**Table S1. The origin of 56 genotypes of *Rubus fructicosus* L. used in this study.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Lines | Mutagen treatment  | Application part | No.  | Lines | Mutagen treatment  | Application part |
| 1 | V-9 | control | *in vitro* sprouts | 30 | γ-F153 | γ-ray 20 Gy  | *in vitro* sprouts |
| 2 | γ-1 | γ-ray\* 80 Gy | *in vitro* sprouts | 31 | γ-F205 | γ-ray 20 Gy | *in vitro* sprouts |
| 3 | γ-2 | γ-ray 80 Gy  | *in vitro* sprouts | 32 | γ-F207 | γ-ray 20 Gy | *in vitro* sprouts |
| 4 | γ-4 | γ-ray 80 Gy | *in vitro* sprouts | 33 | γ-F211 | γ-ray 20 Gy  | *in vitro* sprouts |
| 5 | γ-A101 | γ-ray 60 Gy | *in vitro* sprouts | 34 | γ-F242 | γ-ray 20 Gy  | *in vitro* sprouts |
| 6 | γ-A202 | γ-ray 60 Gy  | *in vitro* sprouts | 35 | γ-F250 | γ-ray 20 Gy  | *in vitro* sprouts |
| 7 | γ-A219 | γ-ray 60 Gy  | *in vitro* sprouts | 36 | γ-G103 | γ-ray 60 Gy | *in vitro* sprouts |
| 8 | γ-B101 | γ-ray 80 Gy  | *in vitro* sprouts | 37 | γ-G202 | γ-ray 60 Gy  | *in vitro* sprouts |
| 9 | γ-B116 | γ-ray 80 Gy | *in vitro* sprouts | 38 | γ-G204 | γ-ray 60 Gy | *in vitro* sprouts |
| 10 | γ-B122 | γ-ray 80 Gy | *in vitro* sprouts | 39 | γ-G213 | γ-ray 60 Gy  | *in vitro* sprouts |
| 11 | γ-B201 | γ-ray 80 Gy  | *in vitro* sprouts | 40 | γ-G214 | γ-ray 60 Gy | *in vitro* sprouts |
| 12 | γ-B205 | γ-ray 80 Gy  | *in vitro* sprouts | 41 | γ-G215 | γ-ray 60 Gy | *in vitro* sprouts |
| 13 | γ-B221 | γ-ray 80 Gy  | *in vitro* sprouts | 42 | γ-S1 | γ-ray 40 Gy | *in vitro* sprouts |
| 14 | γ-B303 | γ-ray 80 Gy  | *in vitro* sprouts | 43 | γ-S2 | γ-ray 40 Gy  | *in vitro* sprouts |
| 15 | γ-C101 | γ-ray 60 Gy | *in vitro* sprouts | 44 | γ-S3 | γ-ray 40 Gy | *in vitro* sprouts |
| 16 | γ-C105 | γ-ray 60 Gy  | *in vitro* sprouts | 45 | γ-S4 | γ-ray 40 Gy  | *in vitro* sprouts |
| 17 | γ-C122 | γ-ray 60 Gy | *in vitro* sprouts | 46 | γ-S5 | γ-ray 40 Gy  | *in vitro* sprouts |
| 18 | γ-C129 | γ-ray 60 Gy  | *in vitro* sprouts | 47 | γ-S6 | γ-ray 40 Gy | *in vitro* sprouts |
| 19 | γ-C137 | γ-ray 60 Gy | *in vitro* sprouts | 48 | γ-S7 | γ-ray 40 Gy  | *in vitro* sprouts |
| 20 | γ-C209 | γ-ray 60 Gy  | *in vitro* sprouts | 49 | γ-S8 | γ-ray 40 Gy | *in vitro* sprouts |
| 21 | γ-C216 | γ-ray 60 Gy | *in vitro* sprouts | 50 | γ-S9 | γ-ray 40 Gy  | *in vitro* sprouts |
| 22 | γ-C225 | γ-ray 60 Gy  | *in vitro* sprouts | 51 | γ-S10 | γ-ray 40 Gy  | *in vitro* sprouts |
| 23 | γ-C234 | γ-ray 60 Gy  | *in vitro* sprouts | 52 | γ-S11 | γ-ray 40 Gy  | *in vitro* sprouts |
| 24 | γ-D109 | γ-ray 40 Gy | *in vitro* sprouts | 53 | γ-S12 | γ-ray 40 Gy  | *in vitro* sprouts |
| 25 | γ-D120 | γ-ray 40 Gy  | *in vitro* sprouts | 54 | MNU-3 | MNU† (Seed) | seeds |
| 26 | γ-D129 | γ-ray 40 Gy | *in vitro* sprouts | 55 | MNU-11 | MNU (Seed) | seeds |
| 27 | γ-D144 | γ-ray 40 Gy  | *in vitro* sprouts | 56 | MNU-32 | MNU (Seed) | seeds |
| 28 | γ-D210 | γ-ray 40 Gy  | *in vitro* sprouts |  |  |  |  |
| 29 | γ-D215 | γ-ray 40 Gy  | *in vitro* sprouts |  |  |  |  |

\*γ-ray: ⁶⁰Co (KAERI, Daejon),‡MNU: *N*-methyl-*N'*-nitrosourea(0.05%).

**Table S2. Measurements of genetic variation with the populations of blackberry**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Population | No. of total bands | No. of polymorphism bands | Polymorphism rate (%) | Number of alleles | Effective number of alleles | GDa |
| 20 Gy | 18 | 5 | 27.78 | 1.277 | 1.195 | 0.109 |
| 40 Gy | 18 | 7 | 38.89 | 1.388 | 1.255 | 0.141 |
| 60 Gy | 18 | 8 | 44.44 | 1.444 | 1.343 | 0.188 |
| 80 Gy | 18 | 7 | 38.89 | 1.388 | 1.268 | 0.156 |
| MNU | 18 | 4 | 22.22 | 1.222 | 1.182 | 0.098 |
| Mean | 18 | 6.20 | 34.44 | 1.343 | 1.248 | 0.138 |

aGD: Nei’s (1973) gene diversity.

**Table S3. Genetic distance matrix values based on the ISSR data between five populations**.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 20 Gy | 40 Gy | 60 Gy | 80 Gy | MNU |
| 20 Gy |  |  |  |  |  |
| 40 Gy | 0.027 |  |  |  |  |
| 60 Gy | 0.049 | 0.017 |  |  |  |
| 80 Gy | 0.109 | 0.068 | 0.034 |  |  |
| MNU | 0.011 | 0.009 | 0.040 | 0.077 |  |



**Fig. S1. ISSR electrophoresis profiles of *Rubus* *fructicosus* with the UBC 808primer combination. Lane M : 5 Kb ladder. Red arrow shows a polymorphic band.**