

油茶 MYB 转录因子家族鉴定及 *CoMYB107* 基因在雄蕊发育中的功能分析

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Genome-wide Identification of the MYB Transcription Factor Family in *Camellia oleifera* and Functional Analysis of *CoMYB107* in Stamen Development

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附表 1 引物序列

Appendix 1 Primer sequences

引物名称	引物序列	引物名称	引物序列
Name of primer	Sequences of primers (5'—3')	Name of primer	Sequences of primers (5'—3')
<i>CoMYB52</i> -F	GGAACATTCAGCCAGTGACATCTC	<i>CoMYB105</i> -F	AAGGGAAATGCCAGGGAGGAC
<i>CoMYB52</i> -R	GATCGTCCATAGAAGTCGTGTTAGTG	<i>CoMYB105</i> -R	TACTGACCTTTACACTTGCTGAATCG
<i>CoMYB55</i> -F	AAGAGACGATGGAAGTGGAGAGAG	<i>CoMYB107</i> -F	CCTACAGAGATTACCAAGTGCATTCC
<i>CoMYB55</i> -R	CACCGTGCTTGGCGATGAAG	<i>CoMYB107</i> -R	TGGCAGTTCTCCTTGTTCAGTATTC
<i>CoMYB16</i> -F	GCTACGATTGCCAGACTACTTAACAG	<i>CoMYB121</i> -F	TGGACGAAGAGTGTGAATCAATGG
<i>CoMYB16</i> -R	AACCACCGATTCTTCACTGCTTC	<i>CoMYB121</i> -R	AAGCAGGAAACATGACAGGGTAAC
<i>CoMYB80</i> -F	AAACAATCACGGCTTCTCCAATTTG	<i>CoMYB71</i> -F	AGTGAGGATGAGTGTGAGTACGATGG
<i>CoMYB80</i> -R	TACTCTCCTCATCTTCTTCCATCATCC	<i>CoMYB71</i> -R	GAGGAATCAACGGCTGAGACAAC
<i>CoMYB91</i> -F	AGAGGTTTCTAGAAGCGGTTTCG	<i>CoMYB67</i> -F	CAGCGAAGAAGGAGAGGAAGAGG
<i>CoMYB91</i> -R	TGGTTGAAGAAGATGGTGATGATGATG	<i>CoMYB67</i> -R	AACTGAGGTGGTGGAGGAATCG
<i>CoMYB54</i> -F	ACAACCACAATCTGCTCCAAGAAG	<i>CoMYB136</i> -F	ATTGACACAAGGAATCAGGCACCTC
<i>CoMYB54</i> -R	AACGGCGTAATGTCCTCTCC	<i>CoMYB136</i> -R	TTACTAGACAAGGTCTTGGTCTTTC
<i>NcGA3ox1</i> -F	GCAGGGGAGGGGAGAAGATA	<i>NcGA3ox2</i> -F	GGTCAGTGACGTGGAGTGAG
<i>NcGA3ox1</i> -R	CAACGCTCGAACCAAAGCAA	<i>NcGA3ox2</i> -R	CAATACGAGGAGCGCAAAGC
<i>NcCOL</i> -F	AGGGCATCTTCAACTGGTTCG	<i>NcTCP1</i> -F	TGTACCCTGCAGGACCACTA
<i>NcCOL</i> -R	GGGATGCTCAGCGACGATAA	<i>NcTCP1</i> -R	CATGGTTCTCCGGGTACAC
<i>NcOPR2</i> -F	CCTGATGGAGGTGCACCAAT	<i>NcAPI</i> -F	GGGGAGAGGGAAAGTGAAT
<i>NcOPR2</i> -R	ATGAGTTCCATCTGGCATTAGT	<i>NcAPI</i> -R	AGCGTCACAAAGCACTGAGA
<i>NcMYB305</i> -F	CGGCTCCGGTGGCTAAATTA	<i>NcAP2</i> -F	ACTTTCAGAGCCACCTTCG

<i>NcMYB305-R</i>	TTGACCACCTGTTTCCCCAC	<i>NcAP2-R</i>	TTGAGGCCGGTTTCTGAGAC
<i>HygR-F</i>	AATACGAGGTCGCCAACATCTTCTTC	<i>HygR-R</i>	TCTACACAGCCATCGGTCCAGAC
<i>CoMYB107-F</i>	AGCTTTCGCGAGCTCGGTACCATGATGG	<i>CoMYB107-R</i>	GCCCTTGCTCACCATGGATCCACTCCT
	AGAGAGGCTACGGC		ATATGCAAGTGTCTTGGCT

附表 2 油茶基因组中 CoMYB 蛋白的特征和名称

Appendix 2 Characteristics and names of CoMYB proteins in the genome of *Camellia oleifera*

Sequence ID	Number of Amino Acid	Molecular Weight	Theoretical pI	Instability Index	Aliphatic Index	Grand Average of Hydropathicity	Localizations
<i>MYB76</i>	359	41327.28	9.42	62.6	72.03	-0.942	Nucleus
<i>MYB77</i>	259	28701.6	7.83	36.62	74.59	-0.492	Nucleus
<i>MYB78</i>	243	25793.99	5.72	54.82	73.54	-0.31	Nucleus
<i>MYB79</i>	235	26030.18	6.39	65.17	68.89	-0.911	Nucleus
<i>MYB80</i>	409	46605.93	8.69	57.91	77.48	-0.841	Nucleus
<i>MYB81</i>	210	23721.34	9.67	47.15	72.48	-0.637	Nucleus
<i>MYB82</i>	268	29306.54	8.31	41.71	60.45	-0.649	Nucleus
<i>MYB83</i>	352	38836.41	4.77	61.16	64.18	-1.031	Nucleus
<i>MYB84</i>	347	38462.85	4.83	65.7	60.06	-1.09	Nucleus
<i>MYB85</i>	243	25784.97	5.63	56.52	73.54	-0.312	Nucleus
<i>MYB86</i>	222	25060.09	8.36	67.91	59.41	-1.021	Nucleus
<i>MYB87</i>	358	41223.21	9.42	62.59	72.23	-0.937	Nucleus
<i>MYB88</i>	387	42509.89	6.93	74.58	57.26	-1.018	Nucleus
<i>MYB89</i>	237	27114.3	6.45	74.01	60.89	-0.851	Nucleus
<i>MYB90</i>	644	71896.92	9.55	53.74	70.33	-0.77	Nucleus
<i>MYB91</i>	283	31765.83	9.08	33.3	77.14	-0.709	Nucleus
<i>MYB92</i>	308	33574.72	5.33	52.56	81.07	-0.511	Nucleus
<i>MYB93</i>	149	16622.7	9.21	35.09	69.93	-0.816	Nucleus
<i>MYB94</i>	319	35878.86	7.36	51.59	56.61	-0.78	Nucleus
<i>MYB95</i>	314	34964.04	8.95	56.34	78.28	-0.491	Nucleus Endoplasmic reticulum
<i>MYB96</i>	128	13998.9	4.7	47.82	45.86	-1.092	Cytoplasm Nucleus
<i>MYB97</i>	242	27670.97	6.45	72.14	61.24	-0.776	Nucleus
<i>MYB98</i>	270	30414.53	6.8	52.45	80.85	-0.682	Nucleus
<i>MYB99</i>	123	14205.68	4.41	45.4	62.76	-0.82	Cytoplasm Nucleus
<i>MYB100</i>	289	32697.42	8.11	52.6	57.4	-0.797	Nucleus
<i>MYB101</i>	314	34964.04	8.95	56.34	78.28	-0.491	Nucleus Endoplasmic reticulum
<i>MYB102</i>	170	18728.65	6.52	45.84	61.94	-0.832	Nucleus

<i>MYB103</i>	120	13356.31	10.15	55.43	85.33	-0.798	Nucleus
<i>MYB104</i>	340	37401.67	9.74	46.76	68.88	-0.656	Nucleus
<i>MYB105</i>	234	26482.79	9.37	61.03	63.38	-0.815	Nucleus
<i>MYB106</i>	218	23977.4	11.19	69.86	72.52	-0.801	Nucleus
<i>MYB107</i>	109	12111.02	10.24	61.31	68.99	-0.757	Nucleus
<i>MYB108</i>	131	14580.5	5.7	79.79	84.2	-0.476	Cytoplasm
<i>MYB109</i>	202	21851.27	9.55	50.87	93.96	-0.226	Nucleus
<i>MYB110</i>	356	41545.44	9.05	87.16	56.07	-1.254	Nucleus
<i>MYB111</i>	269	29487.9	6.7	49	79.03	-0.629	Nucleus
<i>MYB112</i>	196	21575.71	10.19	55.01	69.8	-0.81	Nucleus
<i>MYB113</i>	227	25797.05	9.28	62.94	64.89	-0.789	Nucleus
<i>MYB114</i>	1234	139092.7	6.01	52.02	79.25	-0.422	Nucleus
<i>MYB115</i>	331	37504.52	8.39	56.66	54.83	-0.892	Nucleus
<i>MYB116</i>	623	68908.43	6.24	41.03	75.07	-0.539	Nucleus
<i>MYB117</i>	332	37682.67	8.39	59.14	53.49	-0.905	Nucleus
<i>MYB118</i>	244	27728.74	9.64	52.88	83.48	-0.781	Nucleus
<i>MYB119</i>	270	29820.53	9.22	41.81	66.59	-0.778	Nucleus
<i>MYB120</i>	123	14213.73	9.99	42.39	85.69	-0.684	Nucleus
<i>MYB121</i>	220	24408.57	5.85	47.34	48.68	-0.97	Nucleus
<i>MYB122</i>	333	37869.88	8.39	58.41	53.33	-0.919	Nucleus
<i>MYB123</i>	105	11974.45	9.98	60.62	53.9	-0.99	Nucleus
<i>MYB124</i>	206	23328.19	10.04	54.78	63.4	-0.788	Nucleus
<i>MYB125</i>	382	42674.72	5.05	43.6	78.64	-0.651	Nucleus
<i>MYB126</i>	159	17962.15	9.93	60.08	60.13	-0.79	Nucleus
<i>MYB127</i>	289	32218	5.03	44.85	77.65	-0.656	Nucleus
<i>MYB128</i>	255	28625.51	9.57	53.38	71.92	-0.642	Nucleus
<i>MYB129</i>	289	32149.88	4.91	45.51	77.65	-0.644	Cytoplasm Nucleus
<i>MYB130</i>	321	35022.67	4.76	59.96	71.4	-0.474	Nucleus
<i>MYB131</i>	562	63199.33	4.8	51.89	71.09	-0.681	Nucleus
<i>MYB132</i>	183	20919.97	5.17	57.47	99.07	-0.363	Nucleus
<i>MYB133</i>	343	38962.68	6.09	28.31	83.79	-0.373	Nucleus
<i>MYB134</i>	682	74609.48	9.27	58.48	72.61	-0.554	Nucleus
<i>MYB135</i>	183	20851.94	5.08	59.25	103.33	-0.315	Cytoplasm Nucleus
<i>MYB136</i>	321	35052.69	4.76	60.34	71.09	-0.482	Nucleus
<i>MYB137</i>	627	70598.71	4.82	55.96	72.12	-0.675	Nucleus
<i>MYB1</i>	962	107548.07	5.18	50.23	75.43	-0.844	Nucleus
<i>MYB2</i>	270	30608.27	5.46	50.16	70.78	-0.783	Nucleus
<i>MYB3</i>	119	13147.9	9.34	39.5	76.22	-0.577	Nucleus
<i>MYB4</i>	249	26173.22	6.52	63.87	69.8	-0.358	Nucleus
<i>MYB5</i>	386	42098.75	6.08	57.27	65.26	-0.717	Nucleus
<i>MYB6</i>	1017	114213.39	5.07	50.42	75.27	-0.85	Nucleus
<i>MYB7</i>	235	26515.55	6.27	68.12	68.98	-0.856	Nucleus

<i>MYB8</i>	120	13234.98	9.34	39.25	75.58	-0.579	Nucleus
<i>MYB9</i>	281	31600.77	6.77	47.6	79.4	-0.636	Nucleus
<i>MYB10</i>	225	25823.65	7.67	43.94	50.22	-1.296	Nucleus
<i>MYB11</i>	135	15312.76	4.71	52.94	61.41	-0.839	Nucleus
<i>MYB12</i>	235	26515.55	6.27	68.12	68.98	-0.856	Nucleus
<i>MYB13</i>	151	17070.29	10.59	64.89	59.54	-1.138	Nucleus
<i>MYB14</i>	239	27919.47	5.59	56.76	67.7	-0.74	Nucleus
<i>MYB15</i>	286	31134.29	6.14	36.75	83.11	-0.511	Nucleus
<i>MYB16</i>	249	26147.18	6.52	61.33	70.2	-0.345	Nucleus
<i>MYB17</i>	386	42115.69	5.88	56.55	64.51	-0.728	Nucleus
<i>MYB18</i>	180	21180.68	4.35	60.75	67.67	-0.921	Nucleus
<i>MYB19</i>	111	12136.61	8.82	50.18	78.2	-0.868	Nucleus
<i>MYB20</i>	221	23984.7	6.23	53.18	71.95	-0.588	Nucleus
<i>MYB21</i>	111	12136.61	8.82	50.18	78.2	-0.868	Nucleus
<i>MYB22</i>	214	23368.82	4.92	58.97	71.54	-0.653	Nucleus
<i>MYB23</i>	210	23261.57	5.03	76.3	63.24	-0.927	Nucleus
<i>MYB24</i>	221	24665.82	7.73	52.11	69.86	-0.752	Nucleus
<i>MYB25</i>	231	26305.2	5.58	55.67	59.09	-0.885	Nucleus
<i>MYB26</i>	351	40545.99	9.54	59.64	73.87	-0.798	Nucleus
<i>MYB27</i>	412	46334.84	6.05	46.01	82.91	-0.475	Cytoplasm Nucleus
<i>MYB28</i>	701	76539.47	5.85	52.04	60.63	-0.713	Nucleus
<i>MYB29</i>	1193	130970.51	6.65	50.38	83.29	-0.462	Nucleus
<i>MYB30</i>	360	41515.08	9.53	58.11	75.53	-0.758	Nucleus
<i>MYB31</i>	143	16009.95	10.16	67.54	61.33	-0.744	Nucleus
<i>MYB32</i>	204	23875.56	6.05	66.06	50.25	-1.519	Nucleus
<i>MYB33</i>	102	11335.48	7.02	50.53	59.41	-0.867	Nucleus
<i>MYB34</i>	143	16019.99	10.16	68.68	61.33	-0.75	Nucleus
<i>MYB35</i>	202	22371.86	5.75	61.07	61.39	-0.737	Nucleus
<i>MYB36</i>	143	16019.99	10.16	68.68	61.33	-0.75	Nucleus
<i>MYB37</i>	102	11351.52	7.02	49.38	63.24	-0.814	Nucleus
<i>MYB38</i>	156	17623.8	8.95	66.83	66.22	-0.849	Nucleus
<i>MYB39</i>	260	31400.78	7.68	49.05	60.77	-1.079	Nucleus
<i>MYB40</i>	282	31291.06	5.38	55.06	70.18	-0.673	Nucleus
<i>MYB41</i>	173	19827.23	7.83	57.81	56.36	-0.861	Nucleus
<i>MYB42</i>	140	15591.6	4.73	42.24	89.21	-0.458	Nucleus
<i>MYB43</i>	260	31406.82	7.68	49.05	58.88	-1.08	Nucleus
<i>MYB44</i>	329	36924.15	8.86	69.71	77.17	-0.689	Cytoplasm Nucleus
<i>MYB45</i>	282	31230.88	5.38	54.15	70.18	-0.691	Nucleus
<i>MYB46</i>	440	49843.33	5.52	53.25	85.55	-0.6	Nucleus
<i>MYB47</i>	296	33583.17	8.03	64.02	65.88	-0.833	Nucleus
<i>MYB48</i>	344	39561.25	9.38	62.58	74.94	-0.9	Nucleus
<i>MYB49</i>	282	31289.03	5.38	53.46	70.85	-0.673	Nucleus

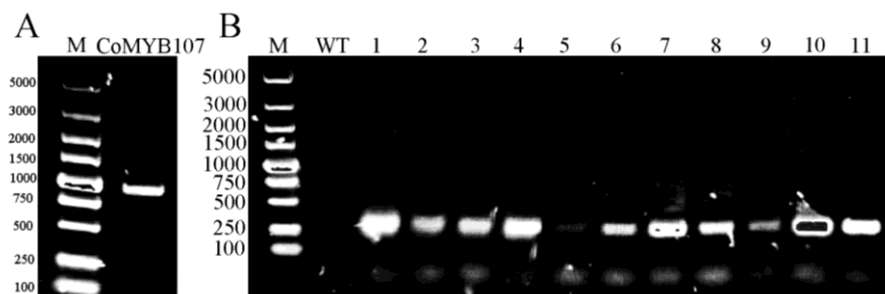
<i>MYB50</i>	141	16077.86	5.27	60.67	57.38	-0.85	Cytoplasm Nucleus
<i>MYB51</i>	476	53648.46	5.18	50.6	85.4	-0.556	Nucleus
<i>MYB52</i>	294	32010.91	8.34	58.81	68.37	-0.548	Nucleus
<i>MYB53</i>	683	74851.84	5.75	48.59	77.51	-0.469	Nucleus
<i>MYB54</i>	317	35119.39	7.59	43.81	62.52	-0.726	Nucleus
<i>MYB55</i>	228	26078.66	9.71	66.85	67.98	-0.821	Nucleus
<i>MYB56</i>	118	12520.84	9.18	82.92	58.73	-0.575	Nucleus
<i>MYB57</i>	317	34916.1	6.75	43.18	62.52	-0.709	Nucleus
<i>MYB58</i>	474	52902.35	6.72	43.22	83.92	-0.375	Nucleus
<i>MYB59</i>	175	19846	5.17	48.16	54.63	-0.827	Nucleus
<i>MYB60</i>	735	83753.21	6.81	53.02	69.77	-0.961	Nucleus
<i>MYB61</i>	632	71433.04	7.31	48.51	86.08	-0.308	Endoplasmic reticulum
<i>MYB62</i>	317	34831.17	9.26	46.01	69.87	-0.609	Nucleus
<i>MYB63</i>	1752	192250.14	5.46	47.82	65.03	-0.688	Nucleus
<i>MYB64</i>	183	20727.82	5.24	52.26	52.79	-0.879	Nucleus
<i>MYB65</i>	643	73119.24	8.34	56.66	69.89	-0.986	Nucleus
<i>MYB66</i>	384	41975.08	6.35	59.3	55.86	-0.75	Nucleus
<i>MYB67</i>	136	15497.8	4.62	59.06	45.96	-0.934	Cytoplasm Nucleus
<i>MYB68</i>	344	37699.1	6.54	56.83	55.26	-0.758	Nucleus
<i>MYB69</i>	344	37548.08	4.52	42.1	92.44	-0.361	Nucleus
<i>MYB70</i>	237	25799.36	6.08	39.71	90.17	-0.307	Nucleus
<i>MYB71</i>	668	73460.34	5.48	53.15	76.77	-0.496	Nucleus
<i>MYB72</i>	804	88314.74	6.21	62.71	71.58	-0.551	Nucleus
<i>MYB73</i>	125	13929.88	8.93	30.76	76.4	-0.698	Nucleus
<i>MYB74</i>	883	100025.94	8.89	64.92	61.12	-0.807	Nucleus
<i>MYB75</i>	167	18808.23	5.83	64.82	80.6	-0.711	Nucleus

附表 3 油茶 MYB 共线性基因对的 KA/KS 值

Appendix 3 The KA/KS values of MYB syntenic gene pairs in *Camellia oleifera*

Seq_1	Seq_2	Ka	Ks	Ka_Ks
<i>CoMYB103</i>	<i>CoMYB111</i>	0.01665	0.00579	2.87433
<i>CoMYB35</i>	<i>CoMYB37</i>	0.12478	0.10643	1.17249
<i>CoMYB24</i>	<i>CoMYB27</i>	0.03642	0.03261	1.11670
<i>CoMYB76</i>	<i>CoMYB80</i>	0.01435	0.01290	1.11253
<i>CoMYB104</i>	<i>YCChr12c_007220.1</i>	0.07425	0.06802	1.09166
<i>CoMYB80</i>	<i>CoMYB87</i>	0.01299	0.01292	1.00523
<i>CoMYB134</i>	<i>YCChr15c_006790.1</i>	0.06458	0.07091	0.91062
<i>CoMYB24</i>	<i>CoMYB28</i>	0.06254	0.07947	0.78695
<i>CoMYB103</i>	<i>CoMYB106</i>	0.20661	0.30232	0.68341
<i>CoMYB106</i>	<i>CoMYB111</i>	0.18559	0.28036	0.66199
<i>YCChr13b_010350.1</i>	<i>CoMYB121</i>	0.56375	0.88592	0.63634

<i>CoMYB27</i>	<i>CoMYB28</i>	0.29821	0.47685	0.62539
<i>CoMYB1</i>	<i>CoMYB6</i>	0.01676	0.02709	0.61885
<i>CoMYB131</i>	<i>CoMYB134</i>	0.54939	1.01214	0.54280
<i>CoMYB124</i>	<i>CoMYB126</i>	0.02018	0.04482	0.45023
<i>CoMYB32</i>	<i>YCChr4b_015330.1</i>	0.07435	0.16562	0.44893
<i>CoMYB132</i>	<i>CoMYB135</i>	0.00713	0.01600	0.44571
<i>CoMYB83</i>	<i>CoMYB84</i>	0.01866	0.04271	0.43690
<i>CoMYB114</i>	<i>YCChr13c_011340.1</i>	0.00439	0.01013	0.43338
<i>CoMYB5</i>	<i>CoMYB17</i>	0.00670	0.01568	0.42708
<i>CoMYB20</i>	<i>CoMYB22</i>	0.00958	0.02259	0.42419
<i>CoMYB26</i>	<i>CoMYB30</i>	0.00364	0.00890	0.40867
<i>CoMYB131</i>	<i>YCChr15c_006790.1</i>	0.48500	1.21937	0.39775
<i>CoMYB115</i>	<i>CoMYB117</i>	0.00681	0.01733	0.39317
<i>CoMYB10</i>	<i>CoMYB18</i>	0.39873	1.15009	0.34669
<i>CoMYB4</i>	<i>CoMYB16</i>	0.00178	0.00546	0.32563
<i>CoMYB31</i>	<i>CoMYB36</i>	0.00309	0.00957	0.32336
<i>CoMYB17</i>	<i>YCChr4b_026950.1</i>	0.24236	0.87079	0.27832
<i>CoMYB94</i>	<i>CoMYB115</i>	0.12074	0.43762	0.27590
<i>CoMYB94</i>	<i>CoMYB117</i>	0.11640	0.44959	0.25889
<i>CoMYB80</i>	<i>YCChr5b_001140.1</i>	0.25376	0.99828	0.25420
<i>CoMYB132</i>	<i>YCChr5b_006490.1</i>	0.22951	1.00215	0.22902
<i>CoMYB117</i>	<i>CoMYB122</i>	0.00291	0.01740	0.16715
<i>CoMYB126</i>	<i>CoMYB31</i>	0.07361	0.52027	0.14148
<i>CoMYB126</i>	<i>CoMYB36</i>	0.07013	0.50069	0.14006
<i>CoMYB126</i>	<i>CoMYB34</i>	0.07013	0.52027	0.13479
<i>CoMYB31</i>	<i>CoMYB34</i>	0.00309	0.02908	0.10640
<i>CoMYB76</i>	<i>YCChr5b_001140.1</i>	0.08331	0.80139	0.10396
<i>CoMYB87</i>	<i>YCChr5b_001140.1</i>	0.08192	0.78873	0.10386
<i>CoMYB76</i>	<i>CoMYB87</i>	0.00121	0.01211	0.10023
<i>CoMYB76</i>	<i>YCChr5c_005110.1</i>	0.05950	0.69826	0.08521
<i>CoMYB87</i>	<i>YCChr5c_005110.1</i>	0.05835	0.68920	0.08466
<i>CoMYB80</i>	<i>YCChr5c_005110.1</i>	0.04871	0.67858	0.07179



A: *CoMYB107* 基因克隆电泳图; B: *CoMYB107* 基因阳性苗鉴定电泳图; M: DL 5 000 DNA maker; WT

为野生型烟草； 1-11： *CoMYB107* 转基因烟草株系

A: PCR electrophoresis of *CoMYB107* gene cloning. B: Electrophoresis for identification of *CoMYB107* transgenic positive seedlings. M: DL 5 000 DNA marker; WT as wild-type tobacco; 1-11: *CoMYB107* transgenic tobacco lines

附图 1 *CoMYB107* 基因克隆及转基因烟草阳性苗 PCR 鉴定电泳图

Fig.S1 PCR electrophoresis for *CoMYB107* gene cloning and identification of transgenic tobacco positive seedlings