Profiling the Abiotic Stress Responsive microRNA Landscape of *Arabidopsis thaliana*

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Supplemental Table S1: Raw miRNA reads and the Log2 fold change in abundance of each *Arabidopsis thaliana* miRNA sRNA detected via high throughput sRNA sequencing.

Using the Qiagen CLC Genomics Workbench (11) software, the sequencing adapter sequences were removed prior to performing sequence quality trimming to remove any sRNA reads that were either shorter than 15 nucleotides (nts), or longer than 35 nts in length. Additionally, parameters within the CLC Genomic Workbench were applied to remove any ambiguous nucleotides at either the 5' or 3' terminus of each sequencing read (i.e., the removal of any 'N' nucleotides on sequence ends), or to 'trim' low quality sequences using a modified '*Mott trimming*' algorithm. This approach allowed for the determination of the (1) total library size (high quality reads only) for each treatment (control, heat, drought and salt stress), and (2) the raw read count for each *Arabidopsis thaliana* miRNA sRNA detected. The total number of miRNA sRNA raw reads for each library was subsequently determined via summing the raw read counts of all detected miRNA sRNAs together per library in Microsoft® Excel 2016. Microsoft® Excel 2016 was also used to normalize miRNA abundance per library for interlibrary comparisons. Post miRNA abundance normalization for each library, the Log2 fold change in miRNA abundance per stress treatment was calculated via the division of the normalized stress library miRNA read count by the normalized non-stressed control library miRNA read count. Specifically, and using the heat stress library as an example, the Log2 fold change for each miRNA sRNA was determined using the Log2 function in Microsoft® Excel, based on the following equation: (miRNA raw reads (heat) / total library size (heat)) // miRNA raw reads (control) / total library size (control)). The calculated Log2 fold change for each miRNA sRNA was subsequently used to construct Figure 2A.

Treatment	Control	Heat		Drought		Salt	
miRNA	**Raw reads**	**Raw reads**	**Log2 FC**	**Raw reads**	**Log2 FC**	**Raw reads**	**Log2 FC**
miR156a	4901	4496	0.102	17203	1.839	8912	0.951
miR156b	3224	4990	0.856	13996	2.145	8087	1.415
miR156c	3939	4160	0.305	15082	1.964	7661	1.048
miR156d	3060	3399	0.378	11644	1.955	6657	1.210
miR156e	1757	1725	0.200	8646	2.326	3752	1.183
miR156f	1855	1727	0.123	8812	2.275	3762	1.108
miR156g	52	100	1.170	219	2.102	86	0.814
miR156h	8	45	2.718	16	1.027	6	-0.327
miR156j	7	5	-0.259	35	2.349	8	0.281
miR157a	4512	6652	0.786	25207	2.509	9606	1.179
miR157b	4513	6643	0.784	25214	2.509	9604	1.178
miR157c	1814	3447	1.152	8181	2.200	4911	1.525
miR157d	37	68	1.104	179	2.302	112	1.686

miR158a	93924	111812	0.478	271986	1.561	185555	1.071
miR158b	873	8904	3.577	2830	1.724	2519	1.617
miR159a	25272	41137	0.929	95303	1.942	44185	0.894
miR159b	28317	42855	0.824	85495	1.622	44948	0.755
miR159c	2292	4746	1.276	11472	2.351	4839	1.166
miR160a	204	438	1.329	710	1.827	351	0.871
miR160b	234	380	0.926	646	1.492	267	0.279
miR160c	401	1125	1.714	1339	1.767	1325	1.813
miR161	92819	85868	0.114	153129	0.750	117690	0.431
miR162a	8042	6261	-0.135	12887	0.708	10759	0.508
miR162b	8248	7003	-0.010	13248	0.711	10919	0.493
miR163	1569	1256	-0.095	2573	0.741	619	-1.254
miR164a	94	460	2.517	364	1.981	193	1.126
miR164b	677	1498	1.372	752	0.179	341	-0.901
miR164c	175	473	1.661	578	1.751	337	1.034
miR165a	3567	5693	0.901	8410	1.265	4668	0.476
miR165b	4401	5898	0.649	9193	1.090	5033	0.282
miR166a	4806	5665	0.463	10678	1.179	6513	0.527
miR166b	3882	4509	0.442	8799	1.208	5290	0.535
miR166c	3167	3336	0.301	6779	1.125	3761	0.336
miR166d	3101	3266	0.301	6670	1.132	3687	0.338
miR166e	4640	4929	0.313	9798	1.106	5461	0.323
miR166f	4546	4681	0.268	9353	1.068	5298	0.309
miR166g	4539	4650	0.261	9325	1.066	5287	0.308
miR167a	3229	5956	1.109	9467	1.579	5473	0.850
miR167b	2896	5285	1.094	8521	1.584	4959	0.864
miR167c	1326	961	-0.238	3071	1.239	1628	0.384
miR167d	1890	2843	0.815	5913	1.673	3631	1.030
miR168a	2566	5231	1.254	5921	1.234	5026	1.058
miR168b	1322	2397	1.085	4133	1.672	3046	1.293
miR169a	40	23	-0.572	51	0.378	30	-0.327
miR169b	33	9	-1.648	28	-0.210	11	-1.497
miR169d	211	13	-3.794	375	0.857	28	-2.825
miR169e	207	24	-2.882	293	0.529	10	-4.283
miR169f	263	24	-3.228	538	1.060	76	-1.703
miR169g	214	13	-3.815	378	0.848	23	-3.130
miR169h	14	2	-2.581	31	1.174	2	-2.719
miR169i	19	6	-1.437	49	1.394	18	0.010
miR169j	4	1	-1.774	12	1.612	2	-0.912
miR169k	4	1	-1.774	10	1.349	2	-0.912
miR169l	8	0	0.000	11	0.487	1	-2.912
miR169m	7	2	-1.581	17	1.307	0	0.000
miR170	256	380	0.796	481	0.937	312	0.374

miR171a	405	572	0.724	793	0.997	547	0.522
miR171b	102	205	1.233	165	0.721	82	-0.227
miR171c	122	162	0.635	132	0.141	99	-0.213
MIR172a	68	207	1.832	59	-0.177	49	-0.384
miR172b	91	326	2.067	93	0.059	118	0.463
miR172c	6	12	1.226	8	0.442	5	-0.175
miR172d	13	11	-0.015	15	0.234	10	-0.290
miR172e	24	131	2.675	48	1.027	55	1.285
miR173	19410	15084	-0.138	28368	0.575	18831	0.045
miR319a	2287	2714	0.473	3403	0.601	2090	-0.042
miR319b	1187	2961	1.545	2168	0.896	1630	0.546
miR319c	8729	2906	-1.361	11432	0.417	4893	-0.747
miR390a	520	839	0.916	955	0.904	725	0.568
miR390b	331	599	1.082	537	0.725	503	0.692
miR391	82	203	1.534	468	2.540	146	0.921
miR393a	53	172	1.925	170	1.709	75	0.589
miR393b	784	3644	2.443	2076	1.432	1707	1.211
miR394a	101	260	1.590	324	1.709	180	0.922
miR394b	118	280	1.473	379	1.711	205	0.885
miR395a	29	2217	6.483	82	1.527	521	4.255
miR395b	36	350	3.508	42	0.250	177	2.386
miR395c	36	344	3.483	41	0.215	173	2.353
miR395d	17	1166	6.326	39	1.225	390	4.608
miR395e	29	2206	6.475	79	1.473	518	4.247
miR395f	28	338	3.820	31	0.174	166	2.656
miR396a	4316	10849	1.556	12785	1.594	8549	1.074
miR396b	7784	19808	1.574	21346	1.483	12346	0.754
miR397a	7	56	3.226	11	0.679	30	2.188
miR397b	8	41	2.584	1	-2.973	20	1.410
miR398a	457	1080	1.467	717	0.677	664	0.627
miR398b	10077	25333	1.556	14693	0.571	17800	0.909
miR398c	10072	25318	1.556	14698	0.573	17763	0.907
miR399a	386	3263	3.306	1306	1.786	2997	3.045
miR399b	322	485	0.817	999	1.661	550	0.861
miR399c	341	529	0.860	1020	1.608	579	0.852
miR399d	8	140	4.356	33	2.072	58	2.946
miR399e	4	9	1.396	11	1.487	10	1.410
miR399f	25	119	2.477	56	1.191	94	1.999
miR400	758	213	-1.605	636	-0.226	479	-0.574
miR401	43	92	1.324	65	0.623	40	-0.016
miR402	42	205	2.513	124	1.589	84	1.088
miR403	7799	9768	0.551	15811	1.047	12392	0.756
miR404	40	55	0.686	35	-0.165	21	-0.841

miR405a	88	109	0.535	127	0.557	81	-0.031
miR405b	24	20	-0.037	34	0.530	14	-0.689
miR405d	11	11	0.226	25	1.212	5	-1.049
miR406	95	39	-1.058	64	-0.542	37	-1.272
miR407	115	90	-0.127	125	0.148	81	-0.417
miR408	2242	15808	3.044	4828	1.134	12273	2.541
miR416	14	17	0.506	21	0.612	8	-0.719
miR447a	488	666	0.675	890	0.894	649	0.500
miR447b	59	62	0.298	89	0.620	48	-0.209
miR447c	1	3	1.811	11	3.487	6	2.673
miR472	221	517	1.452	637	1.555	539	1.375
miR771	4	2	-0.774	97	4.627	14	1.896
miR773a	230	203	0.046	1068	2.243	802	1.890
miR773b	6	26	2.342	58	3.300	43	2.930
miR775	495	1190	1.492	1528	1.654	771	0.728
miR778	1	13	3.927	7	2.835	32	5.088
miR779	205	730	2.059	577	1.520	349	0.856
miR780	6	6	0.226	12	1.027	3	-0.912
miR781a	92	155	0.979	152	0.752	212	1.293
miR781b	75	160	1.319	146	0.988	167	1.243
miR822	714	612	0.004	1582	1.175	1822	1.440
miR823	160	331	1.275	376	1.260	507	1.752
miR824	303	1122	2.115	1093	1.878	916	1.684
miR825	125	109	0.029	176	0.521	92	-0.354
miR826a	7	8	0.419	6	-0.195	32	2.281
miR827	318	929	1.773	738	1.242	1338	2.161
miR829	168	1001	2.801	309	0.907	337	1.093
miR831	43	20	-0.878	74	0.811	337	3.059
miR833a	76	96	0.563	205	1.459	216	1.595
miR833b	18	16	0.056	41	1.215	51	1.591
miR835	86	200	1.444	225	1.415	301	1.896
miR836	70	41	-0.545	67	-0.036	32	-1.041
miR837	69	109	0.886	223	1.720	131	1.013
miR838	22	64	1.767	60	1.475	43	1.055
miR839	25	24	0.167	37	0.593	30	0.351
miR840	117	408	2.028	450	1.971	570	2.373
miR841a	243	192	-0.114	330	0.469	500	1.129
miR841b	238	107	-0.927	202	-0.209	214	-0.065
miR842	12	24	1.226	39	1.728	39	1.789
miR843	70	33	-0.859	113	0.718	59	-0.158
miR844	31	39	0.557	63	1.050	44	0.594
miR845a	559	333	-0.521	774	0.497	1638	1.639
miR845b	15	48	1.904	16	0.120	42	1.574

miR846	1717	2750	0.906	4303	1.353	2159	0.419
miR847	18	154	3.323	66	1.902	13	-0.381
miR848	407	370	0.089	358	-0.158	385	0.008
miR849	16	20	0.548	18	0.197	28	0.896
miR850	314	156	-0.783	521	0.758	1142	1.951
miR851	2	2	0.226	61	4.958	0	0.000
miR852	42	70	0.963	57	0.468	173	2.131
miR853	39	90	1.433	72	0.912	37	0.012
miR854a	13	16	0.526	19	0.575	45	1.880
miR854b	16	17	0.314	24	0.612	49	1.703
miR854c	20	12	-0.511	19	-0.047	43	1.193
miR854d	16	22	0.686	15	-0.066	41	1.446
miR854e	14	20	0.741	25	0.864	51	1.953
miR855	52	39	-0.189	63	0.304	46	-0.089
miR857	11	161	4.098	4	-1.432	107	3.370
miR858a	79	389	2.526	301	1.957	146	0.974
miR858b	4	44	3.686	27	2.782	13	1.789
miR859	5	57	3.737	17	1.793	34	2.854
miR860	11	20	1.089	22	1.027	28	1.436
miR861	67	50	-0.196	103	0.648	57	-0.145
miR862	25	13	-0.717	51	1.056	27	0.199
miR863	5829	1569	-1.667	5875	0.039	12391	1.176
miR864	2	48	4.811	5	1.349	4	1.088
miR865	197	309	0.876	315	0.705	73	-1.344
miR866	102	558	2.678	335	1.743	920	3.261
miR869	398	68	-2.323	247	-0.661	87	-2.105
miR870	14	15	0.326	21	0.612	6	-1.134
miR1886	52	70	0.655	75	0.556	85	0.797
miR1888a	74	55	-0.202	125	0.784	49	-0.506
miR1888b	48	44	0.101	52	0.143	58	0.361
miR2111a	2	67	5.292	9	2.197	28	3.896
miR2111b	3	47	4.196	8	1.442	43	3.930
miR2112	2	10	2.548	10	2.349	10	2.410
miR2933a	94	134	0.738	115	0.318	84	-0.074
miR2933b	70	108	0.852	84	0.290	63	-0.064
miR2936	32	39	0.512	52	0.728	43	0.515
miR3434	245	439	1.068	420	0.805	301	0.385
miR3440b	11	24	1.352	24	1.153	27	1.384
miR3932a	56	17	-1.494	48	-0.195	54	0.036
miR3932b	2516	110	-4.289	1408	-0.810	1153	-1.037
miR4221	12	33	1.686	12	0.027	7	-0.689
miR4228	82	178	1.344	77	-0.063	93	0.270
miR4245	475	452	0.155	537	0.204	424	-0.076

miR5012	37	85	1.426	136	1.905	89	1.355
miR5014a	63	17	-1.664	46	-0.426	16	-1.889
miR5014b	254	73	-1.573	222	-0.167	76	-1.652
miR5020a	35	4	-2.903	30	-0.195	30	-0.134
miR5020b	106	13	-2.801	37	-1.491	22	-2.180
miR5024	45	93	1.274	113	1.356	90	1.088
miR5026	4861	2392	-0.797	6738	0.498	22173	2.278
miR5027	10	5	-0.774	21	1.098	9	-0.064
miR5028	4	115	5.072	17	2.115	17	2.176
miR5029	8	13	0.927	10	0.349	11	0.548
miR5595a	171	290	0.988	231	0.461	202	0.329
miR5628	5	3	-0.511	25	2.349	7	0.574
miR5629	26	99	2.155	46	0.850	83	1.763
miR5630b	11	1	-3.233	2	-2.432	2	-2.371
miR5632	7	20	1.741	6	-0.195	27	2.036
miR5633	10	14	0.712	16	0.705	14	0.574
miR5635a	592	492	-0.041	697	0.263	308	-0.854
miR5635b	411	249	-0.497	354	-0.188	218	-0.826
miR5635c	203	164	-0.082	237	0.251	141	-0.437
miR5635d	394	312	-0.110	439	0.183	254	-0.545
miR5636	7	5	-0.259	11	0.679	4	-0.719
miR5637	28	76	1.667	122	2.151	130	2.303
miR5638a	13	12	0.111	38	1.575	14	0.195
miR5638b	4	8	1.226	11	1.487	7	0.896
miR5639	6	13	1.342	6	0.027	3	-0.912
miR5640	64	60	0.133	99	0.657	48	-0.327
miR5641	21	20	0.156	47	1.190	41	1.054
miR5642a	3830	4683	0.516	4376	0.220	5711	0.665
miR5642b	961	1383	0.751	1467	0.638	2233	1.305
miR5643a	166	161	0.182	145	-0.168	95	-0.717
miR5643b	153	74	-0.822	93	-0.691	47	-1.614
miR5644	696	237	-1.328	481	-0.506	267	-1.294
miR5645a	461	234	-0.752	418	-0.114	214	-1.019
miR5645b	405	189	-0.873	318	-0.322	164	-1.216
miR5645c	73	61	-0.033	52	-0.462	69	0.007
miR5645d	243	136	-0.611	191	-0.320	113	-1.016
miR5645e	90	86	0.161	93	0.075	62	-0.449
miR5645f	315	188	-0.518	301	-0.038	164	-0.853
miR5647	35	99	1.726	59	0.781	64	0.959
miR5650	127	41	-1.405	149	0.258	90	-0.408
miR5651	91	97	0.318	200	1.163	94	0.135
miR5652	300	166	-0.628	735	1.320	420	0.574
miR5653	1219	1143	0.133	1599	0.419	911	-0.332

miR5654	292	363	0.540	693	1.274	334	0.282
miR5655	4	55	4.008	8	1.027	15	1.995
miR5656	26	26	0.226	51	0.999	44	0.847
miR5657	41	89	1.344	68	0.757	69	0.839
miR5659	89	34	-1.162	71	-0.299	37	-1.178
miR5662	492	183	-1.201	356	-0.439	196	-1.239
miR5663	87	138	0.892	178	1.060	156	0.931
miR5664	41	60	0.776	49	0.285	24	-0.684
miR5665	290	133	-0.898	266	-0.097	138	-0.983
miR5995b	55	54	0.200	32	-0.754	31	-0.739
miR5996	623	320	-0.735	491	-0.316	879	0.585
miR5997	6	2	-1.359	13	1.143	6	0.088
miR8121	66	99	0.811	91	0.491	60	-0.049
miR8165	72	39	-0.658	100	0.501	39	-0.796
miR8166	202	146	-0.242	224	0.177	112	-0.763
miR8167a	115	60	-0.712	118	0.065	64	-0.757
miR8167b	115	62	-0.665	113	0.002	65	-0.735
miR8167c	108	61	-0.598	114	0.105	72	-0.497
miR8167d	112	56	-0.774	116	0.078	74	-0.510
miR8167e	116	66	-0.587	119	0.064	76	-0.522
miR8167f	119	64	-0.669	118	0.015	63	-0.829
miR8168	34	52	0.839	54	0.695	22	-0.540
miR8169	278	101	-1.234	153	-0.834	76	-1.783
miR8170	24	12	-0.774	37	0.652	22	-0.037
miR8171	138	99	-0.253	106	-0.353	93	-0.481
miR8172	383	221	-0.567	372	-0.015	198	-0.864
miR8173	128	255	1.221	131	0.061	96	-0.327
miR8174	112	48	-0.996	75	-0.551	31	-1.765
miR8175	173	133	-0.153	211	0.314	217	0.415
miR8176	41	63	0.846	44	0.129	81	1.071
miR8177	99	42	-1.011	89	-0.126	31	-1.587
miR8178	97	68	-0.286	62	-0.618	67	-0.445
miR8179	7	8	0.419	14	1.027	12	0.866
miR8180	285	303	0.315	311	0.153	179	-0.583
miR8182	6	6	0.226	14	1.250	10	0.825
miR8183	18	37	1.266	42	1.250	20	0.240
Library Size	**30,635,847**	**26,189,325**		**30,060,261**		**28,816,378**	
Number of miRNA reads	*463,695*	*604,486*		*1,101,538*		*750,173*	
% of Library	***1.5***	***2.3***		***3.7***		***2.6***	

Profiling the abiotic stress responsive microRNA landscape of *Arabidopsis thaliana*

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Supplemental Table S2: Sequences of the DNA oligonucleotides used in this study for the synthesis of miRNA-specific cDNAs and the RT-qPCR based quantification of miRNA abundance or miRNA target gene expression.

The DNA oligonucleotide sequence of the stem-loop primer used to prime the reverse transcription of a miRNA-specific cDNA for each miRNA sRNA of interest is provided in the below Table (denoted by RTSL). Post synthesis of a miRNA-specific cDNA, the miRNA-specific forward primer (denoted by RTF in the below Table) and a generic reverse primer (denoted by SLR in the below table (underlined sequence of each RTSL primer identifies the binding site for the generic reverse primer)) were used to quantify the abundance of each miRNA sRNA. Also provided in the below Table is the sequence of the DNA oligonucleotide used as the forward (denoted by RTF in the below Table) and reverse (denoted by RTR in the below Table) primer to quantify the expression level of a target gene of each miRNA of interest. The snoRNA, *snoR101*, was used to normalize the abundance value of each miRNA sRNA across the non-stressed control and heat, drought and salt stressed samples. The reference gene, *UBI10* (*AT4G05320*), was used to normalise the expression of each miRNA target gene assessed across the non-stressed control and heat, drought and salt stressed *Arabidopsis* whole seedlings samples.

Targeted Sequence	Primer Name	Oligonucleotide sequence (5' to 3')
DNA oligonucleotides used for miRNA-specific cDNA synthesis and RT-qPCR abundance quantification		
miR156	**p156-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACGTGCTC
	p156-RTF	CGCCTGACAGAAGAGAGTGAGCAC
miR169	**p169-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACCGGCAA
	p169-RTF	AGTGAGCCAAGGATGACTTGCCG
miR395	**p395-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACGAGTTC
	p395-RTF	GCGCTGAAGTGTTTGGGGGAACTC
miR396	**p396-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACAAGTTC
	p396-RTF	GCGCGTTCCACAGCTTTCTTGAAC
miR399	**p399-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACCAGGGC
	p399-RTF	GCATGCCAAAGGAGATTTGCCCTG
miR778	**p778-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACCGGTGT
	p778-RTF	GGCGTGGCTTGGTTTATGTACACCG
miR839	**p839-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACGGGAAC
	p839-RTF	AGCGTACCAACCTTTCATCGTTCCC
miR855	**p855-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACTTCCTT
	p855-RTF	GGCGGAGCAAAAGCTAAGGAAAAGG
miR857	**p857-RTSL**	GTCGTATCCAGTGCAGGGTCCGAGGTATTCGCACTGGATACGACATACAC
	p857-RTF	GGCGGCGTTTTGTATGTTGAAGGTG
miRNA stem-loop oligo	**pSLR-Generic**	CCAGTGCAGGGTCCGAGGTA
snoR101	**pSnoR-RTF**	CTTCACAGGTAAGTTCGCTTG
	pSnoR-RTR	AGCATCAGCAGACCAGTAGTT

DNA oligonucleotides used for miRNA target gene expression quantification via RT-qPCR		
***ATPS1* (*AT3G22890*)**	**pATPS1-RTF**	ATCTCCGGCACTAAGATGCG
	pATPS1-RTR	ACCTGGGCACATAAAACCGT
***GRF7* (*AT5G53660*)**	**pGRF7-RTF**	CATCCCCCACCGTTAGATCG
	pGRF7-RTR	TGCTTCCATGCTTCCGACAT
***LAC7* (*AT3G09220*)**	**pLAC7-RTF**	ACACACCTTCAACGTACAAAACT
	pLAC7-RTR	ACCCTCCTTGACGCGTATTG
***NFYA5* (*AT1G54160*)**	**pNFYA5-RTF**	ACCAAATCCAAAGCACCAAAGT
	pNFYA5-RTR	AGGCATTGAGTTTCCCCAAGA
***P5CS1* (*AT2G39800*)**	**pP5CS1-RTF**	GTTTTTGAATCCCGACCTGA
	pP5CS1-RTR	TTACCCCCAACAGTCTCTGG
***PHO2* (*AT2G33770*)**	**pPHO2-RTF**	ACCGTTTCTCATCAAGGCGT
	pPHO2-RTR	GTGCCCGTCCACCATAAGAA
***SPL9* (*AT2G42200*)**	**pSPL9-RTF**	TTTTGGCCCGATGACGGTTA
	pSPL9-RTR	AATACCCAAGGCGGGTTCAG
***SUVH6* (*AT2G22740*)**	**pSUVH6-RTF**	TTGCAGTTGCAAAACCGAGG
	pSUVH6-RTR	TCCTTCACCAAACTCTCGGC
***UBI10* (*AT4G05320*)**	**pUBI10-RTF**	GGCCTTGTATAATCCCTGATGAATAAG
	pUBI10-RTR	AAAGAGATAACAGGAACGGAAACATA