**Table S1.** Details of the core subset of safflower accessions used in the study and their classification based on genetic clustering methods. IC-Indigenous collection, EC-Exotic collection, GMU-Germplasm Management Unit, G-genotypic group in NJ tree, P-population detected in STRUCTURE; exotic accessions of Indian origin were originally collected by Professor Knowles in India.

|  |  |  |  |
| --- | --- | --- | --- |
| Accession ID | Accession Name | Origin | Genotype classification |
| NJ tree | STRUCTURE |
| 1 | IC-253116 (GMU40) | India | G3 | Admixture |
| 2 | IC-253170 (GMU95) | India | G3 | P3 |
| 3 | IC-302552 (GMU216) | India | G3 | Admixture |
| 4 | IC-401911 (GMU224) | India | G3 | P3 |
| 5 | IC-302637 (GMU330) | India | G3 | P1 |
| 6 | IC-337656 (GMU473) | India | G3 | P3 |
| 7 | IC-302866 (GMU593) | India | G4 | P3 |
| 8 | IC-302872 (GMU599) | India | G3 | P1 |
| 9 | IC-11174 (GMU638) | India | G5 | Admixture |
| 10 | IC-405920 (GMU659) | India | G4 | P3 |
| 11 | IC-302913 (GMU671) | India | G3 | P1 |
| 12 | EC-151819 (GMU707) | Uncertain | G1 | Admixture |
| 13 | EC-155438 (GMU744) | USA | G1 | Admixture |
| 14 | EC-159610 (GMU774) | USA | G2 | Admixture |
| 15 | EC-159643 (GMU819) | USA | G1 | Admixture |
| 16 | EC-159644 (GMU821) | USA | G1 | Admixture |
| 17 | EC-161275 (GMU864) | Italy | G2 | P2 |
| 18 | EC-181072 (GMU878) | Turkey | G3 | P1 |
| 19 | EC-181267 (GMU1047) | India | G3 | P1 |
| 20 | EC-181279 (GMU1059) | India | G3 | Admixture |
| 21 | EC-181299 (GMU1078) | India | G1 | P1 |
| 22 | EC-181367 (GMU1137) | Pakistan | G2 | P2 |
| 23 | EC-181426 (GMU1185) | India | G1 | P4 |
| 24 | EC-181513 (GMU1250) | Israel | G2 | P2 |
| 25 | EC-181563 (GMU1287) | India | G1 | Admixture |
| 26 | EC-181596 (GMU1315) | India | G1 | Admixture |
| 27 | EC-181622 (GMU1339) | India | G3 | P3 |
| 28 | EC-181637 (GMU1354) | India | G3 | Admixture |
| 29 | EC-337427 (GMU1409) | India | G3 | Admixture |
| 30 | EC-181797 (GMU1485) | Sudan | G1 | P2 |
| 31 | EC-181929 (GMU1603) | India | G3 | Admixture |
| 32 | EC-181956 (GMU1626) | India | G3 | P3 |
| 33 | EC-181969 (GMU1638) | India | G3 | P1 |
| 34 | EC-182044 (GMU1695) | India | G3 | Admixture |
| 35 | EC-182058 (GMU1708) | India | G3 | P1 |
| 36 | EC-182138 (GMU1748) | Portugal | G3 | Admixture |
| 37 | EC-182160 (GMU1765) | India | G1 | P4 |
| 38 | EC-182256 (GMU1812) | India | G1 | Admixture |
| 39 | EC-191790 (GMU1824) | Australia | G1 | P4 |
| 40 | EC-175430 (GMU1855) | Hungary | G2 | Admixture |
| 41 | EC-169603 (GMU1871) | Italy | G1 | Admixture |
| 42 | EC-337682 (GMU1875) | India | G3 | P1 |
| 43 | EC-210549 (GMU2016) | USA | G3 | Admixture |
| 44 | IC-337734 (GMU2129) | India | G3 | P1 |
| 45 | IC-337741 (GMU2136) | India | G3 | Admixture |
| 46 | IC-337789 (GMU2198) | India | G4 | P3 |
| 47 | IC-442299 (GMU2240) | India | G1 | P4 |
| 48 | IC-337956 (GMU2413) | India | G3 | Admixture |
| 49 | IC-337972 (GMU2432) | India | G2 | P1 |
| 50 | IC-337977 (GMU2437) | India | G3 | P1 |
| 51 | IC-338007 (GMU2472) | India | G2 | P2 |
| 52 | IC-405973 (GMU2594) | India | G3 | P1 |
| 53 | IC-338143 (GMU2616) | India | G3 | P1 |
| 54 | IC-338212 (GMU2718) | India | G3 | P1 |
| 55 | IC-406021 (GMU2749) | India | G3 | P1 |
| 56 | EC-210499 (GMU2860) | Afghanistan | G3 | Admixture |
| 57 | EC-181946 (GMU2944) | India | G2 | Admixture |
| 58 | EC-210526 (GMU2969) | India | G3 | Admixture |
| 59 | IC-406144 (GMU2985) | India | G3 | P3 |
| 60 | IC-338311 (GMU2987) | India | G3 | P3 |
| 61 | IC-406193 (GMU3047) | India | G3 | Admixture |
| 62 | IC-442321 (GMU3084) | India | G3 | P3 |
| 63 | IC-442329 (GMU3095) | India | G3 | P3 |
| 64 | EC-181372-1 (GMU3177) | India | G5 | P3 |
| 65 | EC-181541-1 (GMU3189) | India | G2 | Admixture |
| 66 | EC-181868-1 (GMU3208) | India | G3 | P3 |
| 67 | EC-210538-1 (GMU3256) | India | G2 | Admixture |
| 68 | IC-338338 (GMU3281) | India | G3 | P1 |
| 69 | IC-442380 (GMU3386) | India | G3 | P1 |
| 70 | IC-338373 (GMU3436) | India | G1 | Admixture |
| 71 | IC-442422 (GMU3491) | India | G3 | Admixture |
| 72 | IC-406256 (GMU3537) | India | G3 | Admixture |
| 73 | IC-338427 (GMU3607) | India | G2 | Admixture |
| 74 | IC-338432 (GMU3617) | India | G1 | Admixture |
| 75 | GMU3629 | India | G3 | Admixture |
| 76 | IC-442494 (GMU3639) | India | G3 | P1 |
| 77 | EC-338328 (GMU3703) | India | G1 | Admixture |
| 78 | EC-338328 (GMU3707) | Iran | G3 | Admixture |
| 79 | IC-442563 (GMU3740) | India | G3 | Admixture |
| 80 | GMU3780 | India | G1 | Admixture |
| 81 | IC-544964 (GMU3822) | India | G2 | Admixture |
| 82 | IC-545045 (GMU3829) | India | G2 | Admixture |
| 83 | IC-544985 (GMU3852) | India | G2 | Admixture |
| 84 | EC-661155 (GMU3968) | USA | G3 | P1 |
| 85 | IC-511314 (GMU4010) | India | G2 | P2 |
| 86 | EC-303232 (GMU4038) | Iran | G3 | Admixture |
| 87 | EC-303263 (GMU4066) | India | G2 | Admixture |
| 88 | IC-511260 (GMU4109) | India | G3 | P1 |
| 89 | IC-442593 (GMU4201) | India | G5 | P1 |
| 90 | IC-574722 (GMU4223) | India | G3 | Admixture |
| 91 | IC-442608 (GMU4234) | India | G2 | Admixture |
| 92 | IC-574764 (GMU4305) | India | G3 | Admixture |
| 93 | EC-565894 (GMU4381) | Mexico | G1 | Admixture |
| 94 | EC-565944 (GMU4420) | Mexico | G1 | Admixture |
| 95 | EC-565943 (GMU4429) | Mexico | G2 | P2 |
| 96 | EC-566009 (GMU4502) | Mexico | G3 | P1 |
| 97 | EC-566012 (GMU4507) | Mexico | G4 | P3 |
| 98 | EC-566030 (GMU4549) | Mexico | G1 | Admixture |
| 99 | EC-566035 (GMU4558) | Mexico | G2 | P2 |
| 100 | EC-566073 (GMU4623) | Mexico | G2 | Admixture |
| 101 | EC-566072 (GMU4627) | Mexico | G2 | Admixture |
| 102 | GMU4646 | Mexico | G1 | P4 |
| 103 | GMU4688 | Mexico | G3 | P1 |
| 104 | GMU4693 | Mexico | G1 | Admixture |
| 105 | GMU4696 | Mexico | G1 | Admixture |
| 106 | GMU4773 | Turkey | G3 | Admixture |
| 107 | GMU4812 | Iran | G1 | P3 |
| 108 | GMU4839 | Italy | G3 | Admixture |
| 109 | IC-76430 (GMU4934) | India | G3 | P3 |
| 110 | GMU4966 | Uncertain | G3 | Admixture |
| 111 | EC-338595 (GMU4972) | India | G3 | Admixture |
| 112 | GMU5032 | India | G3 | Admixture |
| 113 | GMU5044 | India | G3 | P3 |
| 114 | GMU5046 | India | G3 | P1 |
| 115 | IC-442704 (GMU5075) | India | G3 | Admixture |
| 116 | GMU5081 | India | G5 | Admixture |
| 117 | EC-181526 (GMU5133) | Afghanistan | G3 | P3 |
| 118 | EC-337146 (GMU5163) | India | G2 | Admixture |
| 119 | EC-337155 (GMU5170) | India | G4 | P3 |
| 120 | EC-337251 (GMU5239) | India | G3 | Admixture |
| 121 | EC-337318 (GMU5295) | India | G5 | P1 |
| 122 | EC-337375 (GMU5335) | India | G2 | Admixture |
| 123 | EC-337414 (GMU5361) | India | G3 | Admixture |
| 124 | EC-337869 (GMU5663) | USA | G4 | Admixture |
| 125 | EC-337879 (GMU5668) | Belgium | G1 | P3 |
| 126 | EC-337943 (GMU5701) | China | G5 | P1 |
| 127 | EC-337999 (GMU5728) | USA | G5 | P3 |
| 128 | EC-338179 (GMU5825) | Sudan | G5 | Admixture |
| 129 | EC-338199 (GMU5841) | Italy | G2 | Admixture |
| 130 | EC-338210 (GMU5848) | India | G3 | P1 |
| 131 | EC-338329 (GMU5908) | India | G2 | Admixture |
| 132 | EC-338354 (GMU5923) | India | G3 | Admixture |
| 133 | EC-338503 (GMU6026) | India | G3 | P1 |
| 134 | EC-338541 (GMU6057) | India | G3 | P3 |
| 135 | GMU6119 | India | G3 | P1 |
| 136 | IC-442753 (GMU6192) | India | G1 | P3 |
| 137 | IC-442778 (GMU6252) | India | G3 | P1 |
| 138 | IC-442787 (GMU6306) | India | G5 | P1 |
| 139 | GMU6312 | India | G3 | P1 |
| 140 | GMU6424 | India | G3 | P1 |
| 141 | GMU6506 | India | G3 | P3 |
| 142 | IC-442856 (GMU6548) | India | G3 | P3 |
| 143 | GMU6556 | India | G4 | P3 |
| 144 | GMU6663 | India | G3 | P1 |
| 145 | GMU6851 | India | G3 | P1 |
| 146 | IC-442949 (GMU6869) | India | G3 | Admixture |
| 147 | IC-442966 (GMU6924) | India | G3 | P3 |
| 148 | IC-443009 (GMU7191) | India | G4 | Admixture |

**Table S2.** Details of SSR primer pairs used for characterization of the safflower core subset of 148 accessions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SSR locus name | Forward primer sequence | Reverse primer sequence | Repeat motif | Linkage group  |
|
| ct-384 | CTCCTTCGCGATTCGATCC | CTTCGGTTGTGTCCCATGC | (AC)17 | T1 |
| ct-598 | CATCCAACAAGAACACACCG | CTCAATCGTCCATCCCACTT | (GA)19...(AAG)9 | T1 |
| ct-316 | CTGAACGAAAACGCAGTCAA | TGGGTTTTGGATGTGAGGAT | (TC)8 | T1 |
| ct-657 | GGCTCAACTCGACTCATCATC | GCTTGTTGGGAGGGATCATA | (CAT)6...(CAT)6...(CAT)12 | T1 |
| ct-474 | GTGTGTGTGTGTGTGTGGG | AGGGTTGCAATTAGGGGAAAC | (AAG)9 | O1 |
| ct-783 | GATATCGCCGGAGATGGATA | TCTCATCATCGGATCACCAA | (TC)7 | O1 |
| ct-405 | TTCCCGAGGAGGAAGACG | GGTTTGGCCTTTTGGGGTC | (CT)8 | O1 |
| ct-863 | ATTCAACGCCAACCAGAAAC | GCTTTCAGGCAAACGACAAT | (A)10 | T2 |
| ct-309 | TTGCAAGATTGTTCGTCGAT | TCCCTTCCTATTCTGGACCC | (TA)8 | T2 |
| ct-354 | CCCTCCCAAATCAATCCATCG | TCGCTTCTCCTTCTGGTCG | (AG)8 | T2 |
| ct-594 | CAGGTTTTCGTTTGCAGTGA | ATGAGTCCGATTGAGATCCG | (TG)8...(TG)6 | T3 |
| ct-599 | CATTAACCCATCCATCACCC | TGTCATCTCTGAAAGCACCG | (TC)11...(TA)6 | T3 |
| ct-297 | TCTTAATTGGGGCAGTCCAG | GGGAGAGAAGAGTGCGTTTG | (GA)8 | O3 |
| ct-010 | TTGTTCTTATTTTTCCGGCG | CGACTCTCCTCCTACGGTCA | (CT)10 | T4a |
| ct-249 | AGAAGGCGACTTCACCATTG | TGAAAACCTTTAACATGAATTGAGA | (G)10 | T4a |
| ct-006 | CAATTCGCTTCCACCAAGAT | TACTCCTACCCGCCACAAAC | (GT)12 | T4a |
| ct-861 | AGCAATCTTTGATTTCCCCA | TTCCAACAACTCCAATTCCC | (A)10 | O4a |
| ct-788  | GGAGGTTTCATCCTCTCTTCTC | TCCACCACAATCCTTCCTTC | (AG)7 | T4b |
| ct-419 | AACCACCACCAATTCGCAC | GAGTGCTGAAACCACAGCG | (AC)9 | T5 |
| ct-137 | AAGCGCTTCACTTCCCACTA | TCCATCGTCGTTTGTAACCA | (AC)9 | T5 |
| ct-266 | ACGGATTCATTCAGTCTGGC | AGCCTCGGGTAATCGAACTT | (AC)8 | T5 |
| ct-032 | GAGAACCTTCGCGTGAAATC | TGGAAGAAGAAGGGGTGATG | (CT)16 | T5 |
| ct-233 | TCCCAATCACAAAACTGCAA | GCGTAGCGACTGCCTTAATC | (TTC)9 | T5 |
| ct-440 | AGCAGTAGAGCATAACGCC | CAGCCAGCCAGAATGATCG | (AG)9 | T5 |
| ct-185 | ATTTGTCGCCATTATCGAGC | CAATCTAAACCCTCTCGCCA | (TG)9 | T5 |
| ct-518 | CCCTTTTTGCTCTCCAACCT | CTTGGGCCTTCCTCTCTTCT | (AG)10 | T5 |
| ct-044 | GGGCTTGCTTCATTCAGGT | TGGTGGATTGAAATTGGGTT | (TC)13 | T6 |
| ct-381 | CATGGTGGGTCCTCTAATCG | GTTTTCATCTCCATCGGCGG | (AG)14 | T6 |
| ct-337 | CCAAAGCCCTGCTGTCTTC | TAGCTAGGGCACATACACG | (CT)8 | T6 |
| ct-331 | TTCGTCTATTATTGCATGCTTGA | CAAAAGCACCGTGACAAGAA | (TC)8 | T6 |
| ct-590 | CACAACCAGTGAATCAACCG | CAGTGAGGAAATCGGAAGGA | (TCA)6...(GAA)8 | T6 |
| ct-274 | TGAGTAAAGTTTGACAGTGAGGAA | TCCTGCCATTGCTTCTCTTT | (AG)8 | T7 |
| ct-623 | CGATTATTCCCCGTTGTTTG | CGGTCTCTGGGAAGTCCATA | (CTT)10...(GA)6 | T7 |
| ct-015 | TTCGAGTTGTGCCCTAAACC | AGAGAGGCCATCGATTGAGA | (TC)14 | T7 |
| ct-047 | GAGCTCTTCACGCACCTCAC | TAGAAATCGAACACATGGCG | (GA)25 | T8 |
| ct-558 | ACCTTCTCCTCACCTCCGAT | GTCTTAAGCTGTTCCGCCTG | (TCC)5...(GA)21 | T8 |
| ct-831 | CAGAGAGAATCCCGCAAAAA | GCAAACCCATCTCTGCAAAT | (AG)18...(CA)8 | O8a |
| ct-050 | CCTGCTGCTGGTCTTCCTAC | CCAACACCTACGCATCCTTT | (GA)14 | T9 |
| ct-423 | ACCAAGGAGGCTTGATCCC | AGCTCCTCATAAGCTACTCAAAG | (CT)9 | T9 |
| ct-448 | GGGGTGTGCGTAGGATAAG | CCTGCTTCTGCTATTGTGCG | (GT)14 | T9 |
| ct-138 | TGAAATGGTTTCTGGGTGAA | GAAGCCATTGGTGGAAGTGT | (AC)9 | T10a |
| ct-227 | CCCATTTCTCCCTCCTATCC | CGATTGGTAGCAATGTGGTG | (AGA)9 | T10b |
| ct-246 | TCTTGATTCCATCTCTCCCG | TAGATACGGAAGCCGTGGTC | (TCTCCA)18 | T10b |
| ct-218 | AATCATCCCTACCCACCTCC | TCGCATCCCTTGCTATCTTC | (GAA)9 | T11 |