

Additional file 1: Table S1**Total number of MADS-box genes within each group of *Arabidopsis*, Rice, Soybean, Maize, Sorghum and *B. rapa***

Sl.	Crop	MIKC ^c	MIKC ^{*c}	M α	M β	M γ	Total
1	<i>Arabidopsis</i> ^a	39	6	25	20	16	107
2	Rice ^b	38	5	13	9	10	75
3	Soybean ^c	67	5	18	5	11	106
4	Maize ^d	39	4	27	3	2	75
5	Sorghum ^d	33	2	26	2	2	65
6	<i>B. rapa</i>	89	11	29	16	22	167

^a Parenicova et al. (2003)^b Arora et al. (2007)^c Shu et al. (20013)^d Zhao et al. (2010)**Reference list of additional file 1: table S1**

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Parenicova L, de Folter S, Kieffer M, Horner DS, Favalli C, Busscher J, Cook *et al.*: **Molecular and phylogenetic analyses of the complete MADS-box transcription factor family in *Arabidopsis*.** *Plant Cell* 2003, **15(7)**:1538–1551.

Shu Y, Yu D, Wang D, Guo D, Guo C: **Genome-wide survey and expression analysis of the MADS-box gene family in soybean.** *Molecular biology reports* 2013, **40(6)**:3901-3911.

Zhao Y, Li X, Chen W, Peng X, Cheng X, Zhu S, Cheng B: **Whole-genome survey and characterization of MADS-box gene family in maize and sorghum.** *Plant Cell Tissue Organ Cult* 2010, **105(2)**:159–173.

Additional file 1: Table S2
Homology analysis of 167 MADS-box genes in *B. rapa*

Sl.	Gene name	Top matched clones	Name of protein	% Identity	E-value	Top homologous species	References
1	<i>BrMADS1</i>	NP182170	inner membrane OXA1-like protein	78	5E-98	<i>A. thaliana</i>	(Lin et al. 1999)
2	<i>BrMADS2</i>	NP191298	protein agamous-like 18	72	3E-117	<i>A. thaliana</i>	(Salanoubat et al. 2000)
3	<i>BrMADS3</i>	NP191298	protein agamous-like 18	80	9E-133	<i>A. thaliana</i>	(Salanoubat et al. 2000)
4	<i>BrMADS4</i>	NP191298	protein agamous-like 18	55	6E-66	<i>A. thaliana</i>	(Salanoubat et al. 2000)
5	<i>BrMADS5</i>	AAB03807	AGL15 type 2	93	1E-166	<i>B. napus</i>	(Heck et al. 1995)
6	<i>BrMADS6</i>	ABD77425	agamous-like 15	99	0.0	<i>B. napus</i>	Unpublished
7	<i>BrMADS7</i>	XP002864937	MADS-box protein AGL27-I	83	1E-80	<i>A. lyrata subsp. lyrata</i>	Unpublished
8	<i>BrMADS8</i>	NP201311	K-box region and MADS-box transcription factor family protein	71	2E-92	<i>A. thaliana</i>	Unpublished
9	<i>BrMADS9</i>	NP001078798	agamous-like MADS-box protein AGL31	64	3E-62	<i>A. thaliana</i>	Unpublished
10	<i>BrMADS10</i>	NP201312	K-box region and MADS-box transcription factor family protein	72	1E-90	<i>A. thaliana</i>	Unpublished
11	<i>BrMADS11</i>	NP201312	K-box region and MADS-box transcription factor family protein	75	4E-96	<i>A. thaliana</i>	Unpublished
12	<i>BrMADS12</i>	ABO40820	FLC	99	2E-135	<i>B. rapa subsp. chinensis</i>	Unpublished
13	<i>BrMADS13</i>	AAK70215	MADS-box protein	100	1E-134	<i>B. napus</i>	(Tadege et al. 2001)
14	<i>BrMADS14</i>	ADA70732	flowering locus C3	99	2E-134	<i>B. rapa var. purpuraria</i>	Unpublished
15	<i>BrMADS15</i>	AAK70219	MADS-box protein	73	1E-85	<i>B. napus</i>	(Tadege et al. 2001)
16	<i>BrMADS16</i>	NP179848	agamous-like MADS-box protein AGL17	85	1E-135	<i>A. thaliana</i>	(Lin et al. 1999)
17	<i>BrMADS17</i>	NP179848	agamous-like MADS-box protein AGL17	82%	9E-130	<i>A. thaliana</i>	(Lin et al. 1999)
18	<i>BrMADS18</i>	NP195507	agamous-like MADS-box protein AGL21	91%	2E-152	<i>A. thaliana</i>	(Mayer et al. 1999)
19	<i>BrMADS19</i>	NP195507	agamous-like MADS-box protein AGL21	86%	6E-140	<i>A. thaliana</i>	(Mayer et al. 1999)
20	<i>BrMADS20</i>	NP191282	protein agamous-like 16	86%	2E-143	<i>A. thaliana</i>	(Salanoubat et al. 2000)
21	<i>BrMADS21</i>	NP001078305	protein agamous-like 16	69%	5E-124	<i>A. thaliana</i>	(Salanoubat et al. 2000)
22	<i>BrMADS22</i>	ABI96182	short vegetative phase protein	100%	2E-172	<i>B. rapa subsp. Oleifera</i>	Unpublished
23	<i>BrMADS23</i>	ABG24233	short vegetative phase	100%	4E-168	<i>B. rapa subsp.</i>	(Lee et al. 2007)

24	<i>BrMADS24</i>	AFM77897	protein MADS-box protein AGL24	95%	3E-146	<i>Oleifera</i> <i>B. napus</i>	Unpublished
25	<i>BrMADS25</i>	NP194184	O-fucosyltransferase family protein	90%	0.0	<i>A. thaliana</i>	(Mayer et al. 1999)
26	<i>BrMADS26</i>	AEF32148	MADS-box DNA- binding domain transcription factor	100%	6E-179	<i>B. napus</i>	(Deng et al. 2012)
27	<i>BrMADS27</i>	ADV03948	MADS DNA domain binding transcription factor BnaA	98%	2E-158	<i>B. napus</i>	Unpublished
28	<i>BrMADS28</i>	ABY59773	MADS-box DNA- binding domain transcription factor	99%	4E-174	<i>B. napus</i>	Unpublished
29	<i>BrMADS29</i>	ABW74343	PISTILLATA-1	95%	9E-141	<i>B. napus</i>	(Deng et al. 2011)
30	<i>BrMADS30</i>	AAV63867	PISTILLATA	96%	3E-141	<i>B. juncea</i>	Unpublished
31	<i>BrMADS31</i>	ABW74343	PISTILLATA-1	95%	9E-94	<i>B. napus</i>	(Deng et al. 2011)
32	<i>BrMADS32</i>	AAF28894	APETALA3, floral homeotic protein APETALA3 [Brassica rapa subsp. chinensis], APETALA3-4 [Brassica napus]	99%	6E-164	<i>B.napus</i>	(Pylatuik et al. 2003)
33	<i>BrMADS33</i>	AAB08877	homeotic protein boi1AP3	100%	4E-171	<i>B. oleracea var.</i> <i>italica</i>	(Carr and Irish 1997)
34	<i>BrMADS34</i>	NP565022	agamous-like MADS- box protein AGL12	93%	2E-133	<i>A. thaliana</i>	(Theologis et al. 2000)
35	<i>BrMADS35</i>	NP565022	agamous-like MADS- box protein AGL12	91%	2E-131	<i>A. thaliana</i>	(Theologis et al. 2000)
36	<i>BrMADS36</i>	AFM77891	MADS-box protein AGL20/SOC1	93%	7E-143	<i>B. napus</i>	Unpublished
37	<i>BrMADS37</i>	AFM77893	MADS-box protein AGL20/SOC1	99%	1E-152	<i>B. juncea</i>	Unpublished
38	<i>BrMADS38</i>	AFM77891	MADS-box protein AGL20/SOC1	99%	9E-151	<i>B. napus</i>	Unpublished
39	<i>BrMADS39</i>	NP192925	agamous-like MADS- box protein AGL14	65%	2E-74	<i>A. thaliana</i>	(Mayer et al. 1999)
40	<i>BrMADS40</i>	NP194026	agamous-like MADS- box protein AGL19	55%	2E-60	<i>A. thaliana</i>	(Mayer et al. 1999)
41	<i>BrMADS41</i>	NP194025	protein kinase family protein	79%	0.0	<i>A. thaliana</i>	(Mayer et al. 1999)
42	<i>BrMADS42</i>	NP194026	agamous-like MADS- box protein AGL19	86%	1E-124	<i>A. thaliana</i>	(Mayer et al. 1999)
43	<i>BrMADS43</i>	NP568952	protein agamous-like 42	80%	1E-114	<i>A. thaliana</i>	Unpublished
44	<i>BrMADS44</i>	NP568952	protein agamous-like 42	87%	3E-127	<i>A. thaliana</i>	Unpublished
45	<i>BrMADS45</i>	NP200000	protein agamous-like 71	56%	7E-61	<i>A. thaliana</i>	Unpublished
46	<i>BrMADS46</i>	NP001078745	MADS-box protein	57%	6E-64	<i>A. thaliana</i>	Unpublished
47	<i>BrMADS47</i>	NP001078745	MADS-box protein	43%	2E-38	<i>A. thaliana</i>	Unpublished
48	<i>BrMADS48</i>	XP002865878	MADS-box protein	57%	3E-66	<i>A. lyrata subsp.</i> <i>lyrata</i>	Unpublished
49	<i>BrMADS49</i>	NP001078745	MADS-box protein	84%	9E-115	<i>A. thaliana</i>	Unpublished
50	<i>BrMADS50</i>	XP002865878	MADS-box protein	87%	2E-121	<i>A. lyrata subsp.</i> <i>lyrata</i>	Unpublished
51	<i>BrMADS51</i>	NP001190517	protein agamous-like 71	74%	1E-106	<i>A. thaliana</i>	Unpublished
52	<i>BrMADS52</i>	NP001190517	protein agamous-like 71	70%	3E-98	<i>A. thaliana</i>	Unpublished
53	<i>BrMADS53</i>	ACD76823	SEEDSTICK-like	91%	4E-138	<i>Capsella bursa-</i>	Unpublished

54	<i>BrMADS54</i>	NP192734	protein agamous-like MADS- box protein AGL11	87%	7E-135	<i>pastoris</i> <i>A. thaliana</i>	(Mayer et al. 1999)
55	<i>BrMADS55</i>	Q01540	RecName: Full=Floral homeotic protein AGAMOUS	100%	0.0	<i>B. napus</i>	(Mandel et al. 1992)
56	<i>BrMADS56</i>	P17839	RecName: Full=Floral homeotic protein AGAMOUS	92%	3E-167	<i>A. thaliana</i>	(Yanofsky et al. 1990)
57	<i>BrMADS57</i>	NP191437	agamous-like MADS- box protein AGL1	92%	7E-168	<i>A. thaliana</i>	(Salanoubat et al. 2000)
58	<i>BrMADS58</i>	NP191437	agamous-like MADS- box protein AGL1	90%	7E-160	<i>A. thaliana</i>	(Salanoubat et al. 2000)
59	<i>BrMADS59</i>	NP191437	agamous-like MADS- box protein AGL1	92%	1E-163	<i>A. thaliana</i>	(Salanoubat et al. 2000)
60	<i>BrMADS60</i>	NP565986	agamous-like MADS- box protein AGL5	92%	1E-161	<i>A. thaliana</i>	(Lin et al. 1999)
61	<i>BrMADS61</i>	Q41276	Full=Floral homeotic protein APETALA 1; AltName: Full=MADS C	95%	7E-168	<i>Sinapis alba</i>	(Menzel et al. 1995)
62	<i>BrMADS62</i>	Q8GTF4	RecName: Full=Floral homeotic protein APETALA 1 C, Full=Agamous-like MADS-box protein API-C	99%	1E-119	<i>B. oleracea var.</i> <i>botrytis</i>	(Carr and Irish 1997)
63	<i>BrMADS63</i>	Q8GTF5	RecName: Full=Floral homeotic protein APETALA 1 A, Full=Agamous-like MADS-box protein API-A	96%	2E-164	<i>B. oleracea var.</i> <i>botrytis</i>	(Duclos and Björkman 2008)
64	<i>BrMADS64</i>	CAD47852	MADS-box protein FUL-d	98%	2E-169	<i>B. oleracea var.</i> <i>botrytis</i>	Unpublished
65	<i>BrMADS65</i>	CAD47849	MADS-box protein FUL-a	97%	4E-167	<i>B. oleracea var.</i> <i>botrytis</i>	Unpublished
66	<i>BrMADS66</i>	Q41274	RecName: Full=Agamous-like MADS-box protein AGL8 homolog	95%	1E-165	<i>Sinapis alba</i>	(Menzel et al. 1996)
67	<i>BrMADS67</i>	NP189645	protein agamous-like 79	82%	9E-124	<i>A. thaliana</i>	(Salanoubat et al. 2000)
68	<i>BrMADS68</i>	BAB02228	MADS box transcription factor-like protein	88%	4E-93	<i>A. thaliana</i>	(Kaneko et al. 2000)
69	<i>BrMADS69</i>	NP189645	protein agamous-like 79	83%	6E-97	<i>A. thaliana</i>	(Salanoubat et al. 2000)
70	<i>BrMADS70</i>	Q6R4S3	RecName: Full=Transcription factor, AltName: Full=Agamous-like MADS-box protein CAL	100%	0.0	<i>B. rapa subsp.</i> <i>rapa</i>	(Purugganan et al. 2000)
71	<i>BrMADS71</i>	NP191671	agamous-like MADS- box protein AGL13	67%	6E-101	<i>A. thaliana</i>	(Salanoubat et al. 2000)

72	<i>BrMADS72</i>	CAD48306	MADS-box protein AGL6-a	89%	3E-157	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
73	<i>BrMADS73</i>	CAD48306	MADS-box protein AGL6-a	83%	1E-151	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
74	<i>BrMADS74</i>	XP002884314	SEPALLATA2	95%	7E-173	<i>A. lyrata</i> subsp. <i>lyrata</i>	Unpublished
75	<i>BrMADS75</i>	XP002884314	SEPALLATA2	92%	6E-171	<i>A. lyrata</i> subsp. <i>lyrata</i>	Unpublished
76	<i>BrMADS76</i>	O04067	RecName: Full=Agamous-like MADS-box protein AGL9 homolog	88%	1E-151	<i>Sinapis alba</i>	(Bonhomme et al. 1997)
77	<i>BrMADS77</i>	O04067	RecName: Full=Agamous-like MADS-box protein AGL9 homolog	93%	1E-169	<i>Sinapis alba</i>	(Bonhomme et al. 1997)
78	<i>BrMADS78</i>	CAD48302	MADS-box protein AGL3-a	83%	1E-162	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
79	<i>BrMADS79</i>	CAD48302	MADS-box protein AGL3-a	85%	7E-148	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
80	<i>BrMADS80</i>	CAD48302	MADS-box protein AGL3-a	97%	0.0	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
81	<i>BrMADS81</i>	O04067	RecName: Full=Agamous-like MADS-box protein AGL9 homolog	96%	6E-178	<i>Sinapis alba</i>	(Bonhomme et al. 1997)
82	<i>BrMADS82</i>	AAA32732	transcription factor, SEPALLATA1	93%	2E-168	<i>A. thaliana</i>	(Ma et al. 1991)
83	<i>BrMADS83</i>	CAD48303	MADS-box protein SEPI-a	100%	0.0	<i>B. oleracea</i> var. <i>botrytis</i>	Unpublished
84	<i>BrMADS84</i>	BAD93735	MADS transcription factor-like protein	95%	7E-32	<i>A. thaliana</i>	Unpublished
85	<i>BrMADS85</i>	NP974450	protein agamous-like 18	75%	8E-85	<i>A. thaliana</i>	(Salanoubat et al. 2000)
86	<i>BrMADS86</i>	BAD93735.1	MADS transcription factor-like protein	76%	2E-20	<i>A. thaliana</i>	Unpublished
87	<i>BrMADS87</i>	NP974450	protein agamous-like 18	39%	2E-07	<i>A. thaliana</i>	(Salanoubat et al. 2000)
88	<i>BrMADS88</i>	NP565022	agamous-like MADS- box protein AGL12	98%	2E-34	<i>A. thaliana</i>	(Theologis et al. 2000)
89	<i>BrMADS89</i>	ABI20790	MADS-box protein	47%	1E-25	<i>A. lyrata</i> subsp. <i>lyrata</i>]	Unpublished
90	<i>BrMADS90</i>	ADU56838	MADS-box protein Md subfamily	37%	5E-28	<i>Coffea arabica</i>	Unpublished
91	<i>BrMADS91</i>	NP177918	protein agamous-like 67	85%	1E-107	<i>A. thaliana</i>	(Theologis et al. 2000)
92	<i>BrMADS92</i>	NP173632	protein AGAMOUS- like 104	85%	0.0	<i>A. thaliana</i>	(Theologis et al. 2000)
93	<i>BrMADS93</i>	NP173632	protein AGAMOUS- like 104	78%	1E-173	<i>A. thaliana</i>	Theologis A et al (2000)
94	<i>BrMADS94</i>	NP177921	protein agamous-like 66	84%	0.0	<i>A. thaliana</i>	(Theologis et al. 2000)
95	<i>BrMADS95</i>	NP173310	protein AGAMOUS- like 65	78%	0.0	<i>A. thaliana</i>	(Theologis et al. 2000)
96	<i>BrMADS96</i>	BAC99091	MADS-box protein	73%	3E-110	<i>A. thaliana</i>	(Kofuji et al. 2003)
97	<i>BrMADS97</i>	NP173310	protein AGAMOUS- like 65	86%	0.0	<i>A. thaliana</i>	(Theologis et al. 2000)
98	<i>BrMADS98</i>	NP001077873	protein agamous-like 30	81%	0.0	<i>A. thaliana</i>	(Lin et al. 1999)

99	<i>BrMADS99</i>	NP001077873	protein agamous-like 30	78%	0.0	<i>A. thaliana</i>	(Lin et al. 1999)
100	<i>BrMADS100</i>	NP177113	protein agamous-like 94	72%	1E-173	<i>A. thaliana</i>	(Theologis et al. 2000)
101	<i>BrMADS101</i>	XP002882329	MADS-box family protein	54%	2E-48	<i>A. lyrata subsp. lyrata</i>	Unpublished
102	<i>BrMADS102</i>	XP002882329	MADS-box family protein	50%	8E-44	<i>A. lyrata subsp. lyrata</i>	Unpublished
103	<i>BrMADS103</i>	XP002882329	MADS-box family protein	53%	1E-51	<i>A. lyrata subsp. lyrata</i>	Unpublished
104	<i>BrMADS104</i>	NP001077625	protein agamous-like 64	49%	1E-47	<i>A. thaliana</i>	(Theologis et al. 2000)
105	<i>BrMADS105</i>	XP002883198	hypothetical protein ARALYDRAFT_898356	61%	1E-96	<i>A. lyrata subsp. lyrata</i>	Unpublished
106	<i>BrMADS106</i>	NP200852	agamous-like MADS-box protein AGL62	55%	2E-100	<i>A. thaliana</i>	Unpublished
107	<i>BrMADS107</i>	XP002864686	MADS-box protein	44%	1E-65	<i>A. lyrata subsp. lyrata</i>	Unpublished
108	<i>BrMADS108</i>	XP002864686	MADS-box protein	61%	3E-97	<i>A. lyrata subsp. lyrata</i>	Unpublished
109	<i>BrMADS109</i>	NP195377	MADS-box transcription factor family protein	44%	8E-45	<i>A. thaliana</i>	(Mayer et al. 1999)
110	<i>BrMADS110</i>	NP200852	agamous-like MADS-box protein AGL62	45%	1E-56	<i>A. thaliana</i>	Unpublished
111	<i>BrMADS111</i>	NP850058	agamous-like MADS-box protein AGL61	76%	1E-82	<i>A. thaliana</i>	(Lin et al. 1999)
112	<i>BrMADS112</i>	NP850058	agamous-like MADS-box protein AGL61	74%	1E-104	<i>A. thaliana</i>	(Lin et al. 1999)
113	<i>BrMADS113</i>	NP850058	agamous-like MADS-box protein AGL61	58%	1E-54	<i>A. thaliana</i>	(Lin et al. 1999)
114	<i>BrMADS114</i>	NP187320	protein agamous-like 91	69%	3E-71	<i>A. thaliana</i>	(Salanoubat et al. 2000)
115	<i>BrMADS115</i>	NP180991	protein agamous-like 29	76%	9E-90	<i>A. thaliana</i>	(Lin et al. 1999)
116	<i>BrMADS116</i>	NP177379	MADS-box protein	68%	2E-84	<i>A. thaliana</i>	(Theologis et al. 2000)
117	<i>BrMADS117</i>	XP002892945	MADS-box protein	69%	8E-86	<i>A. lyrata subsp. lyrata</i>	Unpublished
118	<i>BrMADS118</i>	NP198678	MADS-box protein AGL73	53%	1E-48	<i>A. thaliana</i>	Unpublished
119	<i>BrMADS119</i>	NP187857	MADS-box family protein	35%	3E-08	<i>A. thaliana</i>	(Salanoubat et al. 2000)
120	<i>BrMADS120</i>	NP198678	MADS-box protein AGL73	41%	9E-66	<i>A. thaliana</i>	Unpublished
121	<i>BrMADS121</i>	NP198678	MADS-box protein AGL73	46%	1E-62	<i>A. thaliana</i>	Unpublished
122	<i>BrMADS122</i>	NP199753	MADS-box transcription factor family protein	45%	5E-52	<i>A. thaliana</i>	Unpublished
123	<i>BrMADS123</i>	NP199753	MADS-box transcription factor family protein	56%	2E-58	<i>A. thaliana</i>	Unpublished
124	<i>BrMADS124</i>	NP176288	protein agamous-like 55	69%	3E-75	<i>A. thaliana</i>	(Theologis et al. 2000)
125	<i>BrMADS125</i>	NP176288	protein agamous-like 55	64%	2E-76	<i>A. thaliana</i>	Unpublished
126	<i>BrMADS126</i>	NP196084	protein agamous-like 99	39%	9E-50	<i>A. thaliana</i>	Unpublished
127	<i>BrMADS127</i>	NP187857	MADS-box family protein	48%	8E-26	<i>A. thaliana</i>	Unpublished
128	<i>BrMADS128</i>	NP175249	MADS-box domain-containing protein	49%	2E-73	<i>A. thaliana</i>	(Theologis et al. 2000)

129	<i>BrMADS129</i>	XP002864686	MADS-box protein	55%	1E-82	<i>A. lyrata subsp. lyrata</i>	Unpublished
130	<i>BrMADS130</i>	NP200380	MADS-box protein AGL47	70%	1E-138	<i>A. thaliana</i>	Unpublished
131	<i>BrMADS131</i>	XP002864598	MADS-box family protein	61%	4E-118	<i>A. lyrata subsp. lyrata</i>	Unpublished
132	<i>BrMADS132</i>	NP188495	protein agamous-like 103	47%	4E-69	<i>A. thaliana</i>	(Salanoubat et al. 2000)
133	<i>BrMADS133</i>	NP188495	protein agamous-like 103	58%	1E-106	<i>A. thaliana</i>	(Salanoubat et al. 2000)
134	<i>BrMADS134</i>	NP201336	protein agamous-like 78	51%	5E-90	<i>A. thaliana</i>	Unpublished
135	<i>BrMADS135</i>	NP198936	protein agamous-like 75	43%	8E-50	<i>A. thaliana</i>	Unpublished
136	<i>BrMADS136</i>	NP201336	protein agamous-like 78	45%	3E-54	<i>A. thaliana</i>	Unpublished
137	<i>BrMADS137</i>	NP198936	protein agamous-like 75	49%	2E-66	<i>A. thaliana</i>	Unpublished
138	<i>BrMADS138</i>	XP002872250	agamous-like MADS-box protein AGL93	37%	1e-32	<i>A. lyrata subsp. lyrata</i>	Unpublished
139	<i>BrMADS139</i>	XP002872250	MADS-box family protein	39%	4E-36	<i>A. lyrata subsp. lyrata</i>	Unpublished
140	<i>BrMADS140</i>	NP198061	protein agamous-like 54	43%	2E-30	<i>A. thaliana</i>	Unpublished
141	<i>BrMADS141</i>	XP002874408	MADS-box family protein	39%	3E-39	<i>A. lyrata subsp. lyrata</i>	Unpublished
142	<i>BrMADS142</i>	XP002872250	MADS-box family protein	38%	2E-31	<i>A. lyrata subsp. lyrata</i>	Unpublished
143	<i>BrMADS143</i>	XP002872250	MADS-box family protein	44%	1E-48	<i>A. lyrata subsp. lyrata</i>	Unpublished
144	<i>BrMADS144</i>	NP198059	protein agamous-like 53	41%	3E-40	<i>A. thaliana</i>	Unpublished
145	<i>BrMADS145</i>	NP198059	protein agamous-like 53	39%	1E-39	<i>A. thaliana</i>	Unpublished
146	<i>BrMADS146</i>	NP180438	protein agamous-like 46	49%	2E-72	<i>A. thaliana</i>	(Lin et al. 1999)
147	<i>BrMADS147</i>	NP180438	protein agamous-like 46	50%	5E-38	<i>A. thaliana</i>	(Lin et al. 1999)
148	<i>BrMADS148</i>	NP180438	protein agamous-like 46	41%	1E-67	<i>A. thaliana</i>	(Lin et al. 1999)
149	<i>BrMADS149</i>	NP180438	protein agamous-like 46	41%	8E-68	<i>A. thaliana</i>	(Lin et al. 1999)
150	<i>BrMADS150</i>	NP187237	MADS-box domain-containing protein	53%	4E-96	<i>A. thaliana</i>	(Salanoubat et al. 2000)
151	<i>BrMADS151</i>	NP850882	MADS-box protein AGL35	61%	4E-81	<i>A. thaliana</i>	Unpublished
152	<i>BrMADS152</i>	NP850882	MADS-box protein AGL35	55%	6E-57	<i>A. thaliana</i>	Unpublished
153	<i>BrMADS153</i>	NP199678	agamous-like MADS-box protein AGL80	60%	7E-107	<i>A. thaliana</i>	Unpublished
154	<i>BrMADS154</i>	NP199678	agamous-like MADS-box protein AGL80	60%	3E-107	<i>A. thaliana</i>	Unpublished
155	<i>BrMADS155</i>	NP199678	agamous-like MADS-box protein	53%	7E-83	<i>A. thaliana</i>	Unpublished
156	<i>BrMADS156</i>	NP176712	MADS-box transcription factor PHERES 1 AltName: Full=Agamous-like	36%	9E-38	<i>A. thaliana</i>	(Theologis et al. 2000)
157	<i>BrMADS157</i>	BAN63704	MADS-box protein agamous-like MADS-box protein AGL36, partial.	36%	7E-46	<i>A. halleri subsp. gemmifera</i>	Unpublished
158	<i>BrMADS158</i>	NP176712	MADS-box transcription factor PHERES 1 AltName: Full=Agamous-like	36%	2E-35	<i>A. thaliana</i>	(Theologis et al. 2000)

159	<i>BrMADS159</i>	NP850880	MADS-box protein agamous-like MADS-box protein AGL36, partial	33%	8E-33	<i>A. halleri</i> subsp. <i>halleri</i>	Unpublished
160	<i>BrMADS160</i>	NP174444	agamous-like MADS-box protein AGL86	36%	5E-52	<i>A. thaliana</i>	(Theologis et al. 2000)
161	<i>BrMADS161</i>	NP973886	protein AGAMOUS-like 87	72%	5E-79	<i>A. thaliana</i>	(Theologis et al. 2000)
162	<i>BrMADS162</i>	NP973886	protein AGAMOUS-like 87	76%	2E-83	<i>A. thaliana</i>	(Theologis et al. 2000)
163	<i>BrMADS163</i>	NP196268	protein agamous-like 96	45%	9E-61	<i>A. thaliana</i>	Unpublished
164	<i>BrMADS164</i>	NP196268	protein agamous-like 96	49%	4E-46	<i>A. thaliana</i>	Unpublished
165	<i>BrMADS165</i>	NP196268	protein agamous-like 96	48%	1E-39	<i>A. thaliana</i>	Unpublished
166	<i>BrMADS166</i>	NP196268	protein agamous-like 96	46%	3E-35	<i>A. thaliana</i>	Unpublished
167	<i>BrMADS167</i>	NP181550	protein agamous-like 48	41%	3E-72	<i>A. thaliana</i>	(Lin et al. 1999)

Reference list of additional file 1: table S2

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Additional file 1: Table S3

Synteny table showing *A. thaliana* orthologous MADS-box gene pairs in *B. rapa*

Sl. no.	Arabidopsis MADS-box genes	Arabidopsis family/subfamily	Orthologous MADS-box gene in <i>B. rapa</i>	Best BLASTX value			Protein BLAST results of <i>B. rapa</i> MADS-box genes		
				Query %	Identity %	E-value	Gene name	Identity %	Query %
1.	<i>AGL18</i>	AGL15-like	<i>BrMADS1</i>	19	73	2e-24	BrMADS86	98	20
			<i>BrMADS2</i>	99	72	5e-116	BrMADS3	80	100
			<i>BrMADS3</i>	99	77	2e-132	BrMADS2	80	100
			<i>BrMADS4</i>	95	55	2e-73	BrMADS2	59	97
			<i>BrMADS84</i>	95	95	1e-38	BrMADS3	97	98
			<i>BrMADS85</i>	98	75	2e-82	BrMADS3	83	99
			<i>BrMADS86</i>	95	76	2e-82	BrMADS1	98	100
2.	<i>AGL15</i>	AGL15-like	<i>BrMADS5</i>	85	75	7e-124			
			<i>BrMADS6</i>	92	75	4e-129			
			<i>BrMADS87</i>	90	70	1e-46			
3.	<i>AGL69</i>	FLC-like	<i>BrMADS7</i>	74	65	4e-72			
4.	<i>AGL27/FLM</i>	FLC-like	<i>BrMADS9</i>	87	64	3e-61			
			<i>BrMADS8</i>	98	73	7e-75			
			<i>BrMADS10</i>	98	68	2e-70			
5.	<i>AGL25/FLC</i>	FLC-like	<i>BrMADS11</i>	98	68	6e-74			
			<i>BrMADS12</i>	98	85	1e-96	BrMADS14	88	99
			<i>BrMADS13</i>	98	86	5e-97	BrMADS12	87	95
6.	<i>AGL17</i>	AGL17-like	<i>BrMADS14</i>	99	83	9e-96	BrMADS12	88	99
			<i>BrMADS15</i>	84	88	2e-47	BrMADS14	58	100
			<i>BrMADS16</i>	99	85	4e-143			
7.	<i>AGL21</i>	AGL17-like	<i>BrMADS17</i>	99	82	3e-137			
			<i>BrMADS18</i>	99	91	5e-160			
8.	<i>AGL16</i>	AGL17-like	<i>BrMADS19</i>	99	86	2e-147			
			<i>BrMADS20</i>	99	86	2e-143			
			<i>BrMADS21</i>	99	66	4e-115			
9.	<i>AGL22/SVP</i>	STMADS11-like	<i>BrMADS22</i>	99	92	1e-163			
			<i>BrMADS23</i>	97	91	7e-158			
10.	<i>AGL24</i>	STMADS11-like	<i>BrMADS24</i>	97	86	3e-113			
			<i>BrMADS25</i>	97	85	9e-108			
			<i>BrMADS26</i>	73	75	2e-127			
11.	<i>AGL32/TT16</i>	GGM13-like	<i>BrMADS27</i>	80	71	6e-127			
			<i>BrMADS28</i>	77	79	5e-134			
			<i>BrMADS29</i>	99	90	9e-131			
12.	<i>PISTILLATA</i>	GLO-like	<i>BrMADS30</i>	99	92	1e-132			
			<i>BrMADS31</i>	95	94	9e-101			
			<i>BrMADS32</i>	99	91	2e-161			
13.	<i>APETALA3</i>	DEF-like	<i>BrMADS33</i>	99	95	3e-171			
14.	<i>AGL12</i>	AGL12-like	<i>BrMADS34</i>	99	93	1e-140			
			<i>BrMADS35</i>	99	90	4e-131			
			<i>BrMADS88</i>	96	98	1e-40			
15.	<i>AGL20/SOC1</i>	TM3-like	<i>BrMADS36</i>	99	93	8e-119			
			<i>BrMADS37</i>	99	95	2e-133			
			<i>BrMADS38</i>	99	95	8e-123			
16.	<i>AGL14</i>	TM3-like	<i>BrMADS39</i>	99	65	2e-78			
17.	<i>AGL19</i>	TM3-like	<i>BrMADS40</i>	98	55	1e-68			
			<i>BrMADS41</i>	16	91	1e-50			
			<i>BrMADS42</i>	98	86	4e-125			
			<i>BrMADS43</i>	99	80	1e-103			
18.	<i>AGL42</i>	TM3-like	<i>BrMADS44</i>	99	87	9e-117			

19.	<i>AGL72</i>	TM3-like	<i>BrMADS45</i>	97	56	2e-68	<i>BrMADS46</i>	75	97
			<i>BrMADS46</i>	96	52	2e-62	<i>BrMADS45</i>	75	96
			<i>BrMADS47</i>	99	40	9e-38	<i>BrMADS46</i>	50	100
			<i>BrMADS48</i>	97	55	3e-70	<i>BrMADS45</i>	67	99
			<i>BrMADS49</i>	99	80	3e-119	<i>BrMADS50</i>	90	95
			<i>BrMADS50</i>	99	82	2e-124	<i>BrMADS49</i>	90	97
			<i>BrMADS89</i>	82	45	4e-27	<i>BrMADS46</i>	60	86
20.	<i>AGL71</i>	FLC-like	<i>BrMADS51</i>	99	68	7e-94			
			<i>BrMADS52</i>	99	67	2e-94			
21.	<i>AGL11</i>	AGAMOUS-like	<i>BrMADS53</i>	90	90	7e-144			
			<i>BrMADS54</i>	90	87	9e-142			
22.	<i>AGAMOUS</i>	AGAMOUS-like	<i>BrMADS55</i>	99	95	2e-161			
			<i>BrMADS56</i>	99	92	1e-160			
23.	<i>AGL1/SHP1</i>	AGAMOUS-like	<i>BrMADS57</i>	99	92	2e-175			
			<i>BrMADS58</i>	82	90	1e-161			
			<i>BrMADS59</i>	99	92	1e-158			
24.	<i>AGL5/SHP2</i>	AGAMOUS-like	<i>BrMADS60</i>	99	92	2e-154			
25.	<i>AGL7/API</i>		<i>BrMADS61</i>	99	94	2e-174			
			<i>BrMADS62</i>	66	97	2e-124			
			<i>BrMADS63</i>	99	92	2e-165			
26.	<i>AGL8/FUL</i>	SQUA-like	<i>BrMADS64</i>	97	92	9e-161			
			<i>BrMADS65</i>	98	94	3e-170			
			<i>BrMADS66</i>	98	92	2e-160			
27.	<i>AGL79</i>	SQUA-like	<i>BrMADS67</i>	99	82	8e-123			
			<i>BrMADS68</i>	85	88	7e-99			
			<i>BrMADS69</i>	91	82	2e-103			
28.	<i>AGL10/CAL</i>	SQUA-like	<i>BrMADS70</i>	99	84	4e-157			
29.	<i>AGL13</i>	AGL6-like	<i>BrMADS71</i>	99	66	2e-102			
30.	<i>AGL6</i>	AGL6-like	<i>BrMADS72</i>	99	81	3e-136			
			<i>BrMADS73</i>	99	82	3e-143			
31.	<i>AGL4/SEP2</i>	AGI2-like	<i>BrMADS74</i>	99	94	1e-178			
			<i>BrMADS75</i>	99	92	5e-177			
32.	<i>AGL9/SEP3</i>	AGI2-like	<i>BrMADS76</i>	97	86	8e-146			
			<i>BrMADS77</i>	99	92	2e-168			
			<i>BrMADS81</i>	99	91	3e-163			
33.	<i>AGL3/SEP4</i>	AGI2-like	<i>BrMADS78</i>	99	82	7e-156			
			<i>BrMADS79</i>	92	83	2e-143			
			<i>BrMADS80</i>	99	82	5e-157			
34.	<i>AGL2/SEP1</i>	AGI2-like	<i>BrMADS82</i>	99	90	2e-158			
			<i>BrMADS83</i>	99	89	7e-158			
35.	<i>AGL67</i>	MIKC*	<i>BrMADS90</i>	91	30	6e-28			
			<i>BrMADS91</i>	53	85	6e-103			
36.	<i>AGL104</i>	MIKC*	<i>BrMADS92</i>	99	85	0.0			
			<i>BrMADS93</i>	99	78	6e-167			
37.	<i>AGL66</i>	MIKC*	<i>BrMADS94</i>	99	84	0.0			
38.	<i>AGL65</i>	MIKC*	<i>BrMADS95</i>	99	78	0.0			
			<i>BrMADS96</i>	91	72	1e-93			
			<i>BrMADS97</i>	99	86	0.0			
39.	<i>AGL30</i>	MIKC*	<i>BrMADS98</i>	97	80	0.0			
			<i>BrMADS99</i>	97	78	4e-177			
40.	<i>AGL94</i>	MIKC*	<i>BrMADS100</i>	66	72	2e-161			
41.	<i>AGL57</i>	Mα	<i>BrMADS101</i>	75	53	3e-42			
			<i>BrMADS103</i>	83	50	7e-44			
42.	<i>AGL58</i>	Mα	<i>BrMADS102</i>	94	47	2e-38			
43.	<i>AGL64</i>	Mα	<i>BrMADS104</i>	96	49	2e-48			
44.	<i>AGL28</i>	Mα	<i>BrMADS105</i>	90	41	2e-44			

45.	AGL62	M α	<i>BrMADS106</i>	99	55	8e-102	BrMADS105	66	94
			<i>BrMADS107</i>	98	42	1e-61	BrMADS108	46	97
			<i>BrMADS108</i>	97	57	6e-93	BrMADS106	50	98
			<i>BrMADS113</i>	91	52	2e-50	BrMADS111	61	80
46.	AGL40	M α	<i>BrMADS109</i>	68	43	1e-50			
47.	AGL23	M α	<i>BrMADS110</i>	93	41	2e-41			
			<i>BrMADS129</i>	85	44	9e-43			
48.	AGL61	M α	<i>BrMADS111</i>	61	76	2e-90			
			<i>BrMADS112</i>	79	74	4e-112			
49.	AGL91	M α	<i>BrMADS114</i>	98	69	3e-78			
50.	AGL29	M α	<i>BrMADS115</i>	98	71	2e-89			
51.	AGL60	M α	<i>BrMADS116</i>	88	69	9e-88			
52.	AGL100	M α	<i>BrMADS117</i>	96	67	4e-75			
53.	AGL84	M α	<i>BrMADS118</i>	60	59	6e-55			
			<i>BrMADS119</i>	49	50	2e-27			
			<i>BrMADS123</i>	75	56	3e-49			
54.	AGL73	M α	<i>BrMADS120</i>	96	41	4e-73			
			<i>BrMADS121</i>	78	46	5e-70			
55.	AGL74	M α	<i>BrMADS122</i>	57	56	1e-44			
			<i>BrMADS127</i>	77	31	2e-14			
56.	AGL55	M α	<i>BrMADS124</i>	89	69	4e-70			
			<i>BrMADS125</i>	98	64	3e-67			
57.	AGL97	M α	<i>BrMADS126</i>	78	46	2e-39			
58.	AGL39	M α	<i>BrMADS128</i>	88	45	5e-59			
59.	AGL47	M β	<i>BrMADS130</i>	99	70	4e-146			
60.	AGL82	M β	<i>BrMADS131</i>	98	61	2e-116			
61.	AGL103	M β	<i>BrMADS132</i>	86	47	5e-71			
			<i>BrMADS133</i>	86	56	6e-104			
62.	AGL52	M β	<i>BrMADS134</i>	94	49	5e-75			
63.	AGL76	M β	<i>BrMADS135</i>	92	44	4e-53			
			<i>BrMADS136</i>	90	47	3e-58			
			<i>BrMADS137</i>	93	47	1e-63			
64.	AGL93	M β	<i>BrMADS138</i>	90	36	3e-37			
			<i>BrMADS139</i>	77	38	2e-39			
65.	AGL89	M β	<i>BrMADS140</i>	69	45	5e-34	BrMADS139	94	100
			<i>BrMADS141</i>	89	40	4e-44	BrMADS138	74	98
			<i>BrMADS142</i>	62	39	2e-35	BrMADS143	86	94
			<i>BrMADS143</i>	80	41	3e-40	BrMADS142	86	96
			<i>BrMADS144</i>	80	41	1e-38	BrMADS143	65	99
66.	AGL101	M β	<i>BrMADS145</i>	98	46	4e-28			
67.	AGL46	M γ	<i>BrMADS146</i>	89	43	2e-57	BrMADS150	52	85
			<i>BrMADS147</i>	99	50	3e-46	BrMADS146	70	100
			<i>BrMADS148</i>	97	38	3e-71	BrMADS149	99	100
			<i>BrMADS149</i>	97	39	2e-71	BrMADS148	99	100
68.	AGL45	M γ	<i>BrMADS150</i>	99	53	2e-107			
69.	AGL35	M γ	<i>BrMADS151</i>	99	59	1e-77			
			<i>BrMADS152</i>	87	54	9e-55			
70.	AGL80	M γ	<i>BrMADS153</i>	72	61	4e-103			
			<i>BrMADS154</i>	72	62	6e-99			
			<i>BrMADS155</i>	72	52	2e-77			
71.	AGL37	M γ	<i>BrMADS156</i>	73	39	6e-44			
72.	AGL36	M γ	<i>BrMADS157</i>	78	34	4e-43			
73.	AGL92	M γ	<i>BrMADS158</i>	73	40	2e-31			
			<i>BrMADS159</i>	78	29	8e-24			
			<i>BrMADS160</i>	83	41	3e-48			
74.	AGL87	M γ	<i>BrMADS161</i>	99	72	1e-86			

75.	AGL96	M γ	<i>BrMADS162</i>	97	76	4e-91			
			<i>BrMADS163</i>	98	44	2e-68	BrMADS164	46	100
			<i>BrMADS164</i>	85	49	1e-46	BrMADS165	71	98
			<i>BrMADS165</i>	76	48	1e-46	BrMADS164	71	98
			<i>BrMADS166</i>	80	46	2e-36	BrMADS165	64	98
76.	AGL95	M γ	<i>BrMADS167</i>	83	52	4e-56			
