Table S1. SSR allele frequencies on selected linkage groups with disease resistance genes targeted among four bean parents

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Marker | Linkage group (LG) | Allele (bp) | Count | Frequency |
| **1** | **PVBR107** | **2** | **170/170** | **26** | **0.25** |
| 2 | BM156 | 2 | 244/244 | 22 | 0.22 |
| 3 | BM156 | 2 | 294/296 | 15 | 0.15 |
| 4 | BM156 | 2 | 236/236 | 14 | 0.14 |
| 5 | BM156 | 2 | 296/298 | 11 | 0.11 |
| 6 | PVBR107 | 2 | 172/172 | 11 | 0.11 |
| 7 | BM156 | 2 | 292/294 | 9 | 0.09 |
| 8 | PVBR107 | 2 | 174/174 | 9 | 0.09 |
| 9 | PVBR107 | 2 | 148/148 | 8 | 0.08 |
| 10 | BM156 | 2 | 278/280 | 5 | 0.05 |
| 11 | PVBR107 | 2 | 174/176 | 5 | 0.05 |
| 12 | BM156 | 2 | 246/246 | 3 | 0.03 |
| 13 | PVBR107 | 2 | 176/176 | 3 | 0.03 |
| 14 | PVBR107 | 2 | 164/164 | 3 | 0.03 |
| 15 | BM156 | 2 | 300/300 | 2 | 0.02 |
| 16 | BM156 | 2 | 266/266 | 2 | 0.02 |
| 17 | PVBR107 | 2 | 180/182 | 2 | 0.02 |
| 18 | PVBR107 | 2 | 172/176 | 2 | 0.02 |
| 19 | PVBR107 | 2 | 172/174 | 2 | 0.02 |
| 20 | PVBR107 | 2 | 168/172 | 2 | 0.02 |
| 21 | PVBR107 | 2 | 168/170 | 2 | 0.02 |
| 22 | PVBR107 | 2 | 166/166 | 2 | 0.02 |
| 23 | PVBR107 | 2 | 164/166 | 2 | 0.02 |
| 24 | PVBR107 | 2 | 162/164 | 2 | 0.02 |
| 25 | PVBR107 | 2 | 154/154 | 2 | 0.02 |
| 26 | PVBR107 | 2 | 100/100 | 2 | 0.02 |
| 27 | BM156 | 2 | 298/300 | 1 | 0.01 |
| 28 | BM156 | 2 | 278/278 | 1 | 0.01 |
| 29 | BM156 | 2 | 264/266 | 1 | 0.01 |
| 30 | BM156 | 2 | 264/264 | 1 | 0.01 |
| 31 | BM156 | 2 | 262/262 | 1 | 0.01 |
| 32 | BM156 | 2 | 250/250 | 1 | 0.01 |
| 33 | BM156 | 2 | 248/252 | 1 | 0.01 |
| 34 | BM156 | 2 | 246/262 | 1 | 0.01 |
| 35 | BM156 | 2 | 242/244 | 1 | 0.01 |
| 36 | BM156 | 2 | 240/246 | 1 | 0.01 |
| 37 | BM156 | 2 | 234/238 | 1 | 0.01 |
| 38 | BM156 | 2 | 230/248 | 1 | 0.01 |
| 39 | BM156 | 2 | 226/272 | 1 | 0.01 |
| 40 | BM156 | 2 | 216/216 | 1 | 0.01 |
| 41 | BM156 | 2 | 208/244 | 1 | 0.01 |
| 42 | BM156 | 2 | 206/296 | 1 | 0.01 |
| 43 | BM156 | 2 | 206/294 | 1 | 0.01 |
| 44 | PVBR107 | 2 | 184/186 | 1 | 0.01 |
| 45 | PVBR107 | 2 | 182/186 | 1 | 0.01 |
| 46 | PVBR107 | 2 | 180/184 | 1 | 0.01 |
| 47 | PVBR107 | 2 | 170/174 | 1 | 0.01 |
| 48 | PVBR107 | 2 | 170/172 | 1 | 0.01 |
| 49 | PVBR107 | 2 | 168/168 | 1 | 0.01 |
| 50 | PVBR107 | 2 | 166/168 | 1 | 0.01 |
| 51 | PVBR107 | 2 | 164/170 | 1 | 0.01 |
| 52 | PVBR107 | 2 | 160/164 | 1 | 0.01 |
| 53 | PVBR107 | 2 | 158/164 | 1 | 0.01 |
| 54 | PVBR107 | 2 | 152/152 | 1 | 0.01 |
| 55 | PVBR107 | 2 | 148/170 | 1 | 0.01 |
| 56 | PVBR107 | 2 | 102/160 | 1 | 0.01 |
| 57 | PVBR107 | 2 | 100/150 | 1 | 0.01 |
|  |  |  |  |  |  |
| **1** | **BM187** | **6** | **201/249** | **13** | **0.13** |
| 2 | BM187 | 6 | 149/161 | 11 | 0.11 |
| 3 | BM187 | 6 | 161/201 | 8 | 0.08 |
| 4 | BM187 | 6 | 161/161 | 6 | 0.06 |
| 5 | BMd37 | 6 | 130/150 | 4 | 0.04 |
| 6 | BMd37 | 6 | 200/200 | 3 | 0.03 |
| 7 | BMd37 | 6 | 156/160 | 3 | 0.03 |
| 8 | BM187 | 6 | 149/149 | 3 | 0.03 |
| 9 | BMd37 | 6 | 134/142 | 3 | 0.03 |
| 10 | BMd37 | 6 | 132/142 | 3 | 0.03 |
| 11 | BMd37 | 6 | 184/184 | 2 | 0.02 |
| 12 | BMd37 | 6 | 178/178 | 2 | 0.02 |
| 13 | BMd37 | 6 | 174/174 | 2 | 0.02 |
| 14 | BMd37 | 6 | 168/168 | 2 | 0.02 |
| 15 | BMd37 | 6 | 158/172 | 2 | 0.02 |
| 16 | BMd37 | 6 | 156/176 | 2 | 0.02 |
| 17 | BMd37 | 6 | 156/168 | 2 | 0.02 |
| 18 | BMd37 | 6 | 150/156 | 2 | 0.02 |
| 19 | BM187 | 6 | 149/201 | 2 | 0.02 |
| 20 | BMd37 | 6 | 140/140 | 2 | 0.02 |
| 21 | BM187 | 6 | 249/249 | 1 | 0.01 |
| 22 | BMd37 | 6 | 192/192 | 1 | 0.01 |
| 23 | BMd37 | 6 | 188/194 | 1 | 0.01 |
| 24 | BMd37 | 6 | 188/188 | 1 | 0.01 |
| 25 | BMd37 | 6 | 182/182 | 1 | 0.01 |
| 26 | BM187 | 6 | 181/205 | 1 | 0.01 |
| 27 | BM187 | 6 | 181/193 | 1 | 0.01 |
| 28 | BMd37 | 6 | 180/180 | 1 | 0.01 |
| 29 | BM187 | 6 | 179/193 | 1 | 0.01 |
| 30 | BMd37 | 6 | 178/200 | 1 | 0.01 |
| 31 | BMd37 | 6 | 176/192 | 1 | 0.01 |
| 32 | BMd37 | 6 | 176/176 | 1 | 0.01 |
| 33 | BMd37 | 6 | 174/196 | 1 | 0.01 |
| 34 | BMd37 | 6 | 172/172 | 1 | 0.01 |
| 35 | BM187 | 6 | 171/205 | 1 | 0.01 |
| 36 | BM187 | 6 | 171/171 | 1 | 0.01 |
| 37 | BMd37 | 6 | 168/182 | 1 | 0.01 |
| 38 | BMd37 | 6 | 168/174 | 1 | 0.01 |
| 39 | BMd37 | 6 | 168/172 | 1 | 0.01 |
| 40 | BMd37 | 6 | 164/196 | 1 | 0.01 |
| 41 | BMd37 | 6 | 164/172 | 1 | 0.01 |
| 42 | BMd37 | 6 | 164/170 | 1 | 0.01 |
| 43 | BM187 | 6 | 161/202 | 1 | 0.01 |
| 44 | BMd37 | 6 | 160/184 | 1 | 0.01 |
| 45 | BMd37 | 6 | 160/180 | 1 | 0.01 |
| 46 | BMd37 | 6 | 160/174 | 1 | 0.01 |
| 47 | BMd37 | 6 | 160/172 | 1 | 0.01 |
| 48 | BMd37 | 6 | 160/160 | 1 | 0.01 |
| 49 | BMd37 | 6 | 158/168 | 1 | 0.01 |
| 50 | BMd37 | 6 | 156/200 | 1 | 0.01 |
| 51 | BMd37 | 6 | 156/178 | 1 | 0.01 |
| 52 | BMd37 | 6 | 156/166 | 1 | 0.01 |
| 53 | BM187 | 6 | 155/159 | 1 | 0.01 |
| 54 | BMd37 | 6 | 154/160 | 1 | 0.01 |
| 55 | BM187 | 6 | 149/205 | 1 | 0.01 |
| 56 | BMd37 | 6 | 146/146 | 1 | 0.01 |
| 57 | BMd37 | 6 | 144/144 | 1 | 0.01 |
| 58 | BMd37 | 6 | 142/144 | 1 | 0.01 |
| 59 | BMd37 | 6 | 136/174 | 1 | 0.01 |
| 60 | BMd37 | 6 | 134/140 | 1 | 0.01 |
| 61 | BMd37 | 6 | 130/180 | 1 | 0.01 |
| 62 | BMd37 | 6 | 130/174 | 1 | 0.01 |
| 63 | BMd37 | 6 | 130/158 | 1 | 0.01 |
| 64 | BMd37 | 6 | 130/136 | 1 | 0.01 |
| 65 | BMd37 | 6 | 128/158 | 1 | 0.01 |
| 66 | BMd37 | 6 | 128/132 | 1 | 0.01 |
| 67 | BMd37 | 6 | 126/152 | 1 | 0.01 |
| 68 | BMd37 | 6 | 124/200 | 1 | 0.01 |
| 69 | BMd37 | 6 | 122/132 | 1 | 0.01 |
| 70 | BMd37 | 6 | 118/180 | 1 | 0.01 |
| 71 | BMd37 | 6 | 118/162 | 1 | 0.01 |
| 72 | BMd37 | 6 | 116/172 | 1 | 0.01 |
| 73 | BMd37 | 6 | 116/142 | 1 | 0.01 |
| 74 | BMd37 | 6 | 116/138 | 1 | 0.01 |
| 75 | BMd37 | 6 | 114/160 | 1 | 0.01 |
| 76 | BMd37 | 6 | 112/160 | 1 | 0.01 |
| 77 | BMd37 | 6 | 110/162 | 1 | 0.01 |
| 78 | BMd37 | 6 | 108/200 | 1 | 0.01 |
| 79 | BMd37 | 6 | 108/134 | 1 | 0.01 |
| 80 | BMd37 | 6 | 108/114 | 1 | 0.01 |
| 81 | BMd37 | 6 | 106/178 | 1 | 0.01 |
| 82 | BMd37 | 6 | 106/126 | 1 | 0.01 |
| 83 | BMd37 | 6 | 106/106 | 1 | 0.01 |
| 84 | BMd37 | 6 | 104/160 | 1 | 0.01 |
| 85 | BMd37 | 6 | 104/128 | 1 | 0.01 |
| 86 | BMd37 | 6 | 102/114 | 1 | 0.01 |
|  |  |  |  |  |  |
| **1** | **BM183** | **7** | **172/172** | **47** | **0.46** |
| 2 | BM160 | 7 | 208/208 | 35 | 0.34 |
| 3 | BM183 | 7 | 166/166 | 20 | 0.2 |
| 4 | BM160 | 7 | 278/280 | 14 | 0.14 |
| 5 | BM183 | 7 | 164/164 | 10 | 0.1 |
| 6 | BM160 | 7 | 276/278 | 10 | 0.1 |
| 7 | BM183 | 7 | 168/168 | 8 | 0.08 |
| 8 | BM160 | 7 | 256/258 | 6 | 0.06 |
| 9 | BM160 | 7 | 236/236 | 6 | 0.06 |
| 10 | BM160 | 7 | 240/240 | 4 | 0.04 |
| 11 | BM160 | 7 | 238/238 | 4 | 0.04 |
| 12 | BM183 | 7 | 174/174 | 4 | 0.04 |
| 13 | BM160 | 7 | 204/204 | 3 | 0.03 |
| 14 | BM183 | 7 | 182/182 | 3 | 0.03 |
| 15 | BM183 | 7 | 154/154 | 3 | 0.03 |
| 16 | BM160 | 7 | 274/276 | 2 | 0.02 |
| 17 | BM160 | 7 | 244/246 | 2 | 0.02 |
| 18 | BM160 | 7 | 282/284 | 1 | 0.01 |
| 19 | BM160 | 7 | 280/283 | 1 | 0.01 |
| 20 | BM160 | 7 | 280/282 | 1 | 0.01 |
| 21 | BM160 | 7 | 254/256 | 1 | 0.01 |
| 22 | BM160 | 7 | 236/238 | 1 | 0.01 |
| 23 | BM160 | 7 | 210/210 | 1 | 0.01 |
| **24** | **BM160** | **7** | **208/308** | **1** | **0.01** |
| 25 | BM160 | 7 | 208/276 | 1 | 0.01 |
| 26 | BM160 | 7 | 206/208 | 1 | 0.01 |
| 27 | BM160 | 7 | 150/158 | 1 | 0.01 |
| 28 | BM160 | 7 | 148/200 | 1 | 0.01 |
| 29 | BM160 | 7 | 140/150 | 1 | 0.01 |
|  |  |  |  |  |  |
| 1 | BM211 | 8 | 212/214 | 19 | 0.19 |
| 2 | BM211 | 8 | 204/204 | 16 | 0.16 |
| 3 | BM189 | 8 | 144/152 | 11 | 0.11 |
| 4 | BM211 | 8 | 214/214 | 7 | 0.07 |
| 5 | BM211 | 8 | 208/210 | 7 | 0.07 |
| 6 | BM189 | 8 | 154/162 | 6 | 0.06 |
| 7 | BM211 | 8 | 212/212 | 5 | 0.05 |
| 8 | BM189 | 8 | 100/108 | 5 | 0.05 |
| 9 | BM211 | 8 | 246/248 | 4 | 0.04 |
| 10 | BM211 | 8 | 208/208 | 4 | 0.04 |
| 11 | BM211 | 8 | 202/204 | 4 | 0.04 |
| 12 | BM189 | 8 | 152/160 | 4 | 0.04 |
| 13 | BM211 | 8 | 164/212 | 3 | 0.03 |
| 14 | BM189 | 8 | 120/126 | 3 | 0.03 |
| 15 | BM211 | 8 | 258/260 | 2 | 0.02 |
| 16 | BM211 | 8 | 244/246 | 2 | 0.02 |
| 17 | BM211 | 8 | 210/210 | 2 | 0.02 |
| 18 | BM211 | 8 | 176/270 | 2 | 0.02 |
| 19 | BM211 | 8 | 176/250 | 2 | 0.02 |
| 20 | BM211 | 8 | 176/246 | 2 | 0.02 |
| 21 | BM211 | 8 | 172/248 | 2 | 0.02 |
| 22 | BM189 | 8 | 172/172 | 2 | 0.02 |
| 23 | BM189 | 8 | 168/176 | 2 | 0.02 |
| 24 | BM189 | 8 | 166/176 | 2 | 0.02 |
| 25 | BM211 | 8 | 164/208 | 2 | 0.02 |
| 26 | BM189 | 8 | 164/164 | 2 | 0.02 |
| 27 | BM211 | 8 | 164/164 | 2 | 0.02 |
| 28 | BM189 | 8 | 160/170 | 2 | 0.02 |
| 29 | BM189 | 8 | 160/168 | 2 | 0.02 |
| 30 | BM189 | 8 | 152/158 | 2 | 0.02 |
| 31 | BM189 | 8 | 144/156 | 2 | 0.02 |
| 32 | BM189 | 8 | 100/102 | 2 | 0.02 |
| 33 | BM211 | 8 | 256/258 | 1 | 0.01 |
| 34 | BM211 | 8 | 248/250 | 1 | 0.01 |
| 35 | BM211 | 8 | 216/216 | 1 | 0.01 |
| 36 | BM211 | 8 | 204/248 | 1 | 0.01 |
| 37 | BM211 | 8 | 202/244 | 1 | 0.01 |
| 38 | BM211 | 8 | 202/202 | 1 | 0.01 |
| 39 | BM211 | 8 | 200/204 | 1 | 0.01 |
| 40 | BM189 | 8 | 200/200 | 1 | 0.01 |
| 41 | BM189 | 8 | 180/180 | 1 | 0.01 |
| 42 | BM211 | 8 | 176/256 | 1 | 0.01 |
| 43 | BM211 | 8 | 176/224 | 1 | 0.01 |
| 44 | BM189 | 8 | 176/184 | 1 | 0.01 |
| 45 | BM189 | 8 | 174/184 | 1 | 0.01 |
| 46 | BM189 | 8 | 174/174 | 1 | 0.01 |
| 47 | BM189 | 8 | 168/168 | 1 | 0.01 |
| 48 | BM189 | 8 | 166/182 | 1 | 0.01 |
| 49 | BM211 | 8 | 164/214 | 1 | 0.01 |
| 50 | BM211 | 8 | 164/210 | 1 | 0.01 |
| 51 | BM189 | 8 | 164/180 | 1 | 0.01 |
| 52 | BM189 | 8 | 164/174 | 1 | 0.01 |
| 53 | BM189 | 8 | 164/172 | 1 | 0.01 |
| 54 | BM189 | 8 | 164/170 | 1 | 0.01 |
| 55 | BM189 | 8 | 162/170 | 1 | 0.01 |
| 56 | BM189 | 8 | 162/168 | 1 | 0.01 |
| 57 | BM189 | 8 | 162/162 | 1 | 0.01 |
| 58 | BM189 | 8 | 160/180 | 1 | 0.01 |
| 59 | BM189 | 8 | 160/164 | 1 | 0.01 |
| 60 | BM189 | 8 | 160/162 | 1 | 0.01 |
| 61 | BM189 | 8 | 160/160 | 1 | 0.01 |
| 62 | BM189 | 8 | 158/172 | 1 | 0.01 |
| 63 | BM189 | 8 | 156/164 | 1 | 0.01 |
| 64 | BM189 | 8 | 156/160 | 1 | 0.01 |
| 65 | BM189 | 8 | 154/168 | 1 | 0.01 |
| 66 | BM189 | 8 | 154/166 | 1 | 0.01 |
| 67 | BM189 | 8 | 154/154 | 1 | 0.01 |
| 68 | BM189 | 8 | 152/162 | 1 | 0.01 |
| 69 | BM189 | 8 | 152/156 | 1 | 0.01 |
| 70 | BM189 | 8 | 150/170 | 1 | 0.01 |
| 71 | BM189 | 8 | 150/166 | 1 | 0.01 |
| 72 | BM189 | 8 | 150/164 | 1 | 0.01 |
| 73 | BM189 | 8 | 150/156 | 1 | 0.01 |
| 74 | BM189 | 8 | 150/154 | 1 | 0.01 |
| 75 | BM189 | 8 | 140/152 | 1 | 0.01 |
| 76 | BM189 | 8 | 140/144 | 1 | 0.01 |
| 77 | BM189 | 8 | 138/160 | 1 | 0.01 |
| 78 | BM189 | 8 | 138/154 | 1 | 0.01 |
| 79 | BM189 | 8 | 138/142 | 1 | 0.01 |
| 80 | BM189 | 8 | 132/132 | 1 | 0.01 |
| 81 | BM211 | 8 | 130/136 | 1 | 0.01 |
| 82 | BM211 | 8 | 130/132 | 1 | 0.01 |
| 83 | BM189 | 8 | 128/134 | 1 | 0.01 |
| 84 | BM189 | 8 | 128/130 | 1 | 0.01 |
| 85 | BM189 | 8 | 126/172 | 1 | 0.01 |
| 86 | BM189 | 8 | 126/126 | 1 | 0.01 |
| 87 | BM189 | 8 | 122/140 | 1 | 0.01 |
| 88 | BM189 | 8 | 114/124 | 1 | 0.01 |
| 89 | BM189 | 8 | 112/122 | 1 | 0.01 |
| 90 | BM189 | 8 | 104/164 | 1 | 0.01 |
| 91 | BM189 | 8 | 102/108 | 1 | 0.01 |
| 92 | BM189 | 8 | 100/146 | 1 | 0.01 |
| 93 | BM189 | 8 | 100/106 | 1 | 0.01 |