

Supplementary Table S1. Polymorphic marker between 02428 and *mp3* screened in this study

No	Primers	Genomic position(bp)	Forward 5'-3'	Reverse3'-5'	Polymorphic marker
1	RM3117	3785864	GCCATCTCTCTCTCTCTCTC	CCTTAGCTCATCAAGCGAGG	Polymorphism
2	RM175	3865706	cttcggcgccgcatcaaggtg	cgttgagcagcgcgacgttgac	
3	RM5819	4285381	CACTCCAGAACCCAGTAGTAGC	ACCCAACAACCTGGTAGACGG	Polymorphism
4	RM6483	4313896	CTCTAGCTTGGAGCTCGTGG	CTCTCTGACTCCTTGTCCCC	
5	RM4352	4313896	GTTGTTGCACCATAGTCAGA	ATACATTCATGAAACCTGCC	Polymorphism
6	RM6594	4333680	CTCATGACCTCGTCTCTCCTC	ACGTGGTAGCACTCCAGCTC	
7	RM489	4333680	acttgagacgatcggacacc	tcacccatggatgtgtcag	Polymorphism
8	RM5849	4723228	AGTAATCTTATGTGCAATTC	ATCTTATGATTTTCTTTCA	
9	RM4992	4723228	CAGCCTGCTAATTAGTATT	ACTCGAAATCCTTCTCTATA	Polymorphism
10	RM5480	5337569	AAGAAGAGGATTTCTCGCC	GTCCAAGATTCGCAACGG	Polymorphism
11	RM5444	5591402	AACGTACCAGTCGCTGGTTC	CCCGTGATTTCTCCGAC	Polymorphism
12	RM3195	5788042	AATAGACCGGAAGAAAGCCC	ATATTCGCCGGAGAGAGAGG	
13	RM3779	5958781	ACGAAGTCCATGGTTCTTGG	GCATTTGATCTTGTGGGGAG	
14	RM3467	6003496	ATAATGGCAGGGTTGTCTCG	CTCGGTGAGCCTCCTACAAC	Polymorphism
15	L3-118	6012517	GAATTGGGAACCTCCGCCTA	TCATGACACTATCCTGCACCA	Polymorphism
16	L3-119	6012674	TAAGACCCAGCTGCTGCTACC	TGTGAAAACCTGCAAACATGCG	
17	L3-120	6016243	CTCGGAGGGTTGATGAGAT	AGATGCTGGAGAGTCAACGC	Polymorphism
18	L3-121	6036861	TGCATGCTCTCCTTAGGCTT	CTCGGACACACTTGGGGGTA	
19	L3-122	6036861	ACAGATCCGTGTGTGCAAGC	ATCATGCTGGTGTATCTCTGC	
20	L3-123	6037116	CCCAAGTGTGTCCGAGCTTA	TGCACCATGGGTGAGTCAAA	
21	L3-124	6037120	AGTGTGTCCGAGCTTAGTGC	ATTGTGCACCATGGGTGAGT	
22	L3-125	6037120	AGTGTGTCCGAGCTTAGTGC	ATTGTGCACCATGGGTGAGT	
23	L3-126	6037120	CCTGCAGCCTATGCTAGATATT	ACGTATTGATGTAATAATTTGTCGT	
24	L3-127	6037321	ATACCCCCAAGTGTGTCCGA	AGCGAAAGTCAACAGGGGAA	
25	L3-128	6037321	TCGGCAGAGATACACCATGC	TGCACCATGGGTGAGTCAAA	
26	L3-129	6040504	GGATCGGATGGACACCACTC	TGGTGTGTAAGAAGCACGGG	
27	L3-130	6041103	ACCATGGATCTCATCTCGCT	GTTGCAATAATGGCGAGGGG	
28	L3-131	6042404	TCTCCCCAACTGATCACCCC	TCCTCGCAAGAAGCTACCCA	
29	L3-132	6043090	TTGCCTGTTTTCCGAGTTGAC	AGCTTCCAGCTCTAGCACATT	Polymorphism
30	L3-133	6043090	TTGCCTGTTTTCCGAGTTGAC	AGCTTCCAGCTCTAGCACATT	Polymorphism
31	L3-134	6048507	TACCCCTATAAGACCCAGC	GAAAACCTGCAAACATGCGT	
32	L3-135	6048599	CGGAGCTTCTGTTCATGTGTC	GA CTGCTTCTTGTACGACGAC	Polymorphism
33	L3-126	6058181	CAGAACTGGCTCAAATGCTTGT	CTTTAACGGTGCGTGCAGT	
34	L3-137	6058818	CCAGAACTGGCTCAAATGCTTG	TCTTTAACGGTGCGTGCAGTA	
35	L3-138	6061085	CCTCAGATCGACGAGTGTTT	TCTCCAGCTCATCATGGTACG	
36	L3-139	6061085	CCTCAGATCGACGAGTGTTT	TCTCCAGCTCATCATGGTACG	
37	L3-140	6067340	AGTGGGGTCAAACCGTCATC	GCCGAAACGAAGGAGAACT	
38	L3-141	6067340	GCCGAAACGAAGGAGAACT	AGTGGGGTCAAACCGTCATC	
39	RM7576	6078216	CTGCCCTGCCTTTTGTACAC	GCGAGCATTTCTTTCTCCAC	Polymorphism
40	L3-94	6124355	CCCCTTTGGCAAACGCATAA	TGAAACAGAAGATTGAATCCTACC	Polymorphism
41	L3-71	6127102	CAGTAGCACGCGATTCCAGT	CAGTTGCGGAACCTCGTCCTT	
42	L3-95	6127475	TCGAGGAATGATTTCACTTCCC	TGCAGCTAGAGAATGGTCGAT	Polymorphism
43	L3-72	6164430	AGCGTGACGTCCTTCCAGTC	CCGACGCCGTGTCTAGG	
44	L3-73	6227774	TAGGAGCACGTCCAGCTATTT	GCCGTTGAGAGCCTAACC	
45	L3-74	6227953	CACGCCTTTCCCCGTACAA	ACCCCTTCCGGCGGT	
46	L3-96	6239662	GGTCTAACGGCCAGTCACTC	ACGATTCCGACGACAAGGAG	

47	L3-97	6239662	TAACGGCCAGTCACTCTCCA	CGATTCCGACGACAAGGAGT	Polymorphism
48	L3-98	6239927	CGGCCAGTCACTCTCCAAAT	CACGATTCCGACGACAAGGA	Polymorphism
49	L3-99	6240243	TGACATGCACGAAACGAGAGT	GTCGGTGATGGTGTCTAGG	Polymorphism
50	L3-100	6240244	GCACGATTGATCACAGCTCG	TGCATGAAACCGACACCGAT	
51	L3-101	6240244	GCACGATTGATCACAGCTCG	TGCATGAAACCGACACCGAT	Polymorphism
52	L3-102	6240278	TTCTTTTCGTGACGCTTGAC	ACTTGGACTGCATACGGCTG	
53	L3-103	6240278	ATCACAGCTCGATCCTTGGG	ACTTGGACTGCATACGGCTG	
54	L3-75	6259697	AAGTCTTGTCCAAATTGCCCG	TTGGTGCCTACGTGAATGGA	
55	L3-76	6263525	CTGGAGCACTCTACTTTGACCA	TTGCACGTTTCATATGGCTTGT	
56	L3-77	6264597	GAGCCCTGAAAACATGAACCC	TGGTCGTCGACTTTTGCTCG	
57	L3-78	6282747	GAGGTGAGGCTCCGAGGTAG	ACCTCGCTCGATCACGAAC	
58	L3-79	6300751	TAACTCCCCGCTCCCTTTCA	GGCGTTAAATGCGTTTGGCT	
59	L3-80	6300751	TAACTCCCCGCTCCCTTTCA	GGCGTTAAATGCGTTTGGCT	
60	L3-81	6300963	ATGCAGCTTTCTGGCCAATC	TCCAAACCTGGACATCGACAG	
61	L3-104	6324800	TGCAGGTATTGGCTGTCCTTC	ACGAAGCACCGTTATCGTCT	
62	L3-82	6388455	GACCAGCAAGTCGAGGTAGC	CCCCAATCATACTAGCGCGG	
63	L3-83	6417306	CACCCCTCTTGTGACCCCTC	CATCACTTAGTCTCTCTCTCTCA	
64	L3-105	6428615	ACGAGATCCGGGAGAAGAAGA	CGCCGCCGTATATGAGATCG	
65	L3-106	6428615	CCTACAGTTGATACGGGAGACA	ACGTAGTTGCTTCCCCCATT	
66	L3-107	6428615	ACAGTTGATACGGGAGACATCA	ATACGTAGTTGCTTCCCCCA	
67	L3-84	6428617	GACGTCGAGAAGTACGTGCG	GAGATCGTAGCACTCCGGC	
68	L3-108	6428617	AGAAGAGCGCCTGCTACAC	ACATCTCACTCTCACGCCG	
69	L3-85	6469138	TTTCCGAATGGGACGGAGT	GCAACCTGTCTGGTAGAGAA	
70	L3-86	6469139	GACCTACAGTTGATACGGGAGAC	ATACGTAGTTGCTTCCCCCA	
71	L3-87	6512933	GGTTGGATCTGCTTGCCCTTG	AGCATCCTCTTGAGCACGG	Polymorphism
72	L3-88	6535503	AGGGCACGTTGAGACTGAAG	CACCTTCTACCCAGCTAGCAATC	Polymorphism
73	L3-109	6537734	TGAGAATTGAGATATGGTGGGGG	CAGCGATGGATCGCCATTG	
74	L3-110	6537923	GAGGCTAGGGTTTCTGCGTC	GGGTCGAGACCATGTGCGTA	Polymorphism
75	RM3864	6543081	AGTCAACCTTGGGGGTAAGG	AGATACTGCCCCGTGTCATCC	Polymorphism
76	RM3206	6552729	GCGCCTCTCTTCTTCCTCTC	GAAAATCGAATCACGGGCGAC	Polymorphism
77	RM5477	6552729	CACGCATTGTTCTGTGATAGG	GCTAATACCGAGCGAGATGG	Polymorphism
78	L3-111	6553617	AGGGGGCTAAACGAGCAATC	CCGTCTCGAGTCTTACCTC	Polymorphism
79	L3-112	6553723	TGATGTACAACGGGCCAACC	TCAACTGACAAGTTGCGCCT	
80	L3-89	6553866	AATGACGCACGCATTGTTCG	TTCAACTGACAAGTTGCGCC	
81	L3-90	6561432	GCAACAGTAACCAAGGAACCC	ACCCCATACAGTGAACCTAAGTC	
82	L3-91	6561581	GCTAAACGAGCAATCGGTGC	CCTCCGTCCTCGAGTCTTAC	
83	L3-113	6561581	GCTAAACGAGCAATCGGTGC	CCTCCGTCCTCGAGTCTTAC	
84	L3-114	6577494	CGTGGCCCATCGTGCATTTT	TGCCACTGTCCAAAGAATAAGGA	
85	L3-115	6583326	AGGTTATGCAGGTATTGGCTGT	AAGCACCGTTATCGTCTGCC	
86	L3-92	6636543	CTTCTCGTCTCATCCCGTCG	CCGAGACCATGTGCTACACC	
87	L3-93	6636618	CCTTTAAAGAGGGCGTCCCA	GCCGTCCTCGCCAGGA	
88	RM5755	6707871	GGAATCGTTGCTCTCGTTTC	CAGACACCGGCCTTAATCAC	Polymorphism
89	L3-116	6714200	AGATCGTCAGACCTCTCGAA	CCGTACGTTGAAGTAGCTGA	
90	L3-117	6714204	CAAAGATCGTCAGACCTCTCG	CCGTACGTTGAAGTAGCTGAA	
91	RM7565	6807113	TGATTCTCTGCGACCGATC	CATGCATGCTCTCCTTAGGC	Polymorphism
92	L3-51	6812447	GTGGCAGCCCACTACAAGTC	TCACGCAACGAGGTTACGAT	
93	L3-52	6812449	GGCAGCCCACTACAAGTCTA	ACGAACGGGAAGTGCAAGAA	
94	L3-53	6812449	GGCAGCCCACTACAAGTCTA	ACGAACGGGAAGTGCAAGAA	
95	L3-54	6812449	GTGGCAGCCCACTACAAGTC	TCACGCAACGAGGTTACGAT	
96	RM3716	6839264	GTCGTTTCGTTGACTCGTTG	CACACATATATACCCCCCCC	Polymorphism
97	L3-55	6840297	AGTCTCATGCTTTTCTGCACG	GGCGTCAGATGCACATTCTC	
98	L3-56	6840310	TCTGCACGTACGATCGTCTTTT	CGTGCATCTGAAGCCATCAAG	
99	L3-57	6840559	ATCCTCCCAAGCTTGACTTGT	TTGGCGTCAGATGCACATTC	
100	L3-58	6840563	TCCTCCCAAGCTTGACTTGT	GAGTTTGGCGTCAGATGCAC	
101	L3-59	6840619	TGCACGTACGATCGTCTTTT	GTCGTGCATCTGAAGCCATC	
102	RM387	6851987	GGAAGAAAGGATCTATATCA	TACGATTTGTTTAAAGTTCAA	Polymorphism

	2				
103	L3-60	6852926	ATAGAGCAGGGCTGGAACAC	TGCTTGCCTTAGTGTCCGTA	
104	L3-61	6852930	AGCAGGGCTGGAACACATTT	ATGCTTGCCTTAGTGTCCGT	
105	L3-62	6852981	ATCCGGGGCTCACAAATTA	GCTTGCCTTAGTGTCCGTAG	
106	L3-63	6854060	TCGACCACGCTGGTTGATTAG	TTAGGCGTCGACACGAAGG	Polymorphism
107	L3-64	6854288	TCGACCACGCTGGTTGATT	GTTAGGCGTCGACACGAAGG	Polymorphism
108	L3-65	6856728	TGGTGATTGGGTTGCCCTG	GGGGAATTTTCAGACAGCCG	
109	L3-66	6856929	ATCAGGTTCAGGTCAGGTCG	GGGGCAAGAGATAGGGGAA	Polymorphism
110	L3-16	6871001	TCCTCCTTCCGTTAGGGCAT	GGAAGTTCTGAGCGAGCGAT	Polymorphism
111	L3-67	6871001	TCCTCCTTCCGTTAGGGCAT	GGAAGTTCTGAGCGAGCGAT	Polymorphism
112	L3-17	6871060	CTGTTCTGGTCGGTCGAGAG	TGAACGGTCGATGACAGGTG	
113	L3-68	6871060	CTGTTCTGGTCGGTCGAGAG	TGAACGGTCGATGACAGGTG	
114	L3-35	6871261	TCCAAAACAGAGTAGCGCGT	TGAACGGTCGATGACAGGTG	Polymorphism
115	L3-36	6871261	CTGTTCTGGTCGGTCGAGAG	GAGCCTTCAATGTGCGTTGG	Polymorphism
116	L3-69	6871270	TTCGAGTGTTTCGTCCAGGG	TCCGGTTTGAACGGTCGAT	Polymorphism
117	L3-70	6934496	ATATGGGAGGCATGCCAAGA	TATAGAGCCAACACAACGGC	
118	L3-37	6957212	ATCTCTACGTCTCCGGGAT	CACGGGAATACCTTTCCCCA	Polymorphism
119	L3-38	6973794	CAAACAACACCTCGTGCCTT	GGCAAATGCATGGCTGGAAT	
120	L3-39	6987563	TATGCTGCCCAAGTTAATCGC	GCCTTTTGTGCTATGGCAACTT	
121	L3-40	6987564	TGCTGCCCAAGTTAATCGCA	GCCTTTTGTGCTATGGCAACT	
122	L3-41	6996952	AGAGGAAGTTGCAGGTCGTG	GTTAGGCTTCTCGCTCTCCC	
123	L3-42	7027054	TAAATGGCCGCTGCGTACAA	ATCGAGCTGTCCCTCACTCA	
124	L3-43	7040253	GAGGCCTCTGTCTGACCC	CGATCAAACGCTTGGTGAGG	
125	L3-44	7050657	GTACTCTGTGCCGCATGTA	ACGGCATAACACCATTTGTCG	
126	L3-45	7050842	GATGTACTCGTTGTCCCGCA	GGCATAACACCATTTGTCGCC	Polymorphism
127	L3-46	7051206	GTTTGGTGCCGTA CTGTCGT	CGTGATGAATCGCTCGCAC	Polymorphism
128	L3-47	7051320	GGGTTTGGTGCCGTA CTGT	CGAATCCGTGATGAATCGCTC	
129	L3-48	7051323	GGGTTTGGTGCCGTA CTGTC	CGTCGAATCCGTGATGAATCG	
130	L3-49	7051366	TTTGGTGCCGTA CTGTCGTG	AAACCGTCACGCTTCCTAGA	
131	L3-50	7051366	GTTTGGTGCCGTA CTGTCGT	GAAACCGTCACGCTTCCTAGA	
132	L3-18	7105849	TTTGCTGACTAGGCGGATGC	AGTCAGTCCGAGGTCCCTAAT	Polymorphism
133	L3-19	7105859	CTCCAAGGTCGGGATCTTCC	CTTCACGTTGAGTCAGTCCGA	
134	L3-20	7127158	CGCCGCACGATCCGGT	ATCGCGTGTGCGTGTCTAT	Polymorphism
135	L3-21	7127158	CCGCACGATCCGGTG	TTAATTGATCGCGTGTGCGT	Polymorphism
136	L3-22	7127163	GCCGCACGATCCGGTG	TAATTGATCGCGTGTGCGTG	Polymorphism
137	L3-23	7143188	TGTTGCTACCCTAGCTTTGAT	TCGCCTCTTTATGGTAGCTGG	Polymorphism
138	L3-1	7180481	ATCACGGTCCAATTACACACC	CCGTGTGCTGTCTGTTACTTG	Polymorphism
139	L3-24	7180481	ATCACGGTCCAATTACACACC	CCGTGTGCTGTCTGTTACTTG	
140	L3-25	7180481	ATCACGGTCCAATTACACACCA	GTGCTGTCTGTTACTTGATTCGG	
141	L3-2	7180483	CACGGTCCAATTACACACCAG	CAGACAAATCGCCGTGTC	
142	L3-3	7180483	ATCACGGTCCAATTACACACCA	GCAGACAAATCGCCGTGTG	Polymorphism
143	L3-26	7180795	CACGGTCCAATTACACACCAG	CGTGTGCTGTCTGTTACTTGAT	Polymorphism
144	L3-27	7180796	ACGGTCCAATTACACACCAGA	CCGTGTGCTGTCTGTTACTTGA	Polymorphism
145	L3-28	7180807	CAGCACACGGCGATTTGTC	TGGGTCTAGAGGAAGCGACT	Polymorphism
146	L3-29	7211315	GCTCCTGACGTCAAAATGCAG	ACTTGGTAGGATGCACGGTT	Polymorphism
147	L3-30	7211447	TCCATCAACCGTGCATCCTA	CTGATCAGGATCGGGTTGCG	Polymorphism
148	L3-31	7211454	ACCGTGCATCCTACCAAGTT	TGGTCACGATGACGTAGCTG	
149	RM551 3	7232837	GCTTTCTGGCCAATCTGATG	CCAAACCTGGACATCGACAG	
150	L3-4	7241879	GACAGGAGTTTGGCAGCTAGA	TCACTAACAGTTGGGGCGTT	Polymorphism
151	L3-32	7241879	GACAGGAGTTTGGCAGCTAGA	TCACTAACAGTTGGGGCGTT	Polymorphism
152	L3-5	7328828	ACATGGTCGGAGTTGTGGAA	GGGCCTTGTAATCGAGAGGC	
153	L3-6	7402543	GGTGCCGTTTGTTCCTTGG	GGATGCTCAATCGATGCCGA	
154	L3-7	7487037	CAAGAGACCAGAGCGGCAAA	TTTAGCGCGGCATCTGCAT	
155	L3-8	7632934	ATCGGGAGGGCAGAATGATG	GAATAAGCCGGAGAGCACGA	
156	L3-9	8438806	TAGCAAGAGCTGTCTCCATTG	TCTCGTGTGATACTGGGCAT	
157	L3-10	8445268	CTCAGATGCCGCTACTCGG	TTTGTCACGTTGCCGTGAGA	Polymorphism
158	L3-11	8456048	AGATACGAGATTACGCCCGC	CAATTTTAGCGCGGGACGAG	Polymorphism
159	L3-12	8593372	CTCAAATTGTGCAATGCACGGA	GTACCCTACCATGTTGGTTTGT	Polymorphism
160	L3-13	9013252	TATCTCGCAGGACAAGCGTC	CGTCGCCTGATCTCCTCATT	
161	L3-14	9083162	TCTTGTAGGCTAAGTGTGCGT	ATGACCACTTGTGGCACGAT	
162	L3-15	9229810	GCCCATAGAGGTTGTCTCAC	GCAAGCAACGAGAAGACCG	
163	RM719 7	9888524	AACGTGGGAATTTCTAGCCC	GTTTTGGGCCTAAACGAGTG	Polymorphism

47	1	1	1	1	1	1	1	1	1	H
48	H	H	H	H	1	1	1	1	1	1
49	1	1	1	1	1	1	1	1	1	H
50	1	1	1	1	1	1	1	1	1	H
51	1	1	1	1	1	1	1	1	H	H
52	1	1	1	1	1	1	1	1	1	H
53	1	1	1	1	1	1	1	1	1	H
54	1	1	1	1	1	1	1	1	1	H
55	1	1	1	1	1	1	1	1	H	H
56	1	1	1	1	1	1	1	1	1	H
57	1	1	1	1	1	1	1	1	1	H
58	1	1	1	1	1	1	1	1	1	H
59	1	1	1	1	1	1	1	1	H	H
60	1	1	1	1	1	1	1	1	1	H
61	1	1	1	1	1	1	1	1	1	H

H: Exchange of recombinant plants for *mp3*. **GP:** Genomic position (bp) with reference to the genome sequence of Nippobare