**Supplementary Table 1: details of 163 mungbean genetic resources in this study**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Genotype** | **Category**  | **PH** | **B/P** | **C/P** | **P/C** | **PL** | **PD** | **PWT** | **100-SW** | **SL** | **SW** | **FSG** | **WIP** | **WIS** | **PHS** |
| Chinhola | Germplasm | 53.33 | 3.00 | 8.00 | 4.67 | 6.91 | 4.00 | 0.17 | 2.83 | 4.24 | 2.70 | 19.00 | 20.79 | 27.33 | 34.96 |
| Chamu 4 | Germplasm | 40.00 | 2.33 | 12.00 | 3.33 | 6.24 | 3.91 | 0.15 | 2.35 | 3.64 | 2.79 | 8.33 | 19.41 | 13.76 | 7.14 |
| China 4 | Germplasm | 40.67 | 2.00 | 8.33 | 4.33 | 6.36 | 3.58 | 0.14 | 1.89 | 4.05 | 2.60 | 46.00 | 19.30 | 56.91 | 31.55 |
| DMG 1042 | Germplasm | 39.67 | 2.67 | 8.67 | 3.00 | 6.85 | 3.79 | 0.13 | 2.85 | 3.75 | 2.77 | 50.67 | 35.73 | 52.79 | 32.23 |
| DMG 1050 | Germplasm | 41.67 | 4.00 | 6.00 | 4.00 | 8.14 | 4.05 | 0.13 | 3.14 | 3.89 | 3.10 | 30.33 | 28.20 | 50.82 | 37.84 |
| DMG 1057 | Germplasm | 42.00 | 4.00 | 8.33 | 3.67 | 7.34 | 4.03 | 0.15 | 2.88 | 3.83 | 2.86 | 29.33 | 24.89 | 39.59 | 32.29 |
| DMG 1060 | Germplasm | 39.67 | 1.00 | 7.00 | 3.67 | 7.07 | 4.06 | 0.13 | 1.78 | 3.88 | 2.92 | 25.67 | 30.64 | 58.50 | 22.61 |
| DMG 1090 | Germplasm | 52.67 | 3.33 | 8.33 | 5.00 | 6.36 | 3.82 | 0.16 | 1.96 | 4.01 | 3.10 | 30.67 | 25.60 | 40.62 | 56.33 |
| LM 55 | Germplasm | 46.00 | 3.33 | 8.33 | 3.00 | 7.01 | 3.90 | 0.16 | 3.53 | 4.03 | 3.20 | 24.00 | 21.48 | 12.11 | 27.51 |
| Co local 13 | Germplasm | 48.67 | 3.33 | 14.33 | 2.67 | 6.68 | 4.06 | 0.16 | 2.19 | 4.03 | 2.95 | 39.33 | 26.04 | 57.95 | 29.43 |
| Dopole | Germplasm | 34.33 | 2.00 | 6.33 | 4.33 | 6.87 | 3.98 | 0.13 | 3.07 | 3.89 | 2.92 | 10.33 | 21.17 | 6.31 | 7.70 |
| DMG 1051 | Germplasm | 50.00 | 3.33 | 9.00 | 6.00 | 6.88 | 4.21 | 0.16 | 3.46 | 3.91 | 3.02 | 22.00 | 5.26 | 23.38 | 31.52 |
| DMG 1074 | Germplasm | 43.00 | 2.67 | 9.00 | 4.00 | 7.70 | 3.69 | 0.16 | 2.23 | 3.95 | 2.79 | 23.33 | 28.95 | 40.23 | 15.89 |
| ML 1256 | Germplasm | 51.00 | 2.33 | 8.33 | 6.67 | 6.45 | 3.53 | 0.12 | 3.52 | 3.63 | 2.69 | 23.33 | 18.86 | 19.54 | 50.15 |
| DMG 10990-1 | Germplasm | 46.33 | 4.00 | 14.33 | 3.00 | 6.49 | 3.49 | 0.17 | 1.80 | 4.16 | 2.85 | 17.33 | 26.71 | 40.62 | 9.42 |
| LM 16 | Germplasm | 43.33 | 3.00 | 13.00 | 2.33 | 6.06 | 3.98 | 0.13 | 1.70 | 4.53 | 3.13 | 41.00 | 37.68 | 51.47 | 28.94 |
| VL 112 | Germplasm | 54.67 | 4.33 | 8.00 | 3.33 | 7.00 | 3.49 | 0.15 | 1.79 | 4.03 | 2.88 | 21.67 | 32.76 | 40.82 | 18.98 |
| ML 1059 | Germplasm | 44.00 | 1.33 | 4.67 | 3.00 | 6.83 | 3.47 | 0.14 | 1.86 | 4.14 | 2.98 | 56.33 | 40.83 | 61.63 | 48.94 |
| IC 52061 | Germplasm | 40.00 | 2.33 | 7.00 | 3.67 | 6.59 | 3.51 | 0.14 | 1.41 | 3.83 | 2.88 | 11.67 | 31.42 | 25.39 | 8.88 |
| INM 446 | Germplasm | 43.33 | 3.00 | 10.67 | 4.00 | 7.60 | 3.95 | 0.14 | 2.48 | 4.39 | 3.16 | 42.33 | 27.89 | 49.62 | 33.55 |
| CN 8090 | Germplasm | 48.67 | 5.00 | 8.00 | 2.33 | 6.72 | 3.85 | 0.16 | 2.56 | 3.66 | 2.89 | 43.67 | 9.67 | 21.33 | 25.24 |
| J 2 | Germplasm | 37.33 | 3.00 | 7.67 | 2.00 | 7.28 | 3.76 | 0.15 | 2.36 | 3.87 | 3.04 | 52.67 | 12.28 | 24.42 | 16.80 |
| Jalgaon 2A | Germplasm | 42.00 | 5.67 | 14.00 | 2.67 | 6.31 | 3.88 | 0.16 | 2.77 | 4.01 | 3.11 | 16.33 | 45.84 | 34.65 | 18.37 |
| IPO 1-383 | Germplasm | 41.00 | 3.67 | 8.67 | 2.33 | 6.84 | 3.71 | 0.14 | 1.87 | 3.78 | 2.65 | 65.67 | 29.57 | 49.49 | 62.58 |
| DMG 1104-2 | Germplasm | 46.67 | 2.67 | 11.00 | 2.33 | 6.64 | 3.54 | 0.18 | 1.46 | 3.77 | 2.71 | 17.33 | 31.58 | 46.43 | 24.14 |
| DMG 1103 | Germplasm | 29.33 | 2.67 | 9.67 | 2.67 | 6.08 | 3.59 | 0.28 | 2.25 | 3.99 | 2.76 | 50.67 | 49.21 | 58.08 | 42.21 |
| DMG 111 | Germplasm | 45.67 | 2.67 | 12.00 | 4.33 | 5.82 | 3.51 | 0.26 | 2.42 | 4.04 | 2.97 | 58.67 | 36.18 | 34.05 | 61.25 |
| DMG 1102 | Germplasm | 36.00 | 2.67 | 7.33 | 3.00 | 6.17 | 3.54 | 0.15 | 1.04 | 4.17 | 3.06 | 47.33 | 42.41 | 64.11 | 32.88 |
| DMG 1108 | Germplasm | 46.33 | 4.33 | 11.67 | 2.67 | 6.78 | 3.72 | 0.17 | 3.15 | 4.06 | 3.13 | 71.00 | 29.28 | 9.41 | 31.72 |
| DMG 1026 | Germplasm | 36.67 | 5.67 | 13.67 | 3.33 | 6.10 | 3.66 | 0.17 | 1.48 | 3.83 | 2.87 | 32.33 | 16.64 | 52.30 | 29.88 |
| DMG 1030-2 | Germplasm | 52.67 | 4.00 | 12.33 | 3.00 | 6.46 | 3.45 | 0.26 | 1.82 | 3.93 | 2.83 | 67.00 | 50.45 | 59.81 | 32.05 |
| DMG 1122-2 | Germplasm | 46.00 | 4.00 | 15.67 | 2.67 | 6.26 | 3.90 | 0.17 | 2.21 | 4.41 | 3.26 | 46.33 | 59.39 | 38.48 | 32.37 |
| DML 512 | Germplasm | 40.67 | 1.67 | 10.33 | 3.00 | 6.51 | 3.95 | 0.24 | 2.57 | 3.96 | 3.13 | 65.33 | 20.87 | 29.66 | 52.38 |
| DMG 1081 | Germplasm | 41.00 | 3.33 | 5.67 | 2.33 | 6.06 | 3.81 | 0.24 | 1.79 | 3.97 | 2.80 | 50.67 | 44.57 | 46.33 | 33.33 |
| DMG 1065 | Germplasm | 69.67 | 2.67 | 11.67 | 2.00 | 7.18 | 3.93 | 0.22 | 2.64 | 4.36 | 2.83 | 37.33 | 29.56 | 47.16 | 17.86 |
| DMG 1079 | Germplasm | 36.33 | 3.33 | 6.67 | 2.33 | 6.06 | 3.68 | 0.15 | 3.12 | 3.97 | 3.12 | 54.67 | 29.52 | 49.87 | 24.18 |
| DPC 1057 | Germplasm | 38.00 | 2.33 | 10.33 | 4.00 | 6.89 | 3.37 | 0.14 | 2.54 | 3.97 | 2.89 | 28.67 | 24.78 | 45.50 | 21.85 |
| IC 15276 | Germplasm | 46.33 | 2.00 | 5.67 | 2.67 | 6.36 | 3.59 | 0.15 | 1.26 | 3.96 | 2.80 | 32.67 | 27.92 | 53.35 | 23.60 |
| IC 3620 | Germplasm | 43.00 | 4.00 | 8.33 | 3.00 | 6.68 | 3.68 | 0.20 | 1.38 | 3.72 | 2.59 | 32.33 | 24.20 | 44.19 | 51.81 |
| BM 11 | Germplasm | 46.00 | 3.00 | 13.33 | 3.33 | 6.24 | 3.67 | 0.21 | 2.69 | 4.32 | 3.20 | 40.33 | 58.59 | 28.73 | 33.68 |
| CHAMAH 1 | Germplasm | 41.67 | 3.00 | 11.67 | 3.00 | 6.75 | 3.60 | 0.18 | 2.42 | 3.81 | 2.96 | 8.33 | 34.69 | 12.32 | 9.53 |
| IC 324025 | Germplasm | 46.67 | 2.67 | 10.67 | 2.67 | 6.44 | 3.93 | 0.24 | 3.28 | 3.99 | 2.91 | 23.67 | 24.56 | 39.91 | 35.73 |
| BGG 1 | Germplasm | 41.67 | 3.33 | 17.33 | 2.00 | 6.39 | 3.26 | 0.15 | 1.30 | 3.80 | 2.76 | 9.67 | 20.32 | 32.80 | 9.95 |
| BM 109 | Germplasm | 48.00 | 4.00 | 8.67 | 2.00 | 6.85 | 3.73 | 0.16 | 2.84 | 3.74 | 2.92 | 75.33 | 39.16 | 27.56 | 14.66 |
| BM 7 | Germplasm | 53.00 | 4.33 | 10.67 | 4.00 | 8.04 | 3.14 | 0.17 | 3.08 | 4.06 | 3.06 | 27.67 | 38.25 | 31.08 | 24.65 |
| CN 9042 | Germplasm | 44.67 | 2.67 | 10.67 | 2.67 | 6.46 | 3.73 | 0.16 | 2.61 | 4.17 | 2.96 | 24.33 | 40.58 | 55.81 | 20.15 |
| IC 152776A | Germplasm | 45.67 | 3.00 | 9.00 | 3.00 | 6.13 | 4.19 | 0.14 | 1.23 | 4.04 | 2.80 | 54.33 | 48.25 | 61.18 | 42.06 |
| IC 2829 | Germplasm | 49.00 | 1.67 | 16.00 | 2.33 | 6.22 | 4.09 | 0.17 | 2.49 | 3.48 | 2.66 | 62.00 | 54.54 | 32.39 | 69.47 |
| IC 2056 | Germplasm | 54.67 | 3.67 | 14.67 | 4.00 | 5.82 | 3.23 | 0.17 | 2.73 | 4.25 | 2.96 | 19.00 | 17.45 | 31.23 | 39.03 |
| LGG 0011 | Germplasm | 41.33 | 2.00 | 7.67 | 3.33 | 6.06 | 3.83 | 0.16 | 3.14 | 3.81 | 2.64 | 48.33 | 16.15 | 31.80 | 23.99 |
| IC 31500 | Germplasm | 52.67 | 3.67 | 21.67 | 2.33 | 6.66 | 4.42 | 0.15 | 1.85 | 4.45 | 3.30 | 55.33 | 28.29 | 42.92 | 21.19 |
| IC 433 | Germplasm | 39.33 | 2.33 | 10.00 | 3.33 | 6.11 | 3.77 | 0.13 | 2.76 | 3.97 | 2.78 | 51.67 | 27.82 | 52.01 | 68.41 |
| IC 683 | Germplasm | 51.33 | 4.67 | 16.67 | 5.00 | 5.97 | 3.89 | 0.17 | 2.31 | 3.65 | 2.69 | 52.00 | 28.79 | 51.58 | 32.54 |
| IC 15205 | Germplasm | 53.67 | 3.00 | 7.67 | 3.33 | 5.78 | 3.77 | 0.16 | 1.22 | 4.01 | 3.10 | 55.33 | 25.87 | 55.16 | 34.69 |
| IC 1608 | Germplasm | 54.00 | 2.33 | 12.67 | 2.33 | 6.30 | 3.74 | 0.14 | 1.58 | 4.04 | 2.73 | 42.67 | 20.30 | 44.25 | 27.34 |
| Hyb 45-1-1 | Germplasm | 46.33 | 3.67 | 10.33 | 2.33 | 6.76 | 4.30 | 0.15 | 2.64 | 3.77 | 2.51 | 52.00 | 21.92 | 45.05 | 39.70 |
| H 7015 | Germplasm | 45.00 | 3.33 | 13.67 | 6.00 | 6.86 | 3.91 | 0.18 | 3.65 | 3.99 | 3.00 | 54.00 | 36.78 | 19.16 | 33.47 |
| H 705 | Germplasm | 65.00 | 4.00 | 12.33 | 5.33 | 6.39 | 3.99 | 0.16 | 2.54 | 4.27 | 3.03 | 68.67 | 13.53 | 40.07 | 55.08 |
| IC 31401 | Germplasm | 48.33 | 3.00 | 12.67 | 4.33 | 6.36 | 3.28 | 0.16 | 3.02 | 4.11 | 2.96 | 66.33 | 44.86 | 32.86 | 25.73 |
| DMG 1040-2 | Germplasm | 57.67 | 5.00 | 21.00 | 3.67 | 6.56 | 3.83 | 0.13 | 2.91 | 4.17 | 2.72 | 69.67 | 19.31 | 46.77 | 45.57 |
| Jalgaon 1 | Germplasm | 39.33 | 3.00 | 5.67 | 3.00 | 5.92 | 3.96 | 0.14 | 3.00 | 4.12 | 3.17 | 29.33 | 21.41 | 26.54 | 49.18 |
| Jalgaon 3 | Germplasm | 40.33 | 3.00 | 12.00 | 4.00 | 6.54 | 3.78 | 0.15 | 2.69 | 3.95 | 3.06 | 70.67 | 30.03 | 10.08 | 23.66 |
| Jalgaon 2 | Germplasm | 36.67 | 1.33 | 9.00 | 4.00 | 6.22 | 3.83 | 0.16 | 3.30 | 4.39 | 3.26 | 50.33 | 30.75 | 24.87 | 34.81 |
| JBT/37/158 | Germplasm | 47.67 | 3.33 | 13.67 | 3.33 | 6.10 | 3.25 | 0.16 | 2.65 | 3.61 | 2.53 | 92.00 | 19.95 | 26.70 | 26.06 |
| JBT/37/100 | Germplasm | 36.00 | 2.67 | 12.33 | 3.33 | 6.47 | 3.78 | 0.15 | 0.93 | 3.60 | 2.71 | 47.33 | 22.76 | 52.57 | 24.02 |
| JBT/37/150 | Germplasm | 49.00 | 1.67 | 10.33 | 4.67 | 6.60 | 3.89 | 0.14 | 2.29 | 3.70 | 2.60 | 54.67 | 31.07 | 48.19 | 32.35 |
| Khargaon M 1 | Germplasm | 47.67 | 3.67 | 11.00 | 2.33 | 5.32 | 4.08 | 0.14 | 2.96 | 3.94 | 3.13 | 57.67 | 23.43 | 24.67 | 42.49 |
| Anhula | Germplasm | 42.33 | 2.33 | 15.33 | 3.67 | 6.51 | 3.33 | 0.20 | 1.44 | 3.78 | 2.97 | 39.33 | 31.33 | 51.61 | 42.55 |
| 441-20 | Germplasm | 42.67 | 3.00 | 12.00 | 3.67 | 6.35 | 3.06 | 0.15 | 2.75 | 4.08 | 2.85 | 42.00 | 7.75 | 44.40 | 30.81 |
| AKP/NP/8/63 | Germplasm | 53.67 | 4.00 | 8.33 | 2.33 | 6.06 | 3.86 | 0.14 | 3.13 | 3.97 | 3.19 | 44.33 | 24.21 | 21.51 | 22.69 |
| Anihide | Germplasm | 46.00 | 2.67 | 9.33 | 3.67 | 6.09 | 3.77 | 0.15 | 3.46 | 4.09 | 3.09 | 56.33 | 11.81 | 12.14 | 54.44 |
| Balami | Germplasm | 44.00 | 2.33 | 8.67 | 4.33 | 6.54 | 3.51 | 0.17 | 2.89 | 4.19 | 3.07 | 41.33 | 31.46 | 35.08 | 35.82 |
| EC 3190 | Germplasm | 42.00 | 3.00 | 11.00 | 2.33 | 6.47 | 3.82 | 0.13 | 2.95 | 3.78 | 2.65 | 57.67 | 37.22 | 39.06 | 34.25 |
| EC 304993 | Germplasm | 43.00 | 3.33 | 16.33 | 2.00 | 6.14 | 3.69 | 0.24 | 1.48 | 3.87 | 2.75 | 40.33 | 31.39 | 54.14 | 39.41 |
| EC 93161 | Germplasm | 49.00 | 2.67 | 12.33 | 3.00 | 6.46 | 3.70 | 0.17 | 2.67 | 3.78 | 2.95 | 50.33 | 38.72 | 43.03 | 27.51 |
| DU 5-6 | Germplasm | 41.67 | 2.00 | 13.00 | 3.33 | 6.61 | 3.79 | 0.15 | 3.08 | 3.87 | 3.05 | 50.67 | 43.27 | 16.39 | 34.74 |
| E 3-8 | Germplasm | 52.00 | 2.67 | 17.33 | 2.67 | 6.13 | 3.79 | 0.16 | 2.42 | 4.00 | 2.84 | 71.33 | 27.38 | 39.76 | 33.29 |
| LM 237 | Germplasm | 42.67 | 3.00 | 11.67 | 2.67 | 6.32 | 3.79 | 0.16 | 1.36 | 4.00 | 2.72 | 53.00 | 39.53 | 47.34 | 40.20 |
| LM 241 | Germplasm | 45.33 | 1.67 | 8.00 | 2.67 | 6.34 | 3.79 | 0.18 | 1.14 | 3.89 | 2.92 | 62.33 | 76.38 | 63.25 | 64.86 |
| LM 95 | Germplasm | 62.33 | 2.00 | 8.33 | 2.33 | 7.09 | 3.85 | 0.21 | 1.29 | 4.28 | 2.96 | 42.67 | 14.95 | 55.00 | 20.24 |
| LM 57 | Germplasm | 49.67 | 3.33 | 20.00 | 3.33 | 6.37 | 3.80 | 0.20 | 2.49 | 4.10 | 2.93 | 81.00 | 32.65 | 32.35 | 43.88 |
| LM 19 | Germplasm | 49.67 | 3.67 | 9.00 | 3.67 | 5.88 | 3.90 | 0.15 | 3.87 | 4.07 | 2.98 | 50.33 | 8.41 | 6.21 | 27.89 |
| DMG 1088 | Germplasm | 50.67 | 3.33 | 13.67 | 2.67 | 6.70 | 3.69 | 0.17 | 3.20 | 3.73 | 2.91 | 43.33 | 19.96 | 11.74 | 13.33 |
| DMG 1080 | Germplasm | 47.67 | 3.33 | 16.00 | 2.00 | 5.93 | 3.62 | 0.15 | 2.26 | 3.83 | 2.62 | 58.00 | 47.14 | 39.50 | 40.87 |
| LM 131 | Germplasm | 54.00 | 3.67 | 12.00 | 3.33 | 6.71 | 3.56 | 0.16 | 1.69 | 4.17 | 2.94 | 33.00 | 28.87 | 53.45 | 47.58 |
| CN 8082 | Germplasm | 60.33 | 3.00 | 15.00 | 3.33 | 7.79 | 3.68 | 0.16 | 2.71 | 3.96 | 2.85 | 78.67 | 16.33 | 27.74 | 53.98 |
| LM 174 | Germplasm | 53.00 | 3.67 | 21.33 | 3.00 | 6.72 | 3.73 | 0.15 | 1.44 | 4.02 | 2.71 | 42.67 | 43.53 | 49.50 | 62.80 |
| LM 104 | Germplasm | 54.00 | 2.33 | 16.33 | 3.00 | 6.74 | 3.23 | 0.16 | 2.87 | 3.82 | 2.74 | 54.00 | 32.02 | 45.89 | 31.94 |
| LM 101 | Germplasm | 42.33 | 2.67 | 14.67 | 3.67 | 6.41 | 3.63 | 0.14 | 1.35 | 3.94 | 2.81 | 50.33 | 43.32 | 52.61 | 57.94 |
| LM 240 | Germplasm | 78.00 | 2.67 | 28.67 | 3.67 | 7.24 | 3.83 | 0.15 | 3.12 | 4.33 | 2.89 | 33.00 | 18.63 | 31.50 | 51.74 |
| LM 25-7 | Germplasm | 61.00 | 4.67 | 13.67 | 3.33 | 6.72 | 4.03 | 0.16 | 3.08 | 4.13 | 2.82 | 35.33 | 36.96 | 46.39 | 30.09 |
| LM 5-112 | Germplasm | 35.67 | 3.67 | 12.67 | 3.00 | 5.98 | 3.30 | 0.14 | 2.68 | 3.73 | 2.94 | 42.00 | 16.40 | 44.02 | 58.70 |
| LM 258 | Germplasm | 65.67 | 2.67 | 17.33 | 3.33 | 6.66 | 4.04 | 0.20 | 1.83 | 4.03 | 2.82 | 55.33 | 25.01 | 61.23 | 59.88 |
| LM 236 | Germplasm | 64.33 | 4.00 | 16.67 | 3.67 | 5.82 | 4.21 | 0.18 | 2.55 | 3.46 | 2.77 | 42.67 | 40.52 | 13.76 | 55.45 |
| LM 3 | Germplasm | 65.00 | 3.33 | 20.00 | 4.00 | 6.71 | 3.99 | 0.13 | 1.94 | 3.75 | 2.96 | 51.67 | 17.72 | 53.03 | 24.64 |
| IPO 359 | Germplasm | 64.00 | 5.00 | 18.33 | 4.67 | 6.60 | 3.55 | 0.17 | 1.51 | 4.06 | 2.82 | 63.00 | 37.11 | 53.49 | 59.38 |
| IPM 03-7 | Germplasm | 43.33 | 3.33 | 14.33 | 3.67 | 6.36 | 3.74 | 0.16 | 3.17 | 4.26 | 2.90 | 33.00 | 30.05 | 48.06 | 54.76 |
| INM 646 | Germplasm | 73.00 | 3.67 | 14.67 | 4.33 | 6.68 | 3.99 | 0.14 | 1.66 | 3.93 | 2.84 | 52.33 | 35.81 | 53.48 | 30.61 |
| IPO 353 | Germplasm | 45.67 | 5.33 | 17.33 | 2.67 | 6.58 | 3.19 | 0.12 | 3.25 | 4.08 | 2.96 | 81.00 | 17.57 | 46.44 | 52.36 |
| IPO 1-331 | Germplasm | 57.67 | 4.00 | 18.33 | 3.00 | 5.99 | 3.71 | 0.17 | 1.68 | 3.99 | 2.98 | 63.33 | 28.14 | 45.48 | 48.59 |
| Jalgaon 24 | Germplasm | 49.33 | 1.00 | 12.67 | 3.33 | 6.38 | 3.81 | 0.17 | 2.11 | 3.89 | 2.92 | 53.67 | 16.29 | 58.15 | 70.44 |
| China | Germplasm | 61.00 | 2.67 | 17.00 | 3.67 | 7.71 | 3.60 | 0.14 | 3.24 | 4.23 | 2.87 | 49.67 | 5.88 | 10.47 | 20.00 |
| ML 131 | varieties | 50.67 | 3.00 | 7.33 | 3.00 | 5.53 | 4.24 | 0.15 | 3.73 | 4.47 | 3.35 | 21.67 | 16.96 | 20.44 | 14.06 |
| Dauli | varieties | 46.00 | 1.00 | 6.00 | 3.33 | 6.28 | 3.66 | 0.14 | 3.64 | 4.03 | 2.99 | 49.00 | 9.30 | 15.34 | 23.80 |
| HUM-1 | varieties | 39.67 | 2.00 | 6.33 | 3.00 | 6.12 | 3.76 | 0.17 | 3.89 | 4.16 | 3.28 | 45.33 | 6.89 | 10.50 | 31.76 |
| RMG 268 | varieties | 43.33 | 2.00 | 8.67 | 3.33 | 5.93 | 4.00 | 0.13 | 3.51 | 3.86 | 2.61 | 77.00 | 16.45 | 22.75 | 53.92 |
| TARM 2 | varieties | 40.67 | 3.67 | 12.67 | 4.67 | 6.13 | 3.98 | 0.15 | 3.25 | 4.43 | 3.32 | 88.00 | 21.72 | 37.33 | 41.07 |
| Salimar | varieties | 45.00 | 2.67 | 10.33 | 4.00 | 6.15 | 3.12 | 0.15 | 2.21 | 4.34 | 3.18 | 47.00 | 20.33 | 40.05 | 58.41 |
| MH 96-1 | varieties | 46.33 | 1.67 | 5.00 | 3.33 | 7.28 | 3.88 | 0.15 | 2.27 | 4.29 | 3.06 | 80.33 | 38.74 | 53.79 | 65.39 |
| Pant M 4 | varieties | 35.67 | 1.67 | 6.33 | 3.00 | 8.03 | 3.08 | 0.18 | 5.83 | 5.00 | 3.73 | 81.00 | 10.69 | 12.29 | 45.34 |
| MUM 2 | varieties | 37.67 | 1.00 | 8.67 | 2.33 | 6.76 | 3.14 | 0.15 | 4.27 | 4.30 | 3.33 | 72.00 | 10.29 | 47.47 | 46.44 |
| BDN 2 | varieties | 41.67 | 1.00 | 7.33 | 3.00 | 6.54 | 3.37 | 0.16 | 3.52 | 4.45 | 3.19 | 30.33 | 6.67 | 17.52 | 36.27 |
| RMG 62 | varieties | 42.33 | 1.33 | 9.00 | 3.33 | 5.76 | 4.17 | 0.14 | 2.96 | 4.31 | 3.22 | 58.33 | 10.58 | 27.24 | 34.38 |
| GM 3 | varieties | 42.67 | 3.00 | 8.33 | 3.33 | 5.95 | 3.95 | 0.15 | 3.61 | 4.28 | 3.10 | 43.67 | 25.61 | 15.18 | 26.03 |
| SML 32 | varieties | 43.67 | 2.33 | 8.00 | 3.33 | 6.39 | 3.52 | 0.16 | 3.89 | 4.12 | 3.15 | 31.33 | 12.41 | 12.69 | 21.01 |
| Pusa 9531 | varieties | 42.00 | 2.00 | 6.67 | 2.67 | 6.75 | 3.93 | 0.17 | 3.78 | 4.06 | 2.90 | 55.67 | 31.75 | 33.80 | 40.87 |
| PDM 54 | varieties | 43.33 | 2.33 | 9.00 | 3.33 | 6.86 | 3.95 | 0.16 | 3.25 | 4.06 | 2.98 | 45.33 | 11.25 | 14.85 | 29.23 |
| HUM 6 | varieties | 49.00 | 2.67 | 10.33 | 3.33 | 6.66 | 3.64 | 0.13 | 2.08 | 4.08 | 3.08 | 79.00 | 7.89 | 47.87 | 34.03 |
| GM 4 | varieties | 49.67 | 2.33 | 9.33 | 4.00 | 6.48 | 3.56 | 0.17 | 3.07 | 4.33 | 3.14 | 40.67 | 17.04 | 22.53 | 48.30 |
| OUM 11-5 | varieties | 52.67 | 1.67 | 7.00 | 4.00 | 6.39 | 3.27 | 0.24 | 3.40 | 3.86 | 2.67 | 76.00 | 21.05 | 37.88 | 33.46 |
| Co 4 | varieties | 37.67 | 2.33 | 7.67 | 4.33 | 6.82 | 3.90 | 0.15 | 3.52 | 4.25 | 3.31 | 57.00 | 14.71 | 29.35 | 50.96 |
| ML 818 | varieties | 44.33 | 2.33 | 8.33 | 4.00 | 7.18 | 3.95 | 0.16 | 2.98 | 4.34 | 3.12 | 39.33 | 40.49 | 45.23 | 76.74 |
| Pusa Baisakhi | varieties | 40.00 | 1.33 | 5.33 | 4.00 | 7.01 | 3.16 | 0.14 | 3.01 | 4.33 | 3.23 | 39.00 | 36.24 | 27.68 | 67.13 |
| PDM 139 | varieties | 44.00 | 1.00 | 5.67 | 3.00 | 6.42 | 3.34 | 0.16 | 3.08 | 4.14 | 3.19 | 93.33 | 22.72 | 47.89 | 76.31 |
| Ganga 1 | varieties | 39.67 | 1.67 | 7.00 | 3.67 | 6.59 | 3.36 | 0.15 | 2.03 | 4.30 | 3.11 | 68.00 | 36.31 | 42.17 | 76.84 |
| LGG 407 | varieties | 48.00 | 2.00 | 9.00 | 5.33 | 6.45 | 3.54 | 0.22 | 2.87 | 4.40 | 3.07 | 62.33 | 36.30 | 36.92 | 67.29 |
| PS 16 | varieties | 47.33 | 2.67 | 8.33 | 3.67 | 7.16 | 4.06 | 0.15 | 2.57 | 4.11 | 3.12 | 52.00 | 27.29 | 34.80 | 58.01 |
| AKM 9911 | varieties | 46.67 | 1.33 | 8.33 | 4.00 | 6.67 | 3.69 | 0.18 | 2.89 | 4.65 | 3.37 | 62.00 | 39.57 | 49.68 | 67.41 |
| K 851 | varieties | 44.67 | 3.00 | 13.00 | 3.33 | 6.53 | 3.97 | 0.12 | 2.02 | 3.89 | 2.92 | 36.00 | 24.25 | 42.17 | 78.97 |
| ML 5 | varieties | 49.67 | 2.67 | 6.67 | 2.00 | 6.30 | 4.09 | 0.15 | 2.97 | 4.04 | 2.98 | 59.67 | 36.07 | 36.92 | 52.89 |
| JM 721 | varieties | 42.67 | 2.33 | 8.00 | 4.33 | 6.47 | 3.88 | 0.15 | 3.35 | 4.25 | 3.11 | 76.00 | 37.82 | 50.58 | 31.71 |
| LGG 450 | varieties | 48.33 | 3.33 | 11.33 | 3.33 | 7.24 | 3.64 | 0.16 | 3.23 | 4.50 | 2.92 | 30.67 | 28.10 | 40.77 | 41.79 |
| RMG 344 | varieties | 52.33 | 1.67 | 8.67 | 4.33 | 6.85 | 2.82 | 0.15 | 3.48 | 4.68 | 3.33 | 56.33 | 35.58 | 37.52 | 60.85 |
| PKUAKM 4 | varieties | 46.33 | 2.67 | 5.33 | 3.67 | 5.11 | 3.60 | 0.14 | 3.28 | 4.16 | 3.05 | 43.67 | 30.39 | 15.07 | 40.79 |
| BM 2002-1 | varieties | 42.33 | 3.33 | 8.00 | 3.00 | 6.51 | 3.72 | 0.16 | 2.40 | 4.21 | 3.15 | 57.33 | 45.04 | 28.61 | 76.98 |
| Pant M 1 | varieties | 45.33 | 1.67 | 9.00 | 2.67 | 6.74 | 4.10 | 0.20 | 3.23 | 4.15 | 3.30 | 55.33 | 10.44 | 43.39 | 47.27 |
| TARM 1 | varieties | 52.00 | 2.33 | 7.00 | 4.00 | 6.49 | 4.04 | 0.16 | 2.98 | 4.08 | 3.38 | 58.00 | 27.39 | 50.13 | 37.57 |
| Pairy moong | varieties | 38.00 | 4.00 | 6.67 | 3.33 | 6.49 | 3.98 | 0.14 | 2.65 | 4.63 | 3.26 | 63.00 | 11.46 | 53.67 | 69.42 |
| LAM M 2 | varieties | 41.67 | 2.00 | 8.67 | 5.00 | 6.90 | 3.35 | 0.15 | 3.64 | 4.40 | 3.12 | 41.33 | 36.92 | 23.10 | 75.68 |
| BM 4 | varieties | 46.33 | 2.00 | 12.67 | 3.00 | 6.89 | 3.56 | 0.14 | 1.81 | 3.81 | 3.14 | 46.67 | 32.80 | 58.39 | 65.37 |
| Pant M 2 | varieties | 39.33 | 2.67 | 12.33 | 3.33 | 6.32 | 4.33 | 0.17 | 2.27 | 4.19 | 3.28 | 45.67 | 34.99 | 59.05 | 54.31 |
| SML 134 | varieties | 41.33 | 1.33 | 9.67 | 2.67 | 6.60 | 3.65 | 0.15 | 3.29 | 4.06 | 3.10 | 69.00 | 37.17 | 49.92 | 52.61 |
| BPMR 145 | varieties | 43.67 | 2.33 | 11.67 | 4.67 | 6.51 | 3.82 | 0.16 | 3.23 | 3.89 | 2.92 | 37.00 | 21.70 | 24.43 | 43.80 |
| HUM 12 | varieties | 48.00 | 4.00 | 10.33 | 4.00 | 6.25 | 4.03 | 0.14 | 3.55 | 4.35 | 3.22 | 34.00 | 22.40 | 32.77 | 45.52 |
| Pusa 9072 | varieties | 62.00 | 1.67 | 13.67 | 3.67 | 6.65 | 3.84 | 0.16 | 3.74 | 3.89 | 2.92 | 85.33 | 31.77 | 19.50 | 42.88 |
| HUM 16 | varieties | 63.00 | 3.00 | 8.67 | 2.67 | 6.82 | 4.02 | 0.15 | 3.13 | 3.78 | 3.01 | 65.67 | 30.46 | 53.10 | 45.64 |
| AKM 8803 | varieties | 42.33 | 1.67 | 13.67 | 3.33 | 7.83 | 4.40 | 0.17 | 5.19 | 4.97 | 3.54 | 60.67 | 33.28 | 43.51 | 44.66 |
| MGG 295 | varieties | 39.00 | 3.00 | 14.00 | 3.33 | 7.53 | 3.70 | 0.15 | 4.62 | 4.89 | 3.42 | 71.33 | 15.07 | 13.90 | 52.63 |
| SML 688 | varieties | 41.67 | 2.33 | 13.33 | 5.67 | 6.21 | 3.59 | 0.14 | 3.33 | 4.21 | 3.00 | 72.67 | 48.21 | 49.93 | 46.24 |
| ML 613 | varieties | 47.00 | 1.33 | 10.33 | 3.33 | 7.24 | 3.76 | 0.16 | 3.64 | 4.38 | 3.10 | 35.33 | 47.69 | 21.82 | 33.97 |
| Sona | varieties | 49.33 | 2.67 | 12.67 | 3.00 | 6.52 | 4.45 | 0.16 | 3.64 | 4.02 | 3.04 | 64.67 | 46.65 | 18.53 | 24.52 |
| Vamban 1 | varieties | 40.00 | 4.33 | 14.33 | 6.67 | 6.48 | 3.49 | 0.16 | 2.61 | 3.93 | 2.89 | 97.33 | 60.55 | 45.88 | 75.15 |
| Pusa 105 | varieties | 47.67 | 3.33 | 12.67 | 4.00 | 6.38 | 3.41 | 0.15 | 2.69 | 4.35 | 2.84 | 60.67 | 76.14 | 50.01 | 33.30 |
| Sujata | varieties | 41.33 | 3.67 | 12.67 | 4.00 | 6.19 | 3.93 | 0.18 | 3.18 | 4.12 | 2.91 | 34.33 | 59.15 | 30.72 | 20.64 |
| NDM 1 | varieties | 51.67 | 3.33 | 11.00 | 7.00 | 6.28 | 4.33 | 0.16 | 2.93 | 4.25 | 3.13 | 21.67 | 50.62 | 36.53 | 33.50 |
| KM-2 | varieties | 44.00 | 2.00 | 12.33 | 3.33 | 6.94 | 4.00 | 0.15 | 3.33 | 3.89 | 2.92 | 59.00 | 53.05 | 23.49 | 37.36 |
| Pratap | varieties | 43.00 | 3.33 | 15.00 | 4.00 | 6.24 | 3.58 | 0.15 | 3.49 | 4.28 | 3.08 | 56.33 | 41.89 | 17.96 | 25.34 |
| OBGG 052 | varieties | 47.33 | 1.67 | 5.33 | 4.00 | 6.63 | 3.80 | 0.14 | 3.83 | 4.45 | 2.93 | 80.33 | 47.59 | 34.92 | 54.16 |
| HUM 2 | varieties | 52.00 | 4.00 | 16.00 | 3.00 | 6.19 | 4.03 | 0.14 | 3.29 | 4.17 | 2.78 | 78.00 | 47.68 | 55.39 | 56.15 |
| Pusa 0672 | varieties | 57.67 | 1.67 | 14.00 | 4.33 | 6.80 | 3.99 | 0.17 | 3.65 | 4.12 | 3.40 | 54.00 | 43.59 | 37.79 | 48.08 |
| IPM 2-14 | varieties | 57.67 | 2.00 | 12.33 | 4.33 | 7.46 | 4.06 | 0.17 | 3.97 | 4.85 | 3.32 | 94.67 | 47.62 | 40.37 | 76.28 |
| Meha | varieties | 46.00 | 3.00 | 12.67 | 4.00 | 6.63 | 3.85 | 0.16 | 4.08 | 3.93 | 3.03 | 86.33 | 39.58 | 44.79 | 72.43 |
| IPM 2-3 | varieties | 57.00 | 2.67 | 16.00 | 3.67 | 6.78 | 3.98 | 0.17 | 3.14 | 4.72 | 3.37 | 91.00 | 39.62 | 39.84 | 82.52 |

PH-plant height (cm); B/P- number of branches per plant; C/P- number of clusters per plant; P/C- number of pods per cluster; PL- pod length (cm); PD- pod diameter (mm); PWT- pod wall thickness (mm); 100-SW- 100-seed weight (g); SL- seed length (mm); SW: seed width (mm); FSG- fresh seed germination (%); WIP: water imbibition by pod (%); WIS-water imbibition by seed (%); PHS- pre-harvest sprouting value (%).

**Supplementary table 2. Eigen-vectors and eigen-values of six principal components (PC) for fourteen traits of 163 mungbean genotypes**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameters** | **PC1** | **PC2** | **PC3** | **PC4** | **PC5** | **PC6** |
| Plant height (cm) | -0.140 | 0.258 | 0.521 | -0.090 | 0.123 | -0.081 |
| Branches/plant | -0.295 | 0.017 | 0.367 | -0.026 | -0.118 | -0.642 |
| Cluster/plant | -0.244 | 0.287 | 0.459 | -0.051 | -0.025 | -0.205 |
| Pod/cluster | 0.157 | 0.117 | 0.191 | 0.524 | 0.277 | -0.085 |
| Pod length (cm) | 0.185 | 0.043 | 0.170 | -0.344 | 0.659 | 0.107 |
| Pod diameter (mm) | -0.022 | 0.027 | 0.281 | -0.144 | -0.453 | 0.653 |
| Pod wall thickness (mm) | -0.066 | 0.147 | -0.176 | -0.462 | -0.227 | -0.596 |
| 100-seed weight (g) | 0.470 | -0.097 | 0.240 | 0.105 | -0.182 | -0.154 |
| Seed length (mm) | 0.438 | 0.205 | 0.078 | -0.323 | 0.042 | 0.028 |
| Seed width (mm) | 0.480 | 0.056 | 0.044 | -0.272 | -0.129 | 0.099 |
| Fresh seed germination (%) | 0.164 | 0.446 | -0.039 | 0.236 | -0.252 | -0.098 |
| Water imbibition by seed (%) | -0.243 | 0.404 | -0.296 | -0.162 | 0.255 | 0.316 |
| Water imbibition by pod (%) | -0.105 | 0.379 | -0.179 | -0.081 | -0.147 | 0.005 |
| PHS (%) | 0.176 | 0.503 | -0.148 | 0.291 | 0.016 | 0.041 |
| Eigenvalues | 2.73 | 1.95 | 1.60 | 1.09 | 1.06 | 1.02 |
| % of total variance explained  | 19.50 | 13.90 | 11.50 | 7.80 | 7.60 | 7.30 |
| % cumulative variance explained  | 19.50 | 33.40 | 44.90 | 52.70 | 60.30 | 67.60 |



Supplementary figure 1. Principal component analysis plots for PHS and FSG of the 163 genotypes. Five best and poor genotypes based on PHS and FSG are clustered.

Five genotypes with minimum FSG: BGG 1, CHAMAH 1, Chamu 4, Dopole and IC 52061

Five genotypes with minimum PHS: CHAMAH 1, Chamu 4, Dopole, DMG 10990-1 and IC 52061

Five genotypes with maximum FSG: IPM 2-3, IPM 2-14, Vamban 1, JBT/37/158 and PDM 139

Five genotypes with maximum PHS: IPM 2-3, K 851, ML 818, BM 2002-1 and Ganga 1