.45	17.14
50	HI-1620 / PBW-833	-38.96 **	18.21 *	6.10	-54.79 **	-20.33 **	-8.52	45.65 **	40.31 **	8.21	16.42	13.04	-10.25
51	HI-1620 / HI-1563	-26.32 **	7.27	11.32	-44.50 **	-19.76 **	-22.28	11.00	16.23 *	-36.04	9.52	0.00	5.80
52	K-8962 / DBW-107	-35.33 **	8.76	2.97	-25.60 **	1.39	-13.14	20.83 **	21.47 **	6.89	15.87	5.80	19.19
53	K-8962 / DBW-187	-50.25 **	-16.32	3.73	-9.60	23.06 **	9.07	8.74	17.28 **	-4.46	-1.52	-5.80	3.07
54	K-8962 / HD-2967	-34.22 **	10.62	8.57	-32.78 **	-8.50	-0.03	50.00 **	50.79 **	-1.39	-5.33	2.90	-4.23
55	K-8962 / PBW-833	-44.26 **	7.96	-5.28	-53.87 **	-18.70 *	-26.08	20.83 **	21.47 **	-17.25	-13.43	-15.94	0.00
56	K-8962 / HI-1563	-30.00 **	17.73 *	9.83	-13.18 *	19.09 **	-0.67	14.00 *	19.37 **	-28.07	0.00	-8.70	7.93
57	K-607 / DBW-107	-33.05 **	16.09	23.75	-13.34 *	18.10 *	3.39	31.82 **	21.47 **	6.03	18.18	13.04	17.94
58	K-607 / DBW-187	-31.38 **	18.99 *	8.40	-20.72 **	-11.67	-12.07	-0.97	6.81	12.75	-1.52	-5.80	-18.46
59	K-607 / HD-2967	-26.01 **	28.29 **	8.06	-14.09 *	-4.29	-5.31	27.08 **	27.75 **	9.84	-16.00	-8.70	23.81
60	K-607 / PBW-833	-32.29 **	31.13 **	10.68	-21.66 **	38.07 **	12.70	51.85 **	28.80 **	5.70	7.46	4.35	-5.56
61	K-607 / HI-1563	-33.08 **	16.04	8.71	-28.12 **	-1.41	-9.03	10.00	15.18 *	0.90	7.58	2.90	8.45
62	K-9351 / DBW-107	-2.02	62.43 **	6.98	-31.25 **	2.43	-20.45	13.54 *	14.14 *	-20.17	15.87	5.80	-39.72
63	K-9351 / DBW-187	-11.42 *	46.85 **	8.18	-43.63 **	-16.01 *	-3.29	13.59 *	22.51 **	11.12	-3.03	-7.25	6.26
64	K-9351 / HD-2967	-22.94 **	27.75 **	15.44	-26.02 **	10.23	9.93	42.71 **	43.46 **	5.84	-4.00	4.35	30.56
65	K-9351 / PBW-833	-27.22 **	40.95 **	16.09	-50.35 **	-12.50	-8.70	23.96 **	24.61 **	12.61	10.45	7.25	18.91

66	K-9351 / HI-1563	-19.88 **	32.82 **	-21.56	-32.33 **	0.83	4.66	15.00 *	20.42 **	19.13	0.00	-8.70	3.17
67	K-1006 / DBW-107	5.51	58.02 **	-13.28	-12.01 *	19.91 **	14.26	-8.93	6.81	-3.93	6.35	-2.90	22.39
68	K-1006 / DBW-187	17.06 **	62.71 **	11.47	-29.14 **	-16.35 *	-3.98	1.79	19.37 **	-14.91	22.73 *	17.39	7.41
69	K-1006 / HD-2967	8.38	50.66 **	2.79	8.31	27.87 **	2.24	8.04	26.70 **	1.66	-14.67	-7.25	-4.69
70	K-1006 / PBW-833	-31.88 **	31.93 **	1.26	-30.96 **	21.67 **	-1.99	18.75 **	39.27 **	-21.04	8.96	5.80	19.19
71	K-1006 / HI-1563	-4.58	38.92 **	-0.58	-0.68	36.23 **	-6.48	7.14	25.65 **	-20.84	7.94	-1.45	7.35
72	K-9006 / DBW-107	1.89	52.61 **	-10.19	-18.91 **	10.51	3.25	37.50 **	38.22 **	-5.31	4.76	-4.35	27.27
73	K-9006 / DBW-187	18.28 **	62.49 **	10.38	-3.80	5.27	-15.19	21.36 **	30.89 **	14.40	22.73 *	17.39	-18.52
74	K-9006 /HD-2967	24.89 **	71.56 **	16.02	-36.72 **	-30.76 **	-10.04	18.75 **	19.37 **	-29.83	-9.33	-1.45	7.35
75	K-9006 / PBW-833	-32.01 **	31.67 **	4.33	-19.70 **	41.53 **	12.99	6.25	6.81	-27.46	-7.46	-10.14	22.57
76	K-9006 / HI-1563	-4.27	39.38 **	1.81	-55.90 **	-39.51 **	14.81	31.00 **	37.17 **	-18.32	11.11	1.45	12.86
77	HD-3086 / DBW-107	-9.86	36.71 **	5.70	-46.27 **	-25.85 **	-9.47	22.58 **	19.37 **	9.64	7.94	-1.45	13.24
78	HD-3086 /DBW-187	-18.83 **	23.11 **	-10.09	-11.64 *	21.93 **	12.07	8.74	17.28 **	-7.14	18.18	13.04	19.23
79	HD-3086 / HD-2967	-14.43 *	29.78 **	-1.48	-36.80 **	-12.78	4.71	26.04 **	26.70 **	11.58	-17.33 *	-10.14	14.52
80	HD-3086 / PBW-833	-40.68 **	14.89	-5.06	-52.99 **	-17.15 *	0.41	13.98 *	10.99	10.39	1.49	-1.45	-7.37
81	HD-3086 / HI-1563	-27.30 **	10.25	4.60	-47.91 **	-28.13 **	-5.93	21.00 **	26.70 **	0.83	12.70	2.90	32.39
82	PBW-644 / DBW-107	-19.64 **	20.36 *	-2.40	-37.96 **	-15.44 *	-31.25	22.73 **	13.09 *	1.85	17.46	7.25	17.56
83	PBW-644 / DBW-187	12.07	51.00 **	-6.60	26.22 **	50.57 **	-1.83	22.33 **	31.94 **	-29.37	0.00	-4.35	-7.57
84	PBW-644 / HD-2967	9.69	47.79 **	-3.93	-48.95 **	-39.10 **	0.46	52.08 **	52.88 **	-24.66	-14.67	-7.25	0.00
85	PBW-644 / PBW-833	-32.77 **	30.21 **	-7.68	-61.66 **	-32.44 **	8.03	83.10 **	36.13 **	-48.46	0.00	-2.90	25.39
86	PBW-644 / HI-1563	-8.54	33.16 **	11.20	-61.57 **	-47.29 **	0.29	19.00 **	24.61 **	5.04	9.52	0.00	26.09
87	K-1317 / DBW-107	-14.61 *	27.89 **	4.97	-64.35 **	-51.42 **	0.16	16.23 *	16.23 *	-18.01	-8.70	-8.70	-12.69
88	K-1317 / DBW-187	-12.98	16.35	20.26	-44.09 **	-41.09 **	-0.92	20.39 **	29.84 **	-18.54	-8.70	-8.70	22.21
89	K-1317 / HD-2967	26.00 **	26.00 **	26.82	-17.90 *	-17.90 *	12.39	25.00 **	25.65 **	18.34	0.00	8.70	14.66
90	K-1317 / PBW-833	-14.82 **	64.98 **	20.47	-48.43 **	-9.12	-4.32	38.22 **	38.22 **	-41.67	4.35	4.35	-8.33
91	K-1317 / HI-1563	-5.59	37.46 **	20.96	-24.10 **	4.11	-6.77	23.00 **	28.80 **	-33.33	-11.59	-11.59	18.05
92	DBW-222 / DBW-107	-26.13 **	14.78	12.20	-60.56 **	-46.26 **	-6.20	28.41 **	18.32 **	15.04	-3.03	-7.25	3.14
93	DBW-222 / DBW-187	-12.96 *	35.25 **	2.88	-54.94 **	-40.91 **	-3.72	4.85	13.09 *	1.85	9.09	4.35	12.50
94	DBW-222 / HD-2967	-1.71	52.72 **	8.83	-48.15 **	-32.00 **	2.77	37.50 **	38.22 **	-32.58	-9.33	-1.45	7.35
95	DBW-222 / PBW-833	-32.86 **	30.04 **	2.11	-23.68 **	34.50 **	19.32	98.61 **	49.74 **	15.38	0.00	-2.90	22.39
96	DBW-222 / HI-1563	-10.84	38.55 **	-3.89	-12.56 *	19.94 **	9.16	14.00 *	19.37 **	-25.43	-4.55	-8.70	1.60
97	DBW-252 / DBW-107	-25.95 **	10.91	-10.07	3.09	40.50 **	-1.17	9.09	0.52	-43.75	10.61	5.80	-4.11
98	DBW-252 / DBW-187	-14.12 *	18.79 *	17.96	-4.51	4.98	-6.49	17.48 **	26.70 **	-47.11	7.58	2.90	15.49
99	DBW-252 / HD-2967	-18.49 **	12.74	17.53	-54.15 **	-49.59 **	-5.18	12.50	13.09 *	-11.11	-16.00	-8.70	23.81
100	DBW-252 / PBW-833	-19.86 **	55.21 **	-3.51	-57.34 **	-24.82 **	10.31	50.60 **	30.89 **	12.00	-5.97	-8.70	6.36
101	DBW-252 / HI-1563	-6.88	35.57 **	-2.01	-44.94 **	-24.48 **	-4.65	27.00 **	32.98 **	7.09	6.06	1.45	-1.41
SE ±		2.08			1.87			0.423			0.41		
CD at 5%		4.07			3.67			0.838			0.81		
CD at 1%		5.36			4.83			1.092			1.07		

Table 1d: Heterosis and Inbreeding Depression

SN	Hybrids	7. Total tillers per plant						8. Number of spikelets per Ear					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	13.40 *	-17.29 **	-10.01	-4.94	6.94	-16.89	9.76 *	12.50 **	10.16	9.35	18.50 **	4.46
23	K-307 / DBW-187	-4.50	-20.30 **	-49.04	18.52 **	33.33 **	-1.05	2.09	4.64	8.19	-9.96	3.52	-27.66
24	K-307 / HD-2967	-14.29 **	-18.80 **	-7.40	1.16	20.83 **	-27.59	0.35	2.86	-3.13	17.90 **	18.94 **	1.85
25	K-307 / PBW-833	44.32 **	-4.51	2.36	-9.41	6.94	-14.30	4.88	7.50	9.30	-7.97	11.89	-12.99
26	K-307 / HI-1563	20.37 **	-2.26	-7.68	-6.17	5.56	2.64	-3.83	-1.43	-5.07	7.20	24.67 **	17.67
27	K-9465 / DBW-107	19.61 **	-8.27 *	-2.46	8.33	26.39 **	2.21	6.91	16.07 **	7.69	31.85 **	44.05 **	10.70
28	K-9465 / DBW-187	11.71 *	-6.77	-11.29	4.76	22.22 **	2.28	-6.91	1.07	-12.37	-3.07	11.45	-26.09
29	K-9465 / HD-2967	1.59	-3.76	-28.91	0.00	19.44 **	-22.10	8.22 *	17.50 **	6.99	18.95 **	29.96 **	-1.69
30	K-9465 / PBW-833	34.31 **	3.01	-36.50	4.71	23.61 **	-30.34	-14.80 **	-7.50	7.34	21.38 **	47.58 **	3.28
31	K-9465 / HI-1563	23.15 **	0.00	-10.52	2.38	19.44 **	22.08	-11.68 **	-4.11	-15.46	6.44	23.79 **	3.20
32	K-9644 / DBW-107	30.93 **	-4.51	10.24	8.97	18.06 *	-21.18	20.60 **	15.00 **	10.56	13.01 *	22.47 **	-0.36
33	K-9644 / DBW-187	-7.21	-22.56 **	-8.74	0.00	8.33	-3.85	11.32 *	5.36	-8.47	-10.34	3.08	-17.95
34	K-9644 / HD-2967	0.00	-5.26	-22.23	-3.49	15.28 *	-2.42	22.66 **	12.14 **	4.46	19.48 **	21.59 **	2.17
35	K-9644 / PBW-833	21.35 **	-18.80 **	-32.40	-16.47 **	-1.39	16.90	15.02 **	-0.18	3.40	-15.76 **	2.42	3.23
36	K-9644 / HI-1563	-0.93	-19.55 **	-37.39	6.41	15.28 *	22.88	9.57 *	10.36 *	0.65	8.71	26.43 **	6.27
37	K-402 / DBW-107	19.59 **	-12.78 **	-22.42	-13.95 *	2.78	24.33	-2.25	-6.79	-8.43	-11.44 *	5.73	13.33
38	K-402 / DBW-187	25.23 **	4.51	5.76	-2.33	16.67 *	22.63	22.26 **	15.71 **	-6.48	7.75	28.63 **	5.48
39	K-402 / HD-2967	-19.84 **	-24.06 **	-35.65	-6.98	11.11	21.25	21.09 **	10.71 *	8.07	7.75	28.63 **	8.91
40	K-402 / PBW-833	32.14 **	-16.54 **	-10.81	-9.30	8.33	28.21	9.05	-5.36	10.95	-25.72 **	-9.69	-1.95
41	K-402 / HI-1563	6.48	-13.53 **	-38.25	-2.33	16.67 *	15.48	1.42	2.14	-8.39	8.86	29.96 **	18.30
42	K-1616 / DBW-107	3.09	-24.81 **	-10.99	16.90 *	15.28 *	13.25	14.61 **	9.29 *	4.25	-5.28	2.64	-6.44
43	K-1616 / DBW-187	3.60	-13.53 **	-8.69	1.33	5.56	9.22	18.11 **	11.79 **	5.75	-4.60	9.69	3.21
44	K-1616 / HD-2967	4.76	-0.75	5.31	-16.28 **	0.00	15.27	10.27 *	3.57	7.58	33.18 **	30.84 **	3.70
45	K-1616 / PBW-833	64.20 **	0.00	-2.26	7.06	26.39 **	30.77	26.62 **	18.93 **	3.00	0.72	22.47 **	0.36

46	K-1616 / HI-1563	22.22 **	-0.75	-5.31	1.33	5.56	-7.89	20.57 **	21.43 **	13.24	-5.68	9.69	3.61
47	HI-1620 / DBW-107	40.21 **	2.26	-10.29	18.18 *	8.33	-3.85	15.19 **	11.07 *	-2.25	-5.60	11.45	-23.71
48	HI-1620 / DBW-187	2.70	-14.29 **	15.79	9.33	13.89	1.23	9.63 *	5.71	-34.46	-5.97	11.01	-6.74
49	HI-1620 / HD-2967	3.97	-1.50	-6.11	-8.14	9.72	-2.53	-0.74	-4.29	-10.07	-2.99	14.54 *	0.96
50	HI-1620 / PBW-833	53.12 **	10.53 **	13.60	4.71	23.61 **	-32.60	17.04 **	12.86 **	11.71	-14.86 **	3.52	-0.42
51	HI-1620 / HI-1563	9.26	-11.28 **	-33.05	16.00 *	20.83 **	-1.16	2.84	3.57	12.41	-8.21	8.37	2.44
52	K-8962 / DBW-107	26.37 **	-4.51	-3.93	2.67	6.94	6.49	9.61 *	10.00 *	12.01	2.03	10.57	10.36
53	K-8962 / DBW-187	9.01	-9.02 *	-15.69	9.33	13.89	12.20	-4.98	-4.64	1.50	-11.49	1.76	3.46
54	K-8962 / HD-2967	19.05 **	12.78 **	-9.33	-5.81	12.50	-17.28	13.88 **	14.29 **	31.56	12.11	10.13	4.80
55	K-8962 / PBW-833	25.37 **	-5.26	-19.85	-20.00 **	-5.56	4.41	-2.85	-2.50	-10.99	-10.14	9.25	-0.41
56	K-8962 / HI-1563	19.44 **	-3.01	-26.36	-4.00	0.00	5.56	-3.19	-2.50	6.23	-12.12 *	2.20	-11.20
57	K-607 / DBW-107	24.74 **	-9.02 *	7.44	15.07 *	16.67 *	5.95	7.87	2.86	-1.04	21.95 **	32.16 **	28.00
58	K-607 / DBW-187	-5.41	-21.05 **	8.57	9.33	13.89	2.45	0.75	-4.64	-5.62	5.36	21.15 **	9.09
59	K-607 / HD-2967	-2.38	-7.52	4.06	-17.44 **	-1.39	0.00	19.92 **	9.64 *	4.89	4.48	2.64	-11.16
60	K-607 / PBW-833	55.17 **	1.50	0.74	-1.18	16.67 *	-7.14	13.37 *	-1.61	-1.27	-6.88	13.22	0.78
61	K-607 / HI-1563	4.63	-15.04 **	-4.43	5.33	9.72	10.14	6.38	7.14	7.00	-11.36	3.08	-27.35
62	K-9351 / DBW-107	6.80	-17.29 **	-31.83	9.46	12.50	-61.72	5.24	0.36	0.71	-14.06 *	-3.08	-5.00
63	K-9351 / DBW-187	16.22 **	-3.01	7.76	2.67	6.94	14.28	20.38 **	13.93 **	-8.15	-11.88 *	1.32	-5.22
64	K-9351 / HD-2967	15.87 **	9.77 *	-2.74	-9.30	8.33	16.67	17.97 **	7.86	3.31	-2.73	9.69	11.25
65	K-9351 / PBW-833	18.45 **	-8.27 *	8.19	-9.41	6.94	10.38	15.98 **	1.07	3.89	1.81	23.79 **	6.41
66	K-9351 / HI-1563	6.48	-13.53 **	7.83	-1.33	2.78	0.00	14.18 **	15.00 **	6.52	-0.76	15.42 *	-2.67
67	K-1006 / DBW-107	-11.76 **	-21.05 **	-12.39	15.15	5.56	27.63	22.10 **	16.43 **	-8.90	-4.47	3.52	-8.94
68	K-1006 / DBW-187	1.68	-9.02 *	-14.88	14.67 *	19.44 **	9.30	5.28	-0.36	12.19	-11.88 *	1.32	-8.26
69	K-1006 / HD-2967	-1.59	-6.77	-9.68	-12.79 *	4.17	5.34	15.38 **	7.14	9.50	-8.82	-4.41	-21.19
70	K-1006 / PBW-833	15.13 **	3.01	-34.32	-4.71	12.50	16.06	14.23 **	6.07	-6.06	-2.54	18.50 **	0.37
71	K-1006 / HI-1563	5.04	-6.02	-26.40	1.33	5.56	13.16	-2.48	-1.79	-5.45	-9.85	4.85	3.37
72	K-9006 / DBW-107	33.33 **	2.26	-11.03	-6.41	1.39	8.22	13.11 **	7.86	2.65	-11.38	-3.96	4.58
73	K-9006 / DBW-187	16.22 **	-3.01	11.63	10.26	19.44 **	-22.10	10.57 *	4.64	-3.76	12.64 *	29.52 **	30.27
74	K-9006 /HD-2967	15.08 **	9.02 *	-14.48	-6.98	11.11	13.74	15.23 **	5.36	7.80	-8.97	-10.57	3.94
75	K-9006 / PBW-833	43.14 **	9.77 *	6.16	-11.76	4.17	26.66	43.20 **	26.07 **	-6.23	-19.57 **	-2.20	11.71
76	K-9006 / HI-1563	41.67 **	15.04 **	-5.88	3.85	12.50	9.87	7.80	8.57	1.97	-3.41	12.33	-0.39
77	HD-3086 / DBW-107	20.72 **	0.75	17.91	-7.69	0.00	4.17	4.75	10.36 *	10.03	-5.28	2.64	-13.74
78	HD-3086 /DBW-187	9.91 *	-8.27 *	-8.20	10.26	19.44 **	6.98	-5.42	-0.36	-11.83	-18.39 **	-6.17	15.96
79	HD-3086 / HD-2967	3.17	-2.26	10.00	-18.60 **	-2.78	18.58	11.86 **	17.86 **	7.58	2.45	10.57	3.59
80	HD-3086 / PBW-833	0.90	-15.79 **	11.61	1.18	19.44 **	11.62	7.29	13.04 **	-4.58	-5.80	14.54 *	2.31
81	HD-3086 / HI-1563	14.41 **	-4.51	-1.57	1.28	9.72	16.46	3.73	9.29 *	-12.75	-16.67 **	-3.08	-3.18
82	PBW-644 / DBW-107	14.43 **	-16.54 **	-10.81	24.24 **	13.89	14.63	4.40	1.79	-4.91	-7.12	14.98 *	24.52
83	PBW-644 / DBW-187	38.74 **	15.79 **	-15.58	22.67 **	27.78 **	-2.18	5.86	3.21	-1.38	-17.08 **	2.64	11.59
84	PBW-644 / HD-2967	25.40 **	18.80 **	-20.26	-5.81	12.50	8.65	7.69	5.00	5.10	-23.13 **	-4.85	-15.74
85	PBW-644 / PBW-833	77.11 **	10.53 **	-38.09	-15.29 *	0.00	12.50	26.92 **	23.75 **	4.76	-27.76 **	-10.57	-33.99
86	PBW-644 / HI-1563	38.89 **	12.78 **	-31.33	2.67	6.94	24.66	6.74	7.50	12.63	-28.11 **	-11.01	7.92
87	K-1317 / DBW-107	-4.51	-4.51	-18.90	-2.78	-2.78	-8.57	14.29 **	14.29 **	4.06	-10.98	-3.52	-30.60
88	K-1317 / DBW-187	-3.76	-3.76	-33.60	-4.00	0.00	6.94	2.14	2.14	5.60	-1.15	13.66 *	-19.38
89	K-1317 / HD-2967	-0.75	-0.75	14.40	-4.65	13.89	12.20	20.36 **	20.36 **	10.09	1.32	1.32	-10.22
90	K-1317 / PBW-833	6.77	6.77	-42.25	-7.06	9.72	-10.12	12.86 **	12.86 **	-4.11	-21.38 **	-4.41	-21.66
91	K-1317 / HI-1563	6.77	6.77	-21.13	-10.67	-6.94	8.95	8.16	8.93 *	17.05	-5.30	10.13	2.00
92	DBW-222 / DBW-107	30.93 **	-4.51	11.81	8.11	11.11	3.75	1.12	-3.57	3.33	0.00	14.98 *	-0.76
93	DBW-222 / DBW-187	9.01	-9.02 *	6.62	6.67	11.11	8.74	3.40	-2.14	-23.35	-10.73	2.64	-16.74
94	DBW-222 / HD-2967	12.70 **	6.77	-34.50	1.16	20.83 **	11.50	25.00 **	14.29 **	8.75	1.92	17.18 *	4.51
95	DBW-222 / PBW-833	79.76 **	13.53 **	16.56	-11.76	4.17	22.66	46.91 **	27.50 **	-8.96	-15.58 **	2.64	-11.59
96	DBW-222 / HI-1563	18.52 **	-3.76	-16.41	-1.33	2.78	9.45	10.64 *	11.43 *	-7.69	-17.42 **	-3.96	-34.40
97	DBW-252 / DBW-107	16.49 **	-15.04 **	-28.33	2.47	15.28 *	2.40	4.24	5.36	16.27	-17.48 **	-10.57	-33.01
98	DBW-252 / DBW-187	23.42 **	3.01	-34.32	-6.17	5.56	13.16	19.08 **	20.36 **	5.64	0.77	15.86 *	-7.61
99	DBW-252 / HD-2967	-6.35	-11.28 **	-12.71	-11.63	5.56	13.16	1.06	2.14	-9.44	-10.27	-11.45	-18.41
100	DBW-252 / PBW-833	52.27 **	0.75	6.72	-5.88	11.11	2.49	6.71	7.86	-16.56	-26.27 **	-10.35	-36.60
101	DBW-252 / HI-1563	25.00 **	1.50	6.67	13.58 *	27.78 **	6.52	17.67 **	18.93 **	14.11	-11.74 *	2.64	-33.05
SE ±		0.356			0.36			0.849			1.03		
CD at 5%		0.705			0.70			1.681			2.03		
CD at 1%		0.918			0.92			2.191			2.67		

Table 1e: Heterosis and Inbreeding Depression

SN	Hybrids	9. Number of grains per spike						10. Biological Yield (g)					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	15.72 **	5.03	11.25	7.57	12.63 *	-2.61	-10.04	-21.85 **	-16.96	13.87 *	-0.57	29.97
23	K-307 / DBW-187	13.53 *	3.04	12.26	12.95 *	28.05 **	0.92	-17.77 **	-15.62 **	-21.80	71.88 **	39.69 **	3.21
24	K-307 / HD-2967	13.14 *	2.69	4.10	23.18 **	24.08 **	12.19	-9.66 *	-10.86 *	17.94	32.56 **	43.73 **	-0.02
25	K-307 / PBW-833	14.56 *	3.98	20.02	6.64	13.22 *	-9.60	49.98 **	8.03	4.00	9.17	-2.11	-1.52
26	K-307 / HI-1563	-13.56 **	-14.97 **	1.51	-11.44 *	-2.20	0.90	3.06	-7.37	-26.57	0.52	-18.72 **	-33.82
27	K-9465 / DBW-107	6.96	4.21	10.21	27.98 **	35.68 **	-3.25	8.52	-2.83	18.32	48.30 **	41.04 **	4.15
28	K-9465 / DBW-187	-5.40	-7.84	-13.58	5.96	20.12 **	-13.82	-9.27 *	-6.91	1.76	12.04 *	6.55	-22.30
29	K-9465 / HD-2967	10.44 *	7.60	29.13	7.62	14.10 *	-11.33	-11.28 *	-12.46 **	-44.58	-16.34 **	-9.30	-21.54
30	K-9465 / PBW-833	-15.25 **	-17.43 **	1.84	26.42 **	34.21 **	-1.53	3.90	-6.96	-50.82	47.13 **	39.92 **	-11.66
31	K-9465 / HI-1563	-11.06 *	-12.51 *	-19.38	1.86	12.48 *	1.96	19.45 **	7.37	-4.24	-20.81 **	-24.69 **	2.58
32	K-9644 / DBW-107	16.80 **	3.27	6.57	-3.37	1.17	-8.27	20.17 **	4.40	10.81	32.19 **	15.42 **	-8.97
33	K-9644 / DBW-187	21.45 **	9.94	4.57	12.18 *	27.17 **	8.77	-18.91 **	-16.79 **	-10.86	14.37 *	-7.05	-2.99
34	K-9644 / HD-2967	27.27 **	11.35 *	11.24	6.77	11.16	1.06	-12.47 **	-13.63 **	-19.72	-24.06 **	-17.67 **	-16.49
35	K-9644 / PBW-833	14.74 *	-7.13	-0.13	-19.64 **	-14.68 *	1.89	44.07 **	3.77	-0.72	-14.48 *	-23.32 **	11.93
36	K-9644 / HI-1563	6.18	4.44	2.80	3.59	14.39 *	4.62	-7.38	-16.75 **	-22.19	-3.21	-21.91 **	0.64
37	K-402 / DBW-107	-0.93	-12.40 *	-6.81	-29.19 **	-13.80 *	0.68	-1.84	-14.73 **	-27.40	-52.85 **	-49.44 **	-7.00
38	K-402 / DBW-187	24.29 **	12.51 *	-5.09	-1.33	20.12 **	4.28	15.57 **	18.59 **	34.13	-16.70 **	-10.67	2.67
39	K-402 / HD-2967	12.03 *	-1.99	-1.07	-8.69	11.16	3.44	9.37 *	7.91	-5.90	-13.92 **	-6.67	8.08
40	K-402 / PBW-833	10.40	-10.64 *	17.54	-26.18 **	-10.13	4.09	12.12 *	-17.70 **	-7.26	-34.29 **	-29.54 **	18.83
41	K-402 / HI-1563	-4.28	-5.85	-10.93	-21.11 **	-3.96	-3.21	12.82 *	1.40	-5.17	-24.13 **	-18.63 **	11.18
42	K-1616 / DBW-107	-0.95	-2.46	2.28	-15.01 **	-11.01	-19.14	-20.74 **	-31.14 **	3.64	-14.53 *	-25.37 **	3.32
43	K-1616 / DBW-187	2.49	0.94	11.70	-7.51	4.85	5.46	-11.05 *	-8.73	14.81	1.06	-17.14 **	-4.04
44	K-1616 / HD-2967	-3.44	-4.91	11.68	-17.49 **	-16.89 **	-50.00	3.26	1.88	16.66	-12.18 *	-4.78	13.49
45	K-1616 / PBW-833	12.59 *	10.88 *	1.27	8.16	14.83 *	3.71	51.89 **	23.44 **	21.03	-3.19	-13.19 *	10.58
46	K-1616 / HI-1563	10.57 *	8.89	8.92	-7.05	2.64	2.00	26.56 **	13.76 **	-0.50	12.78	-7.53	6.82
47	HI-1620 / DBW-107	-1.70	1.17	5.90	12.20 *	17.47 **	-10.75	42.62 **	23.90 **	19.52	33.55 **	30.03 **	12.32
48	HI-1620 / DBW-187	-6.02	-3.27	-38.33	-16.19 **	-4.99	-26.28	-28.18 **	-26.30 **	-3.40	-36.99 **	-38.66 **	-41.14
49	HI-1620 / HD-2967	-12.95 **	-10.41 *	-8.75	8.45	9.25	-4.70	11.28 *	9.80 *	29.21	-23.06 **	-16.58 **	9.02
50	HI-1620 / PBW-833	-2.05	0.82	8.47	-6.22	-0.44	2.51	53.61 **	29.01 **	23.50	20.40 **	17.22 **	9.28
51	HI-1620 / HI-1563	-6.93	-4.21	14.65	8.11	19.38 **	14.15	18.66 **	6.65	-15.25	-40.47 **	-42.04 **	4.81
52	K-8962 / DBW-107	1.30	0.23	11.90	5.33	10.28	15.31	8.23	2.42	10.61	-31.51 **	-27.11 **	3.23
53	K-8962 / DBW-187	-20.09 **	-20.94 **	-6.06	-19.69 **	-8.96	2.26	-12.01 **	-9.71 *	-4.78	-48.29 **	-44.97 **	5.71
54	K-8962 / HD-2967	11.47 *	10.29 *	34.15	3.79	4.55	-1.97	39.05 **	37.21 **	20.84	-36.74 **	-31.41 **	-4.82
55	K-8962 / PBW-833	-12.06 *	-12.98 *	-9.68	-5.39	0.44	-6.43	21.27 **	14.75 **	6.50	-42.51 **	-38.82 **	7.27
56	K-8962 / HI-1563	-18.91 **	-19.77 **	-8.75	1.60	12.19 *	4.32	12.39 **	6.35	-2.51	-45.16 **	-41.64 **	10.73
57	K-607 / DBW-107	8.99	-3.63	0.48	18.79 **	24.38 **	36.48	19.27 **	3.62	9.96	56.60 **	36.74 **	42.10
58	K-607 / DBW-187	-2.97	-12.16 *	-5.06	-20.98 **	-10.43	-9.34	-17.78 **	-15.63 **	18.39	-18.87 **	-31.63 **	-7.01
59	K-607 / HD-2967	12.17 *	-1.87	8.94	26.97 **	27.90 **	14.47	13.19 **	11.68 **	20.43	-18.45 **	-11.58 *	26.44
60	K-607 / PBW-833	11.85	-9.47	3.23	-25.59 **	-21.00 **	-35.13	37.22 **	11.66 **	16.59	8.47	-2.74	1.79
61	K-607 / HI-1563	5.65	3.92	13.22	9.97	21.44 **	-5.08	11.94 *	0.61	7.39	6.70	-10.09	-3.85
62	K-9351 / DBW-107	6.68	-5.67	2.05	-17.20 **	-4.55	3.38	19.51 **	3.83	-3.96	29.70 **	13.24 *	-10.94
63	K-9351 / DBW-187	7.49	-2.69	-13.58	-12.74 *	0.59	-2.77	-29.35 **	-27.51 **	11.58	-16.65 *	-32.26 **	0.08
64	K-9351 / HD-2967	27.67 **	11.70 *	13.09	-25.10 **	-13.66 *	-2.21	48.83 **	46.85 **	25.30	-46.76 **	-42.28 **	2.38
65	K-9351 / PBW-833	8.92	-11.46 *	0.66	-18.60 **	-6.17	-18.47	45.86 **	5.06	40.94	-10.17	-19.45 **	-2.87
66	K-9351 / HI-1563	2.85	1.17	2.77	11.46 *	28.49 **	9.03	12.42 *	1.05	24.20	45.99 **	17.78 **	25.02
67	K-1006 / DBW-107	14.45 **	6.55	-7.36	14.88 **	22.47 **	9.23	-33.72 **	-33.84 **	-32.24	-28.89 **	-37.91 **	-14.27
68	K-1006 / DBW-187	2.14	-4.91	13.78	-17.10 **	-6.02	-9.37	-4.98	-2.50	-2.10	17.49 **	-3.09	16.08
69	K-1006 / HD-2967	8.92	1.40	13.49	-21.90 **	-16.74 **	-36.51	10.79 *	10.58 *	15.29	-44.61 **	-39.95 **	-6.23
70	K-1006 / PBW-833	3.02	-4.09	-4.82	-2.75	3.67	-5.52	24.37 **	24.14 **	0.55	2.13	-8.43	-17.58
71	K-1006 / HI-1563	-5.35	-6.90	-0.50	8.24	19.53 **	14.37	9.45 *	9.24 *	0.51	-1.80	-19.00 **	3.83
72	K-9006 / DBW-107	9.39	-3.27	2.54	-9.68	-5.43	7.30	39.40 **	21.10 **	3.16	-25.14 **	-34.64 **	3.54
73	K-9006 / DBW-187	2.58	-7.13	-8.44	16.32 **	31.86 **	33.63	8.57	11.40 *	15.50	46.06 **	18.70 **	2.82
74	K-9006 /HD-2967	12.17 *	-1.87	11.68	-24.78 **	-24.23 **	-3.49	2.56	1.20	-16.72	-43.94 **	-39.21 **	-41.55
75	K-9006 / PBW-833	29.47 **	5.85	-16.80	-27.11 **	-22.61 **	-1.52	27.99 **	-7.81	-22.94	-41.11 **	-47.19 **	7.70
76	K-9006 / HI-1563	17.00 **	15.09 **	13.82	-21.01 **	-12.78 *	-23.91	30.32 **	17.14 **	-12.93	17.80 **	-4.97	7.59
77	HD-3086 / DBW-107	9.91	5.03	10.25	3.51	8.37	5.42	6.87	0.09	15.03	-35.44 **	-34.19 **	-4.22
78	HD-3086 /DBW-187	-5.39	-9.59	-8.93	-38.34 **	-30.10 **	2.31	-7.13	-4.70	-20.41	-43.22 **	-42.13 **	-5.13
79	HD-3086 / HD-2967	16.28 **	11.11 *	12.00	3.50	4.26	-4.23	4.33	2.95	13.44	-28.96 **	-22.98 **	-1.36
80	HD-3086 / PBW-	7.59	2.81	-9.22	-18.53 **	-13.51 *	-22.75	3.31	-3.24	30.91	-1.16	0.75	-10.13

	833												
81	HD-3086 / HI-1563	3.33	1.64	-16.34	-18.88 **	-10.43	-4.92	20.91 **	13.25 **	-0.19	-21.55 **	-20.04 **	0.00
82	PBW-644 / DBW-107	10.05	-2.69	0.00	-22.21 **	-3.82	5.34	12.54 *	-2.23	14.52	8.34	-5.40	17.74
83	PBW-644 / DBW-187	20.41 **	9.01	18.24	-23.87 **	-5.87	7.64	15.10 **	18.11 **	-26.52	9.71	-10.83 *	8.12
84	PBW-644 / HD-2967	26.20 **	10.41 *	14.51	-22.57 **	-4.26	-2.30	39.24 **	37.39 **	-5.27	-41.38 **	-36.44 **	-58.46
85	PBW-644 / PBW-833	17.49 **	-4.91	-17.22	-11.52 *	9.40	-1.34	68.55 **	21.41 **	-43.40	-8.11	-17.60 **	-6.48
86	PBW-644 / HI-1563	1.78	0.12	13.20	-33.97 **	-18.36 **	-3.24	50.15 **	34.95 **	2.14	30.17 **	5.01	54.52
87	K-1317 / DBW-107	-5.15	-5.15	-10.60	5.05	9.99	-9.08	-7.90	-7.90	-19.00	-41.85 **	-41.85 **	-90.66
88	K-1317 / DBW-187	-6.78	-6.78	5.52	5.57	19.68 **	-3.56	12.16 **	15.08 **	-29.01	-14.20 **	-14.20 **	0.08
89	K-1317 / HD-2967	8.19	8.19	4.97	25.07 **	25.99 **	23.08	1.93	1.93	5.17	-0.70	7.66	36.60
90	K-1317 / PBW-833	-4.68	-4.68	-15.95	-10.24	-4.70	-12.33	19.23 **	19.23 **	-11.89	-29.33 **	-29.33 **	-12.08
91	K-1317 / HI-1563	-1.75	-1.75	10.95	-17.55 **	-8.96	-1.61	2.02	2.02	-21.85	-24.79 **	-24.79 **	2.33
92	DBW-222 / DBW-107	1.32	-10.41 *	6.40	4.70	14.54 *	1.28	30.46 **	13.34 **	35.64	-18.44 **	-28.79 **	-7.30
93	DBW-222 / DBW-187	-3.62	-12.75 *	-28.69	-6.48	6.02	1.38	-7.86	-5.46	15.78	18.08 **	-3.66	16.26
94	DBW-222 / HD-2967	24.20 **	8.65	10.76	-20.94 **	-13.51 *	-28.18	37.50 **	35.67 **	13.40	-37.12 **	-31.82 **	-0.80
95	DBW-222 / PBW-833	46.10 **	18.25 **	-8.70	2.95	12.63 *	-1.96	64.72 **	30.08 **	17.91	-28.70 **	-36.07 **	-2.24
96	DBW-222 / HI-1563	1.90	0.23	-11.09	-3.46	6.61	-18.87	19.20 **	7.14	-12.16	9.24	-10.88 *	4.31
97	DBW-252 / DBW-107	7.41	-1.64	16.29	10.94	16.15 **	5.18	-24.25 **	-31.68 **	-66.53	-9.07	-18.27 **	13.66
98	DBW-252 / DBW-187	20.43 **	10.29 *	8.70	13.08 *	28.19 **	8.25	22.30 **	25.49 **	-10.16	57.22 **	41.32 **	43.82
99	DBW-252 / HD-2967	12.64 *	3.16	-6.80	1.46	2.20	7.04	19.69 **	18.10 **	16.66	-30.40 **	-24.54 **	-1.84
100	DBW-252 / PBW-833	2.68	-5.96	-16.17	9.82	16.59 **	1.64	33.97 **	20.82 **	29.16	-23.85 **	-31.55 **	-5.71
101	DBW-252 / HI-1563	12.25 *	10.41 *	20.97	8.78	20.12 **	-10.76	39.68 **	25.97 **	32.37	-9.90	-19.01 **	8.97
SE ±		2.941			2.69			1.591			1.340		
CD at 5%		5.823			5.27			3.150			2.652		
CD at 1%		7.587			6.94			4.104			3.456		

Table 1f: Heterosis and Inbreeding Depression

SN	Hybrids	11. Harvest Index (%)						12. 1000 Grain Weight(g)					
		Early			Late			Early			Late		
		BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	0.83	26.95 **	13.88	-9.87 *	-8.67	6.64	-6.47 *	-7.30 *	-10.85	-1.88	-4.84	8.66
23	K-307 / DBW-187	3.54	18.96 **	-9.21	2.38	-1.69	15.78	-12.44 **	-4.93	-13.88	5.63	1.86	1.05
24	K-307 / HD-2967	-19.05 **	-0.45	-25.53	-1.62	-3.05	14.94	-4.36	0.90	-11.96	-1.96	0.60	-5.60
25	K-307 / PBW-833	-12.77 **	11.29 *	-11.83	-7.53	-11.53 *	4.79	2.55	-2.82	-5.27	-14.87 **	-19.18 **	-3.59
26	K-307 / HI-1563	6.82	22.73 **	2.71	-11.49 *	-11.38 *	19.82	-11.66 **	-1.05	6.91	-5.11	-11.60 **	2.64
27	K-9465 / DBW-107	5.75	33.14 **	6.20	-5.02	-3.76	5.78	-1.80	-1.27	6.06	-4.03	-6.49	-2.56
28	K-9465 / DBW-187	7.10	27.79 **	4.85	4.85	0.67	21.28	-12.12 **	-4.58	-6.80	4.70	2.01	3.97
29	K-9465 / HD-2967	6.47	30.93 **	12.21	0.90	-0.57	5.05	-5.96 *	-0.79	-4.73	4.13	6.85	3.30
30	K-9465 / PBW-833	0.04	27.64 **	0.38	-4.14	-8.67	25.35	1.84	2.38	-19.79	1.41	-1.20	5.20
31	K-9465 / HI-1563	5.33	25.69 **	6.85	0.56	0.69	3.83	-11.23 **	-0.56	8.30	-10.66 *	-12.96 **	0.49
32	K-9644 / DBW-107	-13.52 **	11.59 *	3.53	-4.13	-2.86	16.84	-6.24 *	-7.07 *	-6.87	6.41	3.21	0.45
33	K-9644 / DBW-187	-1.41	27.21 **	13.48	-14.58 **	-14.42 **	-0.06	1.61	10.33 **	3.04	6.77	2.97	0.10
34	K-9644 / HD-2967	-0.69	28.15 **	0.41	-5.77	-5.59	24.60	-5.51	-0.31	-14.28	-0.35	2.25	-0.33
35	K-9644 / PBW-833	-11.52 **	14.17 **	-15.60	-0.97	-0.78	7.16	-0.56	-6.40 *	1.83	7.86	2.41	5.03
36	K-9644 / HI-1563	-1.75	26.78 **	-0.67	-3.99	-3.81	1.45	-15.12 **	-4.92	4.69	-0.24	-7.05	-2.10
37	K-402 / DBW-107	1.43	27.72 **	-0.07	-4.17	-2.89	22.80	10.75 **	9.77 **	17.29	2.16	3.47	5.00
38	K-402 / DBW-187	6.56	33.58 **	5.49	-7.11	-10.81 *	-1.85	-8.05 **	-0.16	-4.04	-5.44	-4.23	1.62
39	K-402 / HD-2967	0.48	25.95 **	9.11	-4.16	-5.55	2.21	-11.03 **	-6.14	3.83	-11.59 **	-9.28 *	2.84
40	K-402 / PBW-833	-12.33 **	11.86 *	-12.61	5.22	-2.88	3.52	3.63	-2.47	3.19	-13.11 **	-12.00 **	3.43
41	K-402 / HI-1563	-3.96	20.40 **	-12.35	-0.52	-0.40	-0.42	-21.40 **	-11.95 **	-21.46	-8.45 *	-7.28	-2.80
42	K-1616 / DBW-107	5.76	34.00 **	5.47	-2.15	-0.85	2.23	-5.15	-4.58	-2.21	-9.82 *	-12.53 **	1.65
43	K-1616 / DBW-187	-3.42	22.38 **	-1.84	-1.13	-3.40	2.00	-5.10	3.04	6.61	-17.87 **	-20.80 **	-5.64
44	K-1616 / HD-2967	-2.17	23.96 **	-7.50	-5.29	-6.66	-9.00	1.61	7.20 *	2.95	-2.04	0.52	3.48
45	K-1616 / PBW-833	-1.96	25.09 **	-5.72	-3.11	-5.33	-3.46	5.64	6.27 *	12.98	4.05	-1.20	5.73
46	K-1616 / HI-1563	4.41	32.30 **	12.28	-5.20	-5.08	-1.04	-4.38	7.11 *	18.64	4.25	-1.24	5.39
47	HI-1620 / DBW-107	-7.15 *	20.36 **	-3.10	-23.05 **	-22.03 **	-14.29	-8.42 **	-9.23 **	-6.11	-1.44	-4.41	-1.26

48	HI-1620 / DBW-187	4.07	34.91 **	18.87	-17.93 **	-21.20 **	48.49	-6.70 *	1.31	-11.81	1.32	-2.29	3.95
49	HI-1620 / HD-2967	-3.95	24.51 **	-3.67	-9.76 *	-11.07 *	7.37	7.61 *	13.53 **	12.13	-21.23 **	-19.17 **	-7.61
50	HI-1620 / PBW-833	-2.10	26.91 **	-2.66	-15.34 **	-19.46 **	-0.36	3.54	-2.55	0.08	4.27	-0.73	-2.00
51	HI-1620 / HI-1563	-5.47	22.54 **	-2.85	-30.55 **	-30.46 **	23.33	-12.90 **	-2.43	-6.85	-12.47 **	-16.67 **	-12.18
52	K-8962 / DBW-107	-2.60	22.64 **	-0.44	-13.19 **	-12.03 **	6.46	-4.53	-4.58	-23.99	14.38 **	10.94 **	4.17
53	K-8962 / DBW-187	16.98 **	26.45 **	-6.27	3.14	-0.97	32.05	9.85 **	19.28 **	12.56	3.25	-0.43	6.69
54	K-8962 / HD-2967	0.97	24.16 **	-6.10	-7.09	-8.44	-1.64	-4.95	0.28	-1.40	0.18	2.80	-2.34
55	K-8962 / PBW-833	-2.48	24.43 **	1.18	-6.19	-13.41 **	14.45	-1.02	-1.08	-4.35	-11.24 **	-15.73 **	-4.09
56	K-8962 / HI-1563	27.98 **	30.16 **	9.89	-22.28 **	-22.19 **	-1.04	-10.27 **	0.52	-19.40	10.16 *	3.37	6.07
57	K-607 / DBW-107	-2.31	24.78 **	-1.44	-4.18	-2.90	25.16	-6.18	-7.01 *	-19.07	5.24	5.52	0.84
58	K-607 / DBW-187	-2.22	24.90 **	9.07	-20.26 **	-20.92 **	9.78	-2.12	6.28 *	8.29	-7.36	-7.12	-4.32
59	K-607 / HD-2967	4.00	32.85 **	3.01	-1.44	-2.26	7.89	1.28	6.86 *	-8.31	3.10	5.80	1.82
60	K-607 / PBW-833	3.31	31.98 **	3.98	-16.26 **	-16.96 **	-1.13	6.17	3.39	-6.65	14.87 **	15.16 **	-4.32
61	K-607 / HI-1563	-0.01	27.72 **	6.90	-2.11	-1.99	11.24	-14.82 **	-4.58	-2.53	6.88	7.15	1.93
62	K-9351 / DBW-107	4.36	31.40 **	4.65	-1.14	0.18	2.90	-11.60 **	-12.38 **	-37.40	10.71 *	7.38	-4.96
63	K-9351 / DBW-187	5.94	26.86 **	-3.79	-15.85 **	-19.20 **	5.18	8.51 **	17.82 **	21.39	-0.16	-3.72	-5.88
64	K-9351 / HD-2967	1.91	25.31 **	3.46	-24.21 **	-25.31 **	45.52	-1.45	3.97	-9.73	-14.17 **	-11.92 **	-4.15
65	K-9351 / PBW-833	-3.49	23.14 **	-3.75	2.03	-3.81	1.58	8.23 *	3.85	7.00	-6.30	-11.03 **	-0.50
66	K-9351 / HI-1563	4.61	25.26 **	19.03	-1.38	-1.25	38.39	-19.13 **	-9.41 **	-1.66	22.77 **	14.38 **	3.16
67	K-1006 / DBW-107	-0.41	25.39 **	3.32	-24.90 **	-23.90 **	14.93	-4.66	3.39	-12.62	11.15 **	7.80	1.32
68	K-1006 / DBW-187	3.40	25.01 **	-4.93	0.86	-1.47	22.07	-3.50	4.78	2.91	15.72 **	11.60 **	1.87
69	K-1006 / HD-2967	2.66	26.24 **	-5.94	-21.27 **	-22.41 **	4.61	-2.01	6.27 *	-1.12	-0.81	1.78	2.20
70	K-1006 / PBW-833	-12.25 **	11.96 **	-12.25	-23.07 **	-24.85 **	5.10	-6.32 *	1.60	-18.92	12.58 **	6.89	-3.54
71	K-1006 / HI-1563	-6.12	13.50 **	-17.24	-8.28	-8.16	0.25	-4.21	7.30 *	-5.39	12.86 **	5.15	1.18
72	K-9006 / DBW-107	-5.25	21.35 **	0.31	-18.36 **	-17.27 **	-3.41	7.66 *	6.71 *	-8.40	5.72	2.54	1.28
73	K-9006 / DBW-187	-0.44	27.51 **	5.43	2.09	3.39	3.78	-3.88	4.37	-5.77	-4.69	-8.09 *	-5.64
74	K-9006 /HD-2967	3.89	33.05 **	5.69	-26.19 **	-25.25 **	50.32	-11.92 **	-7.07 *	-26.18	-1.00	1.59	5.00
75	K-9006 / PBW-833	-10.31 **	14.87 **	-14.89	-24.58 **	-23.62 **	36.47	13.72 **	9.64 **	-8.69	-8.64 *	-13.26 **	-4.08
76	K-9006 / HI-1563	4.15	33.39 **	6.85	-26.41 **	-25.48 **	-9.51	-13.28 **	-2.85	-16.61	8.94 *	1.50	-0.52
77	HD-3086 / DBW-107	1.31	27.56 **	0.02	-16.65 **	-15.54 **	11.39	-0.46	-1.35	9.40	11.60 **	8.24 *	9.55
78	HD-3086 /DBW-187	16.51 **	26.74 **	-3.74	-16.77 **	-20.09 **	-4.88	-5.45	2.67	-15.23	7.04	3.22	4.94
79	HD-3086 / HD-2967	4.50	28.51 **	6.36	0.07	-1.38	6.23	-13.67 **	-8.92 **	-13.24	-1.81	0.75	7.18
80	HD-3086 / PBW-833	1.30	29.24 **	3.06	3.43	-4.53	23.71	2.21	0.73	7.62	-8.52 *	-13.14 **	-9.03
81	HD-3086 / HI-1563	22.31 **	33.06 **	3.00	-32.56 **	-32.47 **	-1.75	-12.92 **	-2.46	-13.88	23.35 **	14.92 **	14.20
82	PBW-644 / DBW-107	-15.06 **	6.94	-20.39	-3.44	-2.16	19.44	9.92 **	8.95 **	-4.97	-4.26	-7.14	0.00
83	PBW-644 / DBW-187	7.03	23.12 **	11.76	-20.95 **	-21.04 **	36.93	12.12 **	21.74 **	2.46	-5.05	-8.43 *	-9.84
84	PBW-644 / HD-2967	2.45	25.98 **	-4.37	-14.42 **	-14.53 **	9.60	6.73 *	12.60 **	-7.00	3.22	5.92	4.26
85	PBW-644 / PBW-833	-3.98	22.51 **	7.99	-3.79	-3.91	14.08	16.69 **	9.83 **	-6.49	15.91 **	10.05 *	2.70
86	PBW-644 / HI-1563	-9.20 *	4.46	5.73	-6.51	-6.40	3.85	-11.32 **	-0.66	-5.55	15.20 **	7.33	11.48
87	K-1317 / DBW-107	-9.75 **	13.63 **	-12.83	-6.44	-5.19	28.67	7.09 *	7.09 *	-5.23	-2.83	-2.83	11.15
88	K-1317 / DBW-187	18.59 **	28.18 **	23.01	-27.91 **	-27.91 **	12.87	-2.80	5.54	-3.04	-8.41 *	-8.41 *	-9.76
89	K-1317 / HD-2967	7.88 *	32.67 **	24.72	1.00	1.00	34.49	0.68	6.22 *	10.92	2.30	4.98	7.48
90	K-1317 / PBW-833	-6.52	19.26 **	-6.16	-22.86 **	-22.86 **	5.11	-2.16	-2.16	-14.37	-9.98 *	-9.98 *	-6.30
91	K-1317 / HI-1563	22.06 **	24.14 **	-2.48	-18.14 **	-18.04 **	41.88	-9.28 **	1.62	-5.72	4.32	4.32	19.78
92	DBW-222 / DBW-107	-4.91	19.73 **	-12.10	-27.73 **	-26.77 **	-14.03	0.80	-0.09	-5.69	-6.54	-9.36 *	-18.26
93	DBW-222 / DBW-187	1.92	26.33 **	0.01	3.41	-0.71	17.65	5.48	14.53 **	-5.37	11.10 **	7.14	7.07
94	DBW-222 / HD-2967	8.13 *	34.01 **	2.70	-15.53 **	-16.76 **	-16.03	13.04 **	19.26 **	11.48	2.64	5.32	15.06
95	DBW-222 / PBW-833	2.72	31.06 **	3.31	-22.70 **	-26.18 **	-0.84	4.97	2.40	4.67	11.17 **	5.55	3.29
96	DBW-222 / HI-1563	-1.15	22.52 **	4.30	-0.41	-0.29	-0.97	-14.61 **	-4.35	-16.83	15.37 **	7.49	7.10
97	DBW-252 / DBW-107	-0.78	24.93 **	-1.39	-3.17	-1.20	7.12	18.16 **	17.11 **	2.70	-1.41	-4.38	0.27
98	DBW-252 / DBW-187	2.78	22.58 **	4.27	-5.70	-3.79	27.97	-6.40 *	1.64	-17.11	11.11 **	7.14	-1.79
99	DBW-252 / HD-2967	-6.46	15.02 **	-6.50	-35.38 **	-34.06 **	9.93	1.67	7.27 *	-3.67	-2.39	0.16	5.04
100	DBW-252 / PBW-833	-4.04	22.43 **	-1.34	-21.68 **	-20.09 **	-0.40	23.14 **	17.80 **	19.65	8.78 *	3.28	3.95
101	DBW-252 / HI-1563	6.10	26.54 **	-2.98	-3.85	-1.90	5.75	5.16	17.80 **	15.47	1.76	-5.20	-0.07
SE ±		1.813			2.342			1.303			1.735		
CD at 5%		3.589			4.638			2.580			3.435		
CD at 1%		4.676			6.043			3.362			4.475		

Table 1g: Heterosis and Inbreeding Depression

SN	Hybrids	13. Grain yield per plant (g)					
		Early			Late		
		BP	K1317	IBD	BP	K1317	IBD
22	K-307 / DBW-107	-9.23	-0.63	-0.73	-20.54 **	-29.60 **	7.12
23	K-307 / DBW-187	-9.52	0.53	-32.88	60.25 **	25.42 **	6.02
24	K-307 / HD-2967	-26.89 **	-11.23	-3.07	19.34 **	27.77 **	2.85
25	K-307 / PBW-833	31.03 **	20.44 **	-7.41	-8.66	-24.32 **	-18.38
26	K-307 / HI-1563	24.76 **	13.84 *	-22.94	-17.43 *	-33.35 **	-26.33
27	K-9465 / DBW-107	18.21 **	29.41 **	23.51	40.08 **	24.10 **	-2.67
28	K-9465 / DBW-187	7.20	19.12 **	6.60	9.32	-4.83	-14.87
29	K-9465 / HD-2967	-5.44	14.80 *	-26.80	-26.97 **	-21.81 **	-38.34
30	K-9465 / PBW-833	11.03	18.68 **	-50.46	34.16 **	16.80 **	1.94

31	K-9465 / HI-1563	26.48 **	35.20 **	3.10	-26.91 **	-36.37 **	-18.51
32	K-9644 / DBW-107	6.50	16.59 *	13.90	13.09	0.19	-6.86
33	K-9644 / DBW-187	-4.60	6.00	4.14	8.85	-14.80 *	-2.85
34	K-9644 / HD-2967	-8.74	10.80	-19.14	-23.07 **	-17.63 **	8.05
35	K-9644 / PBW-833	28.72 **	18.32 **	-16.69	-3.19	-19.79 **	16.64
36	K-9644 / HI-1563	15.28 *	5.86	-22.68	-1.07	-20.14 **	2.23
37	K-402 / DBW-107	-0.46	8.97	-27.54	-40.05 **	-46.89 **	10.42
38	K-402 / DBW-187	42.83 **	58.70 **	37.79	-0.41	-14.96 *	1.14
39	K-402 / HD-2967	12.13 *	36.14 **	3.73	-13.15 *	-7.01	9.83
40	K-402 / PBW-833	0.29	-7.81	-20.84	-14.84 *	-27.28 **	19.88
41	K-402 / HI-1563	33.09 **	21.99 **	-18.32	-0.25	-14.83 *	11.02
42	K-1616 / DBW-107	-15.72 *	-7.74	8.60	-11.75	-21.81 **	5.42
43	K-1616 / DBW-187	0.54	11.72	13.36	5.77	-15.42 *	-2.01
44	K-1616 / HD-2967	3.47	25.63 **	9.88	-12.34 *	-6.15	6.72
45	K-1616 / PBW-833	49.95 **	54.58 **	16.52	5.11	-12.91 *	7.80
46	K-1616 / HI-1563	46.33 **	50.84 **	12.01	14.40	-7.66	5.64
47	HI-1620 / DBW-107	36.78 **	49.73 **	17.35	16.50 *	8.14	1.32
48	HI-1620 / DBW-187	-10.39	-0.43	16.34	-40.89 **	-45.13 **	15.48
49	HI-1620 / HD-2967	12.83 *	36.98 **	26.54	-25.43 **	-20.17 **	14.05
50	HI-1620 / PBW-833	50.39 **	63.91 **	21.46	8.45	0.67	8.97
51	HI-1620 / HI-1563	19.88 **	30.67 **	-18.63	-48.27 **	-51.98 **	18.98
52	K-8962 / DBW-107	14.86 *	25.75 **	10.35	-25.94 **	-30.25 **	8.04
53	K-8962 / DBW-187	2.86	14.30 *	-11.29	-37.90 **	-41.52 **	26.83
54	K-8962 / HD-2967	40.43 **	70.49 **	16.09	-36.59 **	-32.11 **	-5.68
55	K-8962 / PBW-833	55.57 **	43.01 **	7.60	-37.73 **	-41.36 **	16.41
56	K-8962 / HI-1563	51.92 **	38.62 **	7.77	-44.57 **	-47.80 **	9.19
57	K-607 / DBW-107	18.19 **	29.39 **	8.62	54.56 **	36.94 **	52.61
58	K-607 / DBW-187	-5.03	5.52	25.93	-27.48 **	-39.31 **	1.68
59	K-607 / HD-2967	22.34 **	48.53 **	22.82	-15.13 **	-9.14	30.27
60	K-607 / PBW-833	41.43 **	47.32 **	19.83	3.96	-13.00 *	3.13
61	K-607 / HI-1563	23.37 **	28.52 **	13.67	10.34	-7.66	6.19
62	K-9351 / DBW-107	24.80 **	36.62 **	0.92	32.68 **	17.55 **	-7.48
63	K-9351 / DBW-187	-17.10 **	-7.88	8.90	-21.98 **	-38.93 **	3.93
64	K-9351 / HD-2967	51.97 **	84.50 **	27.84	-52.98 **	-49.66 **	32.19
65	K-9351 / PBW-833	40.78 **	29.41 **	38.69	-1.07	-18.04 **	-1.32
66	K-9351 / HI-1563	38.92 **	26.76 **	38.74	49.27 **	20.49 **	48.56
67	K-1006 / DBW-107	-31.23 **	-16.90 *	-27.76	-38.71 **	-45.70 **	0.83
68	K-1006 / DBW-187	1.06	22.11 **	-7.09	23.60 **	-0.32	30.48
69	K-1006 / HD-2967	15.15 **	39.80 **	10.28	-50.19 **	-46.67 **	-1.93
70	K-1006 / PBW-833	15.32 **	39.34 **	-11.49	-8.36	-24.08 **	-10.08
71	K-1006 / HI-1563	2.49	23.84 **	-16.84	-1.24	-20.28 **	4.23
72	K-9006 / DBW-107	34.31 **	47.03 **	4.33	-31.71 **	-39.50 **	1.38
73	K-9006 / DBW-187	28.05 **	42.29 **	20.04	61.56 **	26.45 **	6.18
74	K-9006 /HD-2967	11.02 *	34.79 **	-10.17	-50.77 **	-47.29 **	17.29
75	K-9006 / PBW-833	15.42 *	6.10	-41.06	-42.95 **	-52.74 **	28.34
76	K-9006 / HI-1563	71.39 **	56.39 **	-5.40	-3.34	-21.97 **	0.15
77	HD-3086 / DBW-107	16.82 **	27.89 **	15.34	-34.33 **	-39.66 **	3.26
78	HD-3086 /DBW-187	8.90	21.00 **	-24.94	-42.37 **	-47.05 **	-7.53
79	HD-3086 / HD-2967	9.05	32.40 **	18.94	-25.16 **	-19.87 **	4.04
80	HD-3086 / PBW-833	22.76 **	25.24 **	33.20	9.60	0.70	12.59
81	HD-3086 / HI-1563	47.80 **	50.80 **	2.73	-32.95 **	-38.39 **	-1.26
82	PBW-644 / DBW-107	-4.56	4.48	-3.20	9.49	-2.99	29.98
83	PBW-644 / DBW-187	31.16 **	45.73 **	-11.12	-1.72	-23.08 **	33.83
84	PBW-644 / HD-2967	42.89 **	73.48 **	-9.71	-43.69 **	-39.71 **	-40.31
85	PBW-644 / PBW-833	61.97 **	48.89 **	-32.11	1.14	-16.20 **	5.47
86	PBW-644 / HI-1563	54.64 **	41.10 **	7.84	27.72 **	3.10	53.46
87	K-1317 / DBW-107	-4.27	4.80	-34.23	-40.06 **	-40.06 **	-39.50
88	K-1317 / DBW-187	32.70 **	47.44 **	0.62	-30.68 **	-30.68 **	10.00
89	K-1317 / HD-2967	11.48 *	35.34 **	28.62	5.31	12.75 *	53.01
90	K-1317 / PBW-833	42.21 **	42.21 **	-18.90	-38.47 **	-38.47 **	-5.39
91	K-1317 / HI-1563	26.88 **	26.88 **	-24.74	-32.03 **	-32.03 **	33.24
92	DBW-222 / DBW-107	24.05 **	35.80 **	27.82	-32.84 **	-40.50 **	-17.21
93	DBW-222 / DBW-187	7.62	19.58 **	15.91	27.45 **	-0.24	27.49
94	DBW-222 / HD-2967	49.80 **	81.87 **	17.02	-41.30 **	-37.15 **	-12.52
95	DBW-222 / PBW-833	73.78 **	70.47 **	21.26	-34.33 **	-45.59 **	-2.42
96	DBW-222 / HI-1563	33.94 **	31.39 **	-7.16	15.16 *	-7.04	4.03
97	DBW-252 / DBW-107	-21.89 **	-14.49 *	-68.34	-7.51	-15.04 *	18.12
98	DBW-252 / DBW-187	38.45 **	53.83 **	-5.36	52.89 **	40.44 **	55.29

99	DBW-252 / HD-2967	11.04 *	34.81 **	10.32	-45.83 **	-42.01 **	6.56
100	DBW-252 / PBW-833	37.50 **	47.97 **	28.12	-33.49 **	-38.91 **	-5.48
101	DBW-252 / HI-1563	48.23 **	59.52 **	30.32	-8.75	-16.18 **	12.35
SE ±		0.923			0.763		
CD at 5%		1.827			1.510		
CD at 1%		2.381			1.967		

Conclusion

The current study emphasizes the importance of heterosis and inbreeding depression in determining the genetic potential of wheat hybrids under both early and late-sown conditions. Early seeding resulted in significant negative heterosis for earliness parameters such as days to 50% heading and days to anthesis, indicating desirable early flowering and adaptation to favourable conditions. However, the amount of negative heterosis decreased with late sowing, indicating that heat stress and environmental restrictions influenced hybrid Vigor expression. Wide heterotic variations were seen for yield-related parameters such as grains per spike, biological yield, and grain yield per plant, with numerous crosses demonstrating significant positive heterosis over both the better and economic parents. This indicates the potential for using hybrid Vigor to increase productivity across sowing circumstances. Inbreeding depression (IBD) values revealed significant differences amongst hybrids, with some maintaining performance with low or negative IBD and others declining due to lower heterozygosity. Environmental stress following late sowing reduced heterosis while increasing IBD. Overall, the findings highlight the necessity of integrating heterosis with IBD analysis in wheat breeding to develop hybrids with high production potential, adaptability, and uniformity across many conditions.

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