Supplementary Material

Integration of Genetic and Cytogenetic Maps and Identification of Sex Chromosome in Garden Asparagus (*Asparagus officinalis* L.)

Roberto Moreno[1], Patricia Castro[1], Jan Vrána[2], Marie Kubaláková[2], Petr Cápal[2], Verónica García[1], Juan Gil[1], Teresa Millán[1*], Jaroslav Doležel[2*]

* **Correspondence:** Corresponding authors: dolezel@ueb.cas.cz; teresa.millan@uco.es

Supplementary Table 1. List of Simple Sequence Repeat **(**SSR) markers employed in this study. Markers in bold were included in the genetic map

SSR name	Forward Primer	Reverse Primer	Ta	Reference	Segregation*
asp_c10809	**GCTCCTCATGCCGTAAATGT**	**CGACCAAGTCCAAGAAAGGA**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c11315	AGATCTCCTCCTCCTCGTCC	GCCTCACCAAGGACCACTT	58^{o}C	Mercati et al. 2013	NP
asp_c11938	TTCTCGGGCTCGTCTTTCT	TCCATTACATCTACCGACGGA	58^{o}C	Mercati et al. 2013	NP
asp_c11969	**ACAGTGTGGAAGTTAGGCCG**	**CTCTTCCTCCTTCGAAACCC**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c11979	**CAGAAGGTGTATTGTTTGCCC**	**CCTCTTCATCTTGGCTTTCA**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c12534	**CCGCAGTGGATGAAGCTATT**	**TGCATCCACGTAACTAGCGA**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c12796	TGAATCGGGATCAAATTAGAGG	CGTTATCCTCACGACCCAAT	58^{o}C	Mercati et al. 2013	NP
asp_c12877	GAACGCATAGTACATGGCAAA	TTGATATCGATCTTGCTCGC	58^{o}C	Mercati et al. 2013	NP

asp_c1319	TGCTCAAGGCGTATGTGAAG	ACTGATTCTCGCTTTGCAGG	58^{O}C	Mercati et al. 2013	NP
asp_c13301	**CATTACCTCCACGCTGTCCT**	**GACGATCCCTCTTCTGTGGA**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c1367	GATGGAGGTTTGTACGGCCT	GTGGAGGTGAATCCGAGAAC	58^{O}C	Mercati et al. 2013	NP
asp_c1390	**ACCTACGACATACGATGCCC**	**CTCACATGCGCTTGGAAAC**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c1401	**AATGGTTGCCAATGGAGAAG**	**GCCTGCAGTGTCATCAGTGT**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c14231	**CCACAGGATGCAAGTCCTTC**	**AGAGAGACTCGGGCTCATTG**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c1505	ATCCCACGCACTGGTAAATC	AGGATATGGTTATGGCGGTG	58^{O}C	Mercati et al. 2013	NP
asp_c15627	CTCTCATTGTTCGAAACGAGC	TGCTGCGATGCTAGAGAAGA	58^{O}C	Mercati et al. 2013	NP
asp_c168	ATCATCGGCCACTGCTGAG	TGCAACAACCTACCAAGACG	58^{O}C	Mercati et al. 2013	NP
asp_c16828	AGAAGGAAGAGAACCATGCG	ATGTTGGGTTGATGGGTTTG	58^{O}C	Mercati et al. 2013	NP
asp_c17381	AGGGCTCCCAGTATCCAGTC	TTCATTGAACATGGCATTCG	58^{O}C	Mercati et al. 2013	NP
asp_c17476	**AAGCCAGCCACAAGAACCTA**	**AAGAGCCTTGGCTAGCGTTT**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c17769	**CTTCCCATCCATCTCATCTTTC**	**TCCGATAGTCACTCCCTCCA**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
asp_c1779	CTGTGACATTAGCACAACTTAGCA	CAACCTTTCCTCGGAACGTA	58^{O}C	Mercati et al. 2013	NP
asp_c17875	AGCTGAGCAAGTCCCAACTG	CTTCTACTGCTGCTTCCGCT	58^{O}C	Mercati et al. 2013	NP
asp_c20351	CGAATAGATATTGATCCGCCT	GCCTTTACATCGTGAATGGTT	58^{O}C	Mercati et al. 2013	NP
asp_c2065	ATGTCGACGATGATGCTCAG	GTACTGCGATATGCCGATGC	58^{O}C	Mercati et al. 2013	NP
asp_c20893	AACCAGAGGTGTCTGCATTTG	CCCTCATCAGAAACAGCTTCA	58^{O}C	Mercati et al. 2013	NP
asp_c2122	TCAGCCTCCTCTCTTGCTTC	AGTCAAAGAAGGACCCGGAG	58^{O}C	Mercati et al. 2013	NP
asp_c21312	CCTCCAGTTCCCATCAGAAG	GGCTATAACCGTGGAGGAGG	58^{O}C	Mercati et al. 2013	NP
asp_c22306	GATCATCATCTTGCGCATTG	AGAGGAAGCACGAGGAAGAA	58^{O}C	Mercati et al. 2013	Heterozygous in PS010 (no fit segregation)

asp_c22357	**CAATCGACGGAGGAGAAAGA**	**AAGGCTTGTCTTCCATAGCG**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in both parents (1:1:1:1)**
asp_c2370	AGCCTGCCATAATCCTTTCC	TCCCTCTCCACATCTCTTCG	58^{o}C	Mercati et al. 2013	NP
asp_c2736	**GCCTACGACATACAATGCCC**	**CTCACATGCGCTTGGAAAC**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c2771	CCACCTTGACAAAGACCCAC	CCTTGATGGCCATTTCTCAC	58^{o}C	Mercati et al. 2013	NP
asp_c2848	CCTTGTTCCAAGAGCTTCGT	CAGCGATGGAGAGAGGTACG	58^{o}C	Mercati et al. 2013	NP
asp_c3091	GAACACTGAGACCAGGCAGC	GAACTCGGGCAACAATTCAG	58^{o}C	Mercati et al. 2013	NP
asp_c3803	TAAACTGATGGTGAGGCTCG	TTGTAGGCGGCAGGCTATT	58^{o}C	Mercati et al. 2013	NP
asp_c45	GGAGGAATGCCGACAAGG	TTTCTTCAATCGATCTCCTGG	58^{o}C	Mercati et al. 2013	Heterozygous in WN124 (no fit segregation)
asp_c4593	TCCTCCTTCGACACCTTCAG	GACTCCGGAATCGAGAAGC	58^{o}C	Mercati et al. 2013	NP
asp_c4789	**ACTTCCAAAGTCGCACACAC**	**TTTGTTGTTTGTTAATTTGCTGTT**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c5202	AGCTTCAGCAGCAGCAGTC	CTGTGATCCCAAGTAGTTGCTG	58^{o}C	Mercati et al. 2013	Heterozygous in WN124 (no fit segregation)
asp_c5587	TTTGTGGAGGGAGAGGGAG	CCACAAACAACTTTGCATCC	58^{o}C	Mercati et al. 2013	NP
asp_c6215	**CCCAGCTCATAAAGAGGAAACA**	**GAGTTCGCAAACAGAGGAGG**	**58^{o}C**	**Mercati et al. 2013**	**Heterozygous in WN124 (1:1)**
asp_c6290	CGGCGATAAATTGAAAGACC	ACTCAAGAAGCCGGAGGAAT	58^{o}C	Mercati et al. 2013	NP
asp_c6470	AGAAAGTCACGGGCCTCC	TATCCTCCTCCTGATTCGCA	58^{o}C	Mercati et al. 2013	NP
asp_c6790	GGAGAGAGGTCAGCATCTGG	GCCTTCACAACCTCCTCAAC	58^{o}C	Mercati et al. 2013	NP
asp_c7389	TTACTCTCCTACGGGCATGA	ACCTGAACGGTCGCAATTAG	58^{o}C	Mercati et al. 2013	NP
asp_c753	ATATTATGGTGGTGGCCGTG	TTCAATTGAGGGTGCAGATG	58^{o}C	Mercati et al. 2013	NP
asp_c8280	CAATCTCTCCCACAAGCTCA	GATTGCTGGATTTGGTGAGG	58^{o}C	Mercati et al. 2013	NP
asp_c8724	ACCTCCACATTCTATACGTTCCA	TGCTCCGTAAGGAGATTTCG	58^{o}C	Mercati et al. 2013	NP
asp_c8860	CACCAACCATCAGCAATCAC	GCGTTGGTCCAGTCATACG	58^{o}C	Mercati et al. 2013	NP

asp_c9020	GCAGCCAACCCTAGAAACAA	TATTATGAGCCTGTGGCTGG	58^{O}C	Mercati et al. 2013	NP
asp_c923	**CACAGGTAAGGGATTGCAGC**	**CCCAAGCTACTCCAAAGCAG**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in both parents (1:1:1:1)**
asp_c9454	TTCTCTGGTTGCTAAATAGAAAGAAA	AGGAGAATTCGACCACCCTC	58^{O}C	Mercati et al. 2013	NP
asp_c957	TGATGAACCACTCAATACATTCG	TGTGTCTTGTTGTTGTGGTGC	58^{O}C	Mercati et al. 2013	Heterozygous in PS010 (no fit segregation)
asp_c9810	**AGGCAGAAGCTGAAGAGGC**	**TTCTTGCTCTCTGTTCCAGC**	**58^{O}C**	**Mercati et al. 2013**	**Heterozygous in PS010 (1:1)**
TC1	**AGGTGGAGAACAAATGGCTG**	**CGAGCTCAATTGAAATCCATAA**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in PS010 (1:1)**
AG2	**CCTCCTCGGCAATTTAATCA**	**CAGCTGCATCACGTTCTTGT**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in both parents (1:1:1:1)**
AGA1	CCGGTGCTTTGATTACTGCT	GATCATCATCTTGCGCATTG	55^{O}C	Caruso et al. 2008	NP
TC2	GGCAGGATTAGGGTTTCG	TCTCGCTCACCTTCTCATCC	55^{O}C	Caruso et al. 2008	NP
AAT1	CTTTTGCTTCTGAACGCTCC	TTGAAGGAGCCGTAAACTGG	55^{O}C	Caruso et al. 2008	Heterozygous in PS010 (no fit segregation)
AG3	**TCCACCCCACAAAAAGAAAG**	**AGAAGTTGACGCCGTTGTCT**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in WN124 (1:1)**
TC3	**CACCATTTCAAATCCCCACT**	**GAGGCTAGAGCTCCGCTCAT**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in PS010 (1:1)**
AG5	GATTAATAAAGCGCCGCTGA	ACATAAGCCCATACTTGCGG	55^{O}C	Caruso et al. 2008	NP
AG6	TCATCTGAAATGGCATCAGC	CGAGGCCTAGTGTGTGTTGA	55^{O}C	Caruso et al. 2008	NP
AG7	**TTTTGCTCCGATCATTTTCA**	**CCTCTTCGTCTTCATCAGCC**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in both parents (1:1:1:1)**
TC4	AGAGAGGAAGTTGTCGCTCG	TGGGAAAATGGAAGAACCAA	55^{O}C	Caruso et al. 2008	NP
TC5	CCCGATCCAAACCCATCC	GAAAATTCGATCGGAACCCT	55^{O}C	Caruso et al. 2008	NP
AG8	**GATTGGGACCAACACAAACA**	**AGCAATGACTTGATCCCCAG**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in WN124 (1:1)**
TC6	CATGCCCTAAAATCTCCAAGA	GCCAGAGGCTGAAATAAACTG	55^{O}C	Caruso et al. 2008	NP
TC7	**CGCCCCGAATCAACTAATAA**	**TACTGCGGAGGTATGTGGGT**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in PS010 (1:1)**

TC8	GGCTAGCCGAAAGAATCTCC	TCTTCCTCCTCCTCCTCCTC	55^{O}C	Caruso et al. 2008	NP
AG10	**CGCCCTTGTTCTTCTTCTTG**	**CAGTTGTCTGCCGTCTTCAA**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in WN124 (1:1)**
AG11	AGGGGTCCGGATTAATTCAC	GTCCTTGGCCATTAGAGCTG	55^{O}C	Caruso et al. 2008	NP
TC9	**GTGATTCAAGGGGGAAAGGT**	**TACACCAAAACCAGAAGGGC**	**55^{O}C**	**Caruso et al. 2008**	**Heterozygous in both parents (1:1:1:1)**
AG12	GACTAGCGCCATGAGAAAGG	TTTTAGGGCATTTTAAACGCAT	55^{O}C	Caruso et al. 2008	Heterozygous in both parents (no fit segregation)
ssr13	CGACCAGAGAAGGAAGGAG	CAACCACGCTCATAAGAAC	55^{O}C	Li et al. 2016	NP
ssr15	**ATGATCCCTGAAGTTGTTG**	**GTTCCTCTACCAGCCAAG**	**60^{O}C**	**Li et al. 2016**	**Heterozygous in both parents (1:1:1:1)**
ssr20	CTCTACTCAACACTCTCC	TCTCTCCCGCTCTCTATC	55^{O}C	Li et al. 2016	NP
ssr22	TAAGCAACTCACTCACTATG	TGATGTGTGAAGGAGGAGG	55^{O}C	Li et al. 2016	Heterozygous in both parents (no fit segregation)
ssr23	GAGAACATAATCCAGAGAAC	GACACTCGCACAACCTT	55^{O}C	Li et al. 2016	NP
ssr26	CTCTCCAACAGCCTTCTCC	CGCAAGATTAGTGGTGGAAG	55^{O}C	Li et al. 2016	NP
ssr28	TGTTGGTTGTTGGTGTGAG	AGTGGTTGTTGTGGAGAG	55^{O}C	Li et al. 2016	NP
ssr32	TACTGACTTCCTTGTGCTTG	TCCCTCACAGAACTTACG	55^{O}C	Li et al. 2016	NP
ssr37	TATGTTCCTTGCTTCCATG	CGGTAGAAGTGATTGTGTAT	55^{O}C	Li et al. 2016	NP
ssr40	GCATATTTCTACTACGCCTCC	CAAACTAACCCTCAATCACTCG	55^{O}C	Li et al. 2016	Heterozygous in both parents (no fit segregation)
ssr41	CGCATGGGAAGAGAGCTAAAGT	CTGTGGAGTTGAAGGTGAAGAT	55^{O}C	Li et al. 2016	Heterozygous in WN124 (no fit segregation)
ssr42	TTGATACCATCTTGCTGCT	ACCCTCCTCAACAATCGCAG	55^{O}C	Li et al. 2016	NP
ssr43	CTTGATGGAGCTGGTCTTGT	TTCTCCACCCTCAATCTCAATAC	55^{O}C	Li et al. 2016	NP
ssr53	AAGGAGACGAGGAGGATGTG	TGTGATGCAGAGACGTATTAG	55^{O}C	Li et al. 2016	NP

ssr56	GCTGCTAAGGGATATAGTGCCA	TATGGTTGCAGAGGATAGGT	55^{O}C	Li et al. 2016	Heterozygous in WN124 (no fit segregation)
ssr63	TTAAGTCAGGTGGTGCTCTC	CTGGATTAGTGGTTGATGATG	55^{O}C	Li et al. 2016	Heterozygous in PS010 (no fit segregation)
ssr64	AGAGCAGAAAACACCGAGAG	TGTTGTTCGACCGCCGTT	55^{O}C	Li et al. 2016	NP
ssr66	GTGGGATGTTCAATCTCTATGT	CTACCGTCTGAGAGCTATTCTT	55^{O}C	Li et al. 2016	Heterozygous in both parents (no fit segregation)
ssr69	**GGCTAATTGTGTTGGGAATCG**	**CCAACTAATCTACTGACACACG**	**55^{O}C**	**Li et al. 2016**	**Heterozygous in PS010 (1:1)**
ssr73	GTGTCATTACTGTTGAAGC	TCCGATTTCTTTATCTCCC	55^{O}C	Li et al. 2016	Heterozygous in both parents (no fit segregation)
ssr77	GGCCTGCATGTTCTTTATATC	GCTCATTCTCATCCACTCAT	55^{O}C	Li et al. 2016	NP
ssr83	GAGTTGAGGCGAGGGACAT	GTTACTTTCGAGGAGGCCA	55^{O}C	Li et al. 2016	NP

***** NP, markers homozygous in both parents and not polymorphic in the population