**Table S1: Analysis of variance of seven quantitative traits.**

| **Source** | **Df** | **Biomass** | **Grain yield** | **Harvest index** | **No. of** **branches** | **No.of nodes** | **No.of pods** | **Plant height** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Block (ignoring Treatments) | 11 | 19058.33 \*\* | 5929.76 \*\* | 1654.95 \*\* | 7.22 \*\* | 189.14 \*\* | 5640.04 \*\* | 4120.85 \*\* |
| Treatment (eliminating Blocks) | 905 | 1282.19 \* | 357.78 \*\* | 84.08 ns | 1.01 ns | 2.7 \*\* | 222.15 ns | 134.87 \*\* |
| Treatment: Check | 5 | 16294.35 \*\* | 4663.83 \*\* | 351.63 \*\* | 11.29 \*\* | 47.17 \*\* | 2464.32 \*\* | 2554.34 \*\* |
| Treatment: Test and Test vs. Check | 900 | 1198.79 ns | 333.85 \*\* | 82.59 ns | 0.96 ns | 2.45 \*\* | 209.69 ns | 121.43 \*\* |
| Residuals | 55 | 868.07 | 97.47 | 78.7 | 1 | 1.04 | 160.61 | 37.33 |

**ns P > 0.05; \* P <= 0.05; \*\* P <= 0.01**

**Table S2 Heterosis for grain yield and days to maturity in eighteen F1 crosses of NAM population**

|  |  |  |
| --- | --- | --- |
| **Cross combinations** | **Std Heterosis****(Grain yield)** | **Std Heterosis****(Maturity)** |
| Bragg × JS 335 | 52.042\*\*\* | 0.2 NS |
| JS 97-52 × JS 335 | 77.375\*\*\* | 1.87 NS |
| JS 20-38 × JS 335 | 35.585\*\*\* | -2.538<>  |
| PK 472 × JS 335 | -9.716<> | 4.81\*\*\* |
| DOKO × JS 335 | -11.626<> | -0.134<> |
| AGS 191 × JS 335 | -16.004 NS | 1.87 NS |
| IC 501198 × JS 335 | -22.22<> | 4.81\*\*\* |
| EC 546882 × JS 335 | 26.252\*\*\* | -2.204<>  |
| ABL-2 × JS 335 | 33.66\*\*\* | 4.342\*\*\* |
| EC 481347 × JS 335 | -13.084 NS | 1.269 NS |
| Gaurav-2 × JS 335 | -14.976 NS | 2.739\*\* |
| EC 656641 × JS 335 | 13.708\*\*\* | 3.006\*\* |
| Jackson × JS 335 | -16.427 NS | 1.937 NS |
| IC 15759A × JS 335 | 12.607\*\*\* | -3.206<> |
| Santamaria × JS 335 | -21.097<> | 1.069 NS |
| Hardee × JS 335 | -23.573<> | 4.542\*\*\* |
| Kalitur × JS 335 | -43.609<> | -1.937<> |
| G-11 × JS 335 | -21.065<> | 0.802 NS |

**\*\*\*Significant at p<0.001, NS Non-significant heterosis, <>Absence of heterosis**

**Table S3 RILs derived from eleven different crosses used for genetic variability, correlation and cluster analysis**

|  |
| --- |
| **Name of the cross (NAM panel)** |
| Bragg × JS 335 |
| JS 97-52 × JS 335 |
| JS 20-38 × JS 335 |
| PK 472 × JS 335 |
| DOKO × JS 335 |
| JS 335 × AGS191 |
| EC546882 × JS 335 |
| Jackson × JS335 |
| Santamaria × JS335 |
| Kalitur × JS335 |
| RVS 2007-6 × JS335 |

**Table S4 Mean and Range for days to maturity and grain yield in twenty F2 generation of Nested association mapping (NAM) population**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of the cross (NAM panel)** | **Average****Grain Yield (g)** | **Average****Days to maturity** | **Range** |
| **Yield/ plant**  | **Maturity** |
| Bragg × JS 335 | 14.98 | 109 | 0.2-63.5 | 101-113 |
| JS 97-52 × JS 335 | 22.50 | 109 | 1.2-82.7 | 109-112 |
| JS 20-38 × JS 335 | 9.11 | 96 | 0.1-39.2 | 89-100 |
| PK 472 × JS 335 | 12.50 | 103 | 0.9-44 | 99-109 |
| DOKO × JS 335 | 12.90 | 110 | 1-40 | 100-113 |
| AGS191× JS 335 | 7.20 | 112 | 0.6-21.6 | 109-113 |
| IC 501198 × JS 335 | 11.82 | 107 | 1-51.2 | 95-113 |
| EC 546882 × JS 335 | 11.34 | 108 | 0.8-51.2 | 95-115 |
| RVS 2007-6 × JS 335  | 11.86 | 108 | 1.3-35.2 | 95-113 |
| EC 481347 × JS 335  | 4.80 | 95 | 0.8-18.3 | 88-100 |
| Gaurav 2 × JS 335  | 11.46 | 107 | 4.50-23.6 | 91-113 |
| EC 656641 × JS 335  | 5.70 | 92 | 0.1-21.3 | 89-95 |
| Jackson × JS 335 | 15.38 | 113 | 3.9-27.1 | 99-113 |
| IC 15759A × JS 335  | 7.40 | 106 | 0.8-18.10 | 95-113 |
| Santamaria × JS 335 | 6.74 | 97 | 1.1-12.4 | 91-109 |
| Hardee × JS 335 | 7.7 | 110 | 1-20.80 | 91-113 |
| Kalitur × JS 335 | 6.88 | 109 | 2.1-17 | 109-112 |
| G-11 × JS 335 | 27.78 | 103 | 4-53.3 | 91-109 |
| NRC 37 × JS 335 | 17.10 | 106 | 6.3-27 | 95-109 |
| Valder × JS 335 | 9.20 | 95 | 5.2-14.5 | 95-100 |

**Table S5 Statistical parameters of genetic variability in 900 NAM-RILs derived from eleven crosses of NAM population**

| **Trait** | **Mean +SE** | **Variance****(P)** | **Variance****(G)** | **Range** | **PCV (%)** | **GCV (%)** | **Heritability** | **Genetic advance as****% of mean** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Plant height (cm) | 49.52 ±0.42 | 168.65 | 131.32 | 14.71-96.26 | 26.22 | 23.14 | 77.86 | 42.13 |
| No. of nodes | 6.32±0.07 | 4.75 | 3.72 | 1.85-13.80 | 34.51 | 30.52 | 78.18 | 55.66 |
| No. branches | 3.83±0.04 | 1.03 | 0.03 | 1.17-8.68 | 26.5 | 4.72 | 3.17 | 1.74 |
| No. pods | 46.19±0.61 | 270.87 | 110.26 | 4.18-133.98 | 35.63 | 22.73 | 40.7 | 29.92 |
| Biomass (g) | 103.58±1.29 | 1393.02 | 524.95 | 3.26-270.6 | 36.03 | 22.12 | 37.68 | 28.01 |
| Grain yield (g) | 42.52±0.66 | 384.92 | 287.44 | 2.20-129.02 | 46.15 | 39.88 | 74.68 | 71.09 |
| Harvest Index | 40.38±0.33 | 96.93 | 18.23 | 3.83-80.61 | 24.38 | 10.57 | 18.81 | 9.46 |

**Table S6 Mean values of different variables in 10 clusters and no. of accessions in each cluster**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cluster variables** | **C1** | **C2**  | **C3**  | **C4**  | **C5**  | **C6**  | **C7**  | **C8** | **C9**  | **C10** |
| Plant height | 39.76 | 42.17 | 45.53 | 53.45 | 60.35 | 51.26 | 51.18 | 59.621 | 52.54 | 59.342 |
| No. of branches | 3.25 | 3.45 | 3.611 | 4.867 | 4.46 | 4.11 | 4.57 | 4.544 | 5.617 | 3.530 |
| No. of nodes | 5.56 | 5.73 | 5.683 | 6.049 | 6.90 | 6.15 | 7.13 | 7.942 | 7.63 | 7.071 |
| No. of pods | 31.12 | 37.30 | 36.466 | 64.33 | 55.88 | 49.28 | 68.47 | 83.314 | 93.39 | 41.98 |
| Biomass | 49.72 | 76.36 | 107.86 | 189.85 | 131.02 | 143.19 | 110.13 | 156.259 | 240.919 | 91.61 |
| Harvest Index | 35.19 | 42.09 | 46.41 | 46.104 | 31.71 | 45.07 | 44.90 | 45.020 | 40.434 | 32.79 |
| Grain yield | 18.09 | 32.07 | 49.37 | 87.231 | 41.93 | 63.80 | 49.40 | 69.698 | 98.999 | 30.22 |
| No. of lines | 123 | 183 | 139 | 37 | 79 | 81 | 71 | 47 | 7 | 133 |

**Table S7 Correlation coefficients of different quantitative traits in 900 NAM-RILs in soybean**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Traits | Plant height (cm) | No. branches | No. of nodes | No. pods | Biomass (g) | Harvest Index | Grain yield (g) |
| Plant height (cm) | 1 |  |  |  |  |  |  |
| No. branches | 0.06\* | 1 |  |  |  |  |  |
| No. of nodes | 0.46\*\*\* | -0.10\*\* | 1 |  |  |  |  |
| No. pods | 0.33\*\*\* | 0.58\*\*\* | 0.38\*\*\* | 1 |  |  |  |
| Biomass (g) | 0.35\*\*\* | 0.41\*\*\* | 0.17\*\*\* | 0.59\*\*\* | 1 |  |  |
| Harvest Index | -0.11\*\*\* | -0.07\* | -0.06\* | 0.07\* | 0.16\*\*\* | 1 |  |
| Grain yield (g) | 0.21\*\*\* | 0.30\*\*\* | 0.11\*\*\* | 0.51\*\*\* | 0.86\*\*\* | 0.60\*\*\* | 1 |

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**Figure S1 Frequency distribution of accessions for quantitative traits in NAM- RILs**

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**Figure S2 Graphical depiction of correlation coefficients among seven quantitative traits in NAM population**

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**Figure S3 Graphical depiction of contribution of each variable in different five PC**

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**Figure S4 Biplots of PC1 and PC2 involving only top hundred contributing RILs.**

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**Figure S5 Relationship among eleven NAM Families**