**Supplementary Tables**

**Table S1.** Details on fifty-three rice landraces used in the study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Local name** | **Collection Location** | **Grain type** | **Aroma status** | **Altitude (ft)** |
| 1 | Auti dhan | Dalapchand (E.S.) | LB | NS | 3323  |
| 2 | Bhagey tulashi |  Saureni (E.S.) | SB | NS | 3241 |
| 3 | Bhotangey |  Bering (E.S.) | SB | NS | 2089 |
| 4 | Dhansey |  Kaiyathang (E.S.)  | SB | NS | 4563 |
| 5 | Doodh kalami |  32 Mile (E.S.) | LS | NS | 2293 |
| 6 | Doodh katey |  32 Mile (E.S.) | LS | MS | 2293 |
| 7 | Dorakhey |  Dalapchand (E.S.) | MS | NS | 3300 |
| 8 | Fauryal |  Lingthem (N.S.) | MS | NS | 4533 |
| 9 | Fourey | Bering (E.S.) | LS | NS | 2080 |
| 10 | Jasuda |  Rhenock (E.S.) | MS | NS | 1614 |
| 11 | Jhapaka |  Rhenock (E.S.) | MS | NS | 1614 |
| 12 | Jogi dhan |  Dalapchand (E.S.) | SB | NS | 3316 |
| 13 | Kaanchi |  Dentam (W.S.) | SB | MS | 4842 |
| 14 | Kagey |  Reshi (E.S.)  | LB | NS | 3940 |
| 15 | Kalo dhan |  Tintek (E.S.) | SB | SS | 4744 |
| 16 | Kalo nuniaI |  Daramdin (W.S.)  | SB | SS | 3146 |
| 17 | Kaltura |  Reshi (E.S.)  | LB | MS | 3933 |
| 18 | Kataka |  Bering (E.S.) | MS | SS | 2089 |
| 19 | Krishna bhog |  Rumtek (E.S.) | MS | SS | 5089 |
| 20 | Phudungey | Assam Lingzey (E.S.) | SB | NS | 4314 |
| 21 | Rudhua |  Saramsa (E.S.) | SB | MS | 3001 |
| 22 | Sano attey |  Rumtek (E.S.) | SB | NS | 5133 |
| 23 | Sirkey |  Tintek (E.S.) | SB | NS | 4980 |
| 24 | Taprey |  Rumtek (E.S.) | SB | NS | 4523 |
| 25 | Thulo attey |  Bering (E.S.) | SB | NS | 2085 |
| 26 | Thulo tulashi | Saureni (E.S.) | SB | NS | 3243 |
| 27 | Tulashi | Bering (E.S) | SB | MS | 2089 |
| 28 | Chinizho | Pentong (N.S.) | SB | NS | 5781 |
| 29 | Dharmali | Pentong (N.S.) | SB | SS | 5781 |
| 30 | Marbonzho | Pentong (N.S.) | SB | NS | 5781 |
| 31 | Mumpupzho | Pentong(N.S.) | SB | NS | 5781 |
| 32 | Tukmorzho | Pentong (N.S.) | LB | NS | 5781 |
| 33 | Basmati | Gerethang (W.S.) | SB | MS | 3723 |
| 34 | Birinful | Gerethang (W.S.) | MS | MS | 3973 |
| 35 | Champa | Daramdin (W.S.) | MS | NS | 3136 |
| 36 | Charingrey | Chota-Singtam (E.S.) | LB | NS | 4258 |
| 37 | Japani | Malbasey (W.S.) | LS | NS | 2384 |
| 38 | Kalo nunia II | Budang (W.S.)  | MS | SS | 2143 |
| 39 | Khampti | Budang (W.S.) | LB | NS | 2143 |
| 40 | Lalbaachi | Daramdin (W.S.) | LB | NS | 3146 |
| 41 | Manipuri | Malbasey (W.S.) | LB | NS | 2384 |
| 42 | Marshi | Daramdin (W.S.) | SB | NS | 3146 |
| 43 | Panbhara | Daramdin (W.S.) | LB | NS | 3146 |
| 44 | Raja bara | Budang (W.S.) | LS | MS | 2384 |
| 45 | Ram jeera | Gerethang (W.S.)  | SB | SS | 3922 |
| 46 | Shyam jeera | Daramdin (W.S.) | SB | NS | 3146 |
| 47 | Thamba | Melli (S.S.) | LS | NS | 2434 |
| 48 | Timburey | Daramdin (W.S.) | SB | NS | 3146 |
| 49 | Champasari | Turuk (S.S.)  | LS | NS | 2650 |
| 50 | Chirakhey | Bering (E.S.) | SB | NS | 2089 |
| 51 | Mansarey | Daramdin (W.S.) | LS | NS | 3146 |
| 52 | Masuley | Melli (S.S.) | MS | NS | 2434 |
| 53 | Ram bhog | Tareythang (E.S.) | SB | SS | 2086 |
|  |  |  |  |  |  |

*\* E.S. East District of Sikkim, W.S. West District of Sikkim, N.S. North District of Sikkim, S.S. South District of Sikkim, SB: Short bold, LB: Long Bold, MS: Medium Slender, LS: Long Slender, NS: Non-Scented, MS: Mild Scented, SS: Strongly Scented*

**Table S2.** List of 21 phenotypic traits evaluated among 53 rice landraces

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Phenotypic Traits** | **Sl. No.** | **Phenotypic Traits** |
|  |  |  |  |
| 1 | Days to 50% flowering | 12 | Number of panicles per plant |
| 2 | Grain width | 13 | Flag leaf length |
| 3 | Grain length | 14 | Flag leaf width |
| 4 | Grain thickness | 15 | Stem thickness |
| 5 | 100-grain weight | 16 | Plant height |
| 6 | Kernel width | 17 | Protein |
| 7 | Kernel length | 18 | Carbohydrate |
| 8 | Kernel thickness | 19 | Crude fat |
| 9 | Kernel width after cooking | 20 | Crude fiber |
| 10 | Kernel length after cooking | 21 | Amylose value |
| 11 | Number of effective tillers |   |

**Table S3.** Characteristics of 42 SSR markers used in genetic diversity analysis

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Locus** | **Chr.****No.** | **Position (cM)** | **No. of** **Alleles** | **MAF** | **PIC** | **Na** | **Ne** | ***Ho*** | ***He*** |
| RM5 | 1 | 94.9 | 4 | 0.667 | 0.334 | 3.5 | 2.807 | 0.094 | 0.641 |
| RM495 | 1 | 2.8 | 4 | 0.667 | 0.340 | 3.5 | 3.006 | 0.145 | 0.667 |
| RM431 | 1 | 178.3 | 6 | 0.726 | 0.317 | 6 | 4.994 | 0.336 | 0.799 |
| RM237 | 1 | 115.2 | 3 | 0.625 | 0.357 | 2.5 | 2.115 | 0 | 0.524 |
| RM312 | 1 | 71.6 | 7 | 0.694 | 0.334 | 6.5 | 4.96 | 0.189 | 0.791 |
| RM283 | 1 | 31.4 | 5 | 0.588 | 0.36 | 4.5 | 2.737 | 0.025 | 0.63 |
| RM452 | 2 | 58.4 | 5 | 0.632 | 0.352 | 4 | 2.786 | 0.188 | 0.641 |
| RM6 | 2 | 154.7 | 5 | 0.711 | 0.315 | 4.5 | 3.783 | 0.058 | 0.732 |
| RM322 | 2 | 49.7 | 3 | 0.93 | 0.121 | 2.5 | 1.216 | 0.085 | 0.175 |
| RM489 | 3 | 29.2 | 3 | 0.63 | 0.355 | 2.5 | 2.038 | 0.192 | 0.507 |
| RM338 | 3 | 108.4 | 7 | 0.745 | 0.307 | 5.5 | 4.276 | 0.091 | 0.761 |
| OSR13 | 3 | 53.1 | 8 | 0.644 | 0.333 | 8 | 4.95 | 0.679 | 0.789 |
| RM514 | 3 | 216.4 | 8 | 0.579 | 0.366 | 7.5 | 5.989 | 0.549 | 0.832 |
| RM307 | 4 | 0 | 5 | 0.789 | 0.277 | 5 | 4.159 | 0.392 | 0.758 |
| RM537 | 4 | 8.5 | 3 | 0.75 | 0.305 | 2 | 1.42 | 0.036 | 0.228 |
| RM551 | 4 | 8.5 | 8 | 0.764 | 0.293 | 7 | 4.919 | 0.15 | 0.793 |
| RM178 | 5 | 118.8 | 4 | 0.767 | 0.293 | 3 | 2.522 | 0 | 0.542 |
| RM413 | 5 | 26.7 | 5 | 0.548 | 0.372 | 4 | 2.62 | 0.118 | 0.601 |
| RM510 | 6 | 20.8 | 5 | 0.676 | 0.319 | 5 | 3.816 | 0.283 | 0.735 |
| RM454 | 6 | 99.3 | 7 | 0.66 | 0.325 | 6.5 | 3.128 | 0.12 | 0.653 |
| RM190 | 6 | 7.4 | 4 | 0.632 | 0.356 | 3.5 | 2.099 | 0.016 | 0.515 |
| RM253 | 6 | 37 | 3 | 0.647 | 0.346 | 3 | 2.308 | 0.318 | 0.563 |
| RM314 | 6 | 33.6 | 6 | 0.755 | 0.294 | 6 | 4.714 | 0.182 | 0.786 |
| RM118 | 7 | 96.9 | 5 | 0.686 | 0.334 | 5 | 3.771 | 0.284 | 0.734 |
| RM125 | 7 | 24.8 | 3 | 0.649 | 0.293 | 2.5 | 1.575 | 0 | 0.339 |
| RM10 | 7 | 63.5 | 6 | 0.731 | 0.310 | 5.5 | 3.848 | 0.08 | 0.739 |
| RM408 | 8 | 0-1.1 | 4 | 0.698 | 0.319 | 4 | 3.525 | 0.4 | 0.716 |
| RM44 | 8 | 60.9 | 7 | 0.5 | 0.375 | 5.5 | 3.011 | 0.984 | 0.668 |
| RM284 | 8 | 83.7 | 9 | 0.74 | 0.310 | 8.5 | 6.384 | 0.359 | 0.842 |
| RM447 | 8 | 124.6 | 3 | 0.708 | 0.325 | 3 | 1.818 | 0.15 | 0.45 |
| RM223 | 8 | 80.5 | 3 | 0.663 | 0.347 | 2.5 | 1.954 | 0.064 | 0.488 |
| RM342 | 8 | 78.4 | 8 | 0.703 | 0.316 | 7.5 | 4.908 | 0.864 | 0.796 |
| RM515 | 8 | 80.5 | 2 | 0.668 | 0.340 | 1 | 1.210 | 0 | 0.190 |
| RM316 | 9 | 1.8 | 7 | 0.704 | 0.320 | 6 | 3.585 | 0.153 | 0.713 |
| RM215 | 9 | 99.4 | 9 | 0.668 | 0.324 | 8 | 5.156 | 0.867 | 0.801 |
| RM271 | 10 | 59.4 | 6 | 0.774 | 0.286 | 6 | 5.029 | 0.024 | 0.801 |
| RM287 | 11 | 68.6 | 5 | 0.653 | 0.334 | 4 | 2.762 | 0.199 | 0.638 |
| RM536 | 11 | 55.1 | 6 | 0.73 | 0.320 | 5.5 | 4.559 | 0 | 0.78 |
| RM144 | 11 | 60.9 | 4 | 0.767 | 0.292 | 3.5 | 2.151 | 0.212 | 0.529 |
| RM19 | 12 | 20.9 | 2 | 0.587 | 0.359 | 2 | 1.939 | 0 | 0.484 |
| RM20 | 12 | 0 | 11 | 0.615 | 0.349 | 9 | 4.246 | 0.396 | 0.764 |
| RM277 | 12 | 57.2 | 4 | 0.46 | 0.354 | 3.5 | 2.397 | 0.048 | 0.583 |
| Mean | **-** | - | **5.262** | **0.679** | **0.323** | **4.721** | **3.344** | **0.217** | **0.632** |
| S.E. | **-** | - | **0.332** | **0.013** | **0.006** | **0.307** | **0.21** | **0.038** | **0.029** |

*Chr. No., Chromosome Number; cM, centiMorgan; MAF, Major Allele Frequency; PIC, Polymorphism Information content; Na, Number of Different alleles; Ne, Effective No. of Alleles; Ho, Observed heterozygosity; He, Expected heterozygosity; S.E.; Standard Error*

**Table S4** The sequences of forty-five SSR markers used for genotyping of rice landraces

|  |  |  |
| --- | --- | --- |
| **Marker** | **Forward primer sequence (5’ to 3’)** | **Reverse primer sequence (5’ to 3’)** |
| RM5 | TGCAACTTCTAGCTGCTCGA | GCATCCGATCTTGATGGG |
| RM495 | AATCCAAGGTGCAGAGATGG | CAACGATGACGAACACAACC |
| RM431 | TCCTGCGAACTGAAGAGTTG | AGAGCAAAACCCTGGTTCAC |
| RM237 | CAAATCCCGACTGCTGTCC | TGGGAAGAGAGCACTACAGC |
| RM312 | GTATGCATATTTGATAAGAG | AAGTCACCGAGTTTACCTTC |
| RM283 | GTCTACATGTACCCTTGTTGGG | CGGCATGAGAGTCTGTGATG |
| RM452 | CTGATCGAGAGCGTTAAGGG | GGGATCAAACCACGTTTCTG |
| RM6 | GTCCCCTCCACCCAATTC | TCGTCTACTGTTGGCTGCAC |
| RM322 | CAAGCGAAAATCCCAGCAG | GATGAAACTGGCATTGCCTG |
| RM489 | ACTTGAGACGATCGGACACC | TCACCCATGGATGTTGTCAG |
| RM338 | CACAGGAGCAGGAGAAGAGC | GGCAAACCGATCACTCAGTC |
| OSR13 | CATTTGTGCGTCACGGAGTA | AGCCACAGCGCCCATCTCTC |
| RM514 | AGATTGATCTCCCATTCCCC | CACGAGCATATTACTAGTGG |
| RM307 | GTACTACCGACCTACCGTTCAC | CTGCTATGCATGAACTGCTC |
| RM537 | CCGTCCCTCTCTCTCCTTTC | ACAGGGAAACCATCCTCCTC |
| RM551 | AGCCCAGACTAGCATGATTG | GAAGGCGAGAAGGATCACAG |
| RM178 | TCGCGTGAAAGATAAGCGGCGC | GATCACCGTTCCCTCCGCCTGC |
| RM413 | GGCGATTCTTGGATGAAGAG | TCCCCACCAATCTTGTCTTC |
| RM170 | TCGCGCTTCTTCCTCGTCGACG | CCCGCTTGCAGAGGAAGCAGCC |
| RM510 | AACCGGATTAGTTTCTCGCC | TGAGGACGACGAGCAGATTC |
| RM454 | CTCAAGCTTAGCTGCTGCTG | GTGATCAGTGCACCATAGCG |
| RM190 | GCATTGTCATGTCGAAGCC | CTAGCAGGAACTCCTTTCAGG |
| RM253 | TCCTTCAAGAGTGCAAAACC | GCATTGTCATGTCGAAGCC |
| RM314 | CTAGCAGGAACTCCTTTCAGG | AACATTCCACACACACACGC |
| RM455 | AACAACCCACCACCTGTCTC | AGAAGGAAAAGGGCTCGATC |
| RM118 | CCAATCGGAGCCACCGGAGAGC | CACATCCTCCAGCGACGCCGAG |
| RM125 | ATCAGCAGCCATGGCAGCGACC | AGGGGATCATGTGCCGAAGGCC |
| RM10 | TTGTCAAGAGGAGGCATCG | CAGAATGGGAAATGGGTCC |
| RM408 | CAACGAGCTAACTTCCGTCC | ACTGCTACTTGGGTAGCTGACC |
| RM25 | GGAAAGAATGATCTTTTCATGG | CTACCATCAAAACCAATGTTC |
| RM44 | ACGGGCAATCCGAACAACC | TCGGGAAAACCTACCCTACC |
| RM284 | TCCTTGTGAAATCTGGTCCC | GTAGCCTAGCATGGTGCATG |
| RM447 | CCCTTGTGCTGTCTCCTCTC | ACGGGCTTCTTCTCCTTCTC |
| RM223 | GAGTGAGCTTGGGCTGAAAC | GAAGGCAAGTCTTGGCACTG |
| RM342 | CCATCCTCCTACTTCAATGAAG | ACTATGCAGTGGTGTCACCC |
| RM515 | TAGGACGACCAAAGGGTGAG | TGGCCTGCTCTCTCTCTCTC |
| RM316 | CTAGTTGGGCATACGATGGC | ACGCTTATATGTTACGTCAAC |
| RM215 | CAAAATGGAGCAGCAAGAGC | TGAGCACCTCCTTCTCTGTAG |
| RM271 | TCAGATCTACAATTCCATCC | TCGGTGAGACCTAGAGAGCC |
| RM287 | TTCCCTGTTAAGAGAGAAATC | GTGTATTTGGTGAAAGCAAC |
| RM536 | TCTCTCCTCTTGTTTGGCTC | ACACACCAACACGACCACAC |
| RM144 | TGCCCTGGCGCAAATTTGATCC | GCTAGAGGAGATCAGATGGTAGTGCATG |
| RM19 | CAAAAACAGAGCAGATGAC | CTCAAGATGGACGCCAAGA |
| RM20 | ATCTTGTCCCTGCAGGTCAT | GAAACAGAGGCACATTTCATTG |
| RM277 | CGGTCAAATCATCACCTGAC | CAAGGCTTGCAAGGGAAG |