Supplement

Table S1. The detail of the novel miRNAs.

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove11	10	143745135	143745221	-	GAUAUUGGCGCGGUUCAAUCAGAAAGCUUGCGCUCCAGGCCCGAGGGGCUCCACUCUUUGAUUGAGCCGUGCCAAUAUC	UGAUUGAGCCGUGCCAAUAUC	
Nove12	1	114053928	114054053	-	UGCAAGGUGAGAGAAUGGUAUAAUCACAAUUAACGCUGAAAAUAUUGUUGAAAUUUUCAAGUUUAAUUGUGAUUAUACUCUUCUCUCACAUUGCAAUUGUGAUGUUACCCC	UGAGAGAAUGGUAUAAUCACA	UGAUUAUACUCUUCUCUCACA
Nove13	1	118284899	118284973	+	CCCGCCGGCGAGCGCUUUCCUGUGAGGGCGCCGCCGUCGGUGAG	GUGAGGGCGCCGCCGUCGGUGA	
Nove14	1	118402446	118402582	+	GCCAGAUUCCUCGUCCCUUCUGUUCACCGGCCAGGCGGAGGACUGAUCCGUCGUCCAUUGUUGCGCUGCCGUCGAACUCCCCGCCGGCGAGCGCUUUCCUGUGAGGGCGCCGCCGUCGGUGAG	GUGAGGGCGCCGCCGUCGGUGA	
Nove15	1	182818341	182818466	-	AGGACUAGUUUGGGAGCUAAAAUACCGGAGGGGAUUGGAGAGAUUAAAAUCCCCUUAUUUAAAAUUGAAUAAGAAAGGGAUUUUAGCCCCUCCAAUCCCCUCCGGUAUUGUGGUUCCCAAACUAGC	UACCGGAGGGGAUUGGAGAGA	CCUCCAAUCCCCUCCGGUAUU
Nove16	1	244623818	244623928	-	GCAUCCAAUCAAAAUCUAACAAUUACUGCUAUUUUAGGUGGAAGAGGUUAAAUGUAAAAUAGACAUUAAGUUUCUGGUGCAGUCACCGUUGGAUUUUGAUUGGAUGCAC	UUGGAUUUUGAUUGGAUGCAC	GCAUCCAAUCAAAAUCUAACA
Nove17	1	248444551	248444633	+	UUAUUCCCUAAAUUGCCAAACACAAGGACUAAAAUAGAGAUAAUUCCUCUUUUAAUCCAUGUGUUUGGCAAUUUAGGGACUAA	AUUCCCUAAAUUGCCAAACAC	GUUUGGCAAUUUAGGGACUAA
Nove18	1	303789472	303789551	+	CUCUGAUAGCCAAGCAUGAUUUGCCCGUAGUCUGACUCUGAGUGUGCUCCUGCUACGGGCAAAUCAUCUUGGCCAUCUGA	UAGCCAAGCAUGAUUUGCCCG	GGCAAAUCAUCUUGGCCAUC
Nove19	1	32605445	32605565	-	UUGUUUGGGAACAAGGAUACUAGAGGGGAUUGGAGGGGCUAAAAUCCCCUUGCUUUUCAAAUCUGAAUAGCAAGAAAAUUUUAGCACCUCCAAUCCCUUCCGGUAUUCUUGCUC	AGCACCUCCAAUCCCUUCCGG	AGAGGGGAUUGGAGGGGCUAA

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove110	2	10174728	10174866	-	UCCACCCCAUCAAUCUUAAAGUAAUAGAACACCGAUCUUAAAGCAAUAGAACAGCCUGCAGAGAAGUGGCUCGGUGUUCUGUUGCUUUAAGAUUGAUGGGGUGGACAUG	GCUUUAAGAUUGAUGGGGUGG	ACCCCAUCAAUCUUAAAGUAA
Nove111	2	198436177	198436331	+	CUGGCAUGGCGAUGGAAGCUCUGCUUCGGUAGCCAAGGAUGAGCUGCCUGUGGCCUCCUGCUGCGGACGUUGCGUGGCCCCGCCUCCACCGCGUGCGGUCCCCGCAGGCAGCCUCCUUGGCUAGUCUGAGCGGCUUCCAUCCUCCAUGCUAGGCU	UAGCCAAGGAUGAGCUGCCUG	
Nove112	2	32718029	32718291	-	AACAGGUCCUAAAACUUGGUUCGGCCGUGCAAAACCAUAAAAAAUCAGGUUUGCUCAAACCGGAUGCUAACGUGGUGUGCCAUGUUGGAACACACUAAUGAAAGUUCGGGGACCCAAAUGACAUAUUAUACCAACUUAAGAGACUCAAGUGACACAGCAAUGCCAAGUUCUAGGACCCAAGUGAGUCUAACGUGGCACGCCACGUCGGUAUCCGGUUUGAGCAAACCUGGUUUUAGAUGGGCCGCCAAGUUCCAACACAUGUU	ACGCCACGUCGGUAUCCGGUU	CCGGAUGCUAACGUGGUGUGC
Nove113	2	92156518	92156670	+	UUAUGCAGAACAAUUUACAGACGGAAAUGAUUUGUACUAUUUCUCAGGUGCAAACCAACCAUUUCUCAGGUGCAAACCAUUUCGAUCUGUAAGUUGUUGUGCACAAGAAUACUACUGUUUUAUUUUAUAUUUUGGAAACUGCUGUUUGGAUAA	AUGCAGAACAAUUUACAGACG	UCUGUAAGUUGUUGUGCACAA
Nove114	3	123760321	123760453	-	AAGGGCUGAUUUGUUGAUCGGGGAUCCCGAGGGGAUCCAUGGGAGAAAAAUCGUCUUGCUAUUCAAAAUUGUAUUGUAAGGGGAUUCCUCGCCUAUGGAUCCUCUCGAGAUCCCUAACCACCAAAUCAGCCCU	CCGAGGGGAUCCAUGGGAGAA	CGCCUAUGGAUCCUCUCGAGA
Nove115	3	6928564	6928702	-	AAAGCUGACAGAAGAGAGUGAGCACACAUGGUGCCUUUCUUGCAUGAUGUAUGAUCGAGAGAGUUCAUGCUCGAAGCUAUGCGUGCUCACUUCUCUCUCUGUCAGCC	UGACAGAAGAGAGUGAGCAC	GCUCACUUCUCUCUCUGUCAGC
Nove116	4	138150590	138150710	+	UUGUUUGGGAGCAAGGAUACCAGAGAGGAUUGAAGGGGUUACAAUCUCUUUUCUAUUCAAAACUAAAUAGCAAGGGGAUUGUAGCCCCUCCAAUCCUCUCUGG	AGAGAGGAUUGAAGGGGUUAC	AGCCCCUCCAAUCCUCUCUGG

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove117	5	220222145	220222259	-	CUUCCACAGCUUUCUUGAACUGCAUCAUGCAUGCAGCAGGCUGUGCUGUGGACCUGAUCGAGUUUCAAUUGAUCCAAGCAAGCAAGAGGGCAGUUCAAUAAAGCUGUGGGAAAUU	GUUCAAUAAAGCUGUGGGAAA	UUCCACAGCUUUCUUGAACUG
Nove118	5	46506997	46507215	-	AUCCUAAUUCCUUCUAUGUCACUCGGAUGCAAUUUUUUACCCUUCAAUGCCAUCGCCAGCGGCAUAGUAGGUAUUAGGACAUGCAAUUUUCUUACCCUUUAUGCCACUGGCAAUGACAUGGAAGGGGAAGCAAUUGUGUCCGAGUGGCAUAGAAGGGAUUAGGAC	UUCAAUGCCAUCGCCAGCGGC	CACUGGCAAUGACAUGGAAGG
Nove119	6	34769920	34769994	-	CCCGCCGGCGAGCGCUUUCCUGCGAGGGCGCCGCCGUCGGUGA	GCGAGGGCGCCGCCGUCGGUGA	
Nove120	6	34951470	34951544	-	CCCGCCGGCGAGCGCUUUCCUGCGAGGGCGCCGCCGUCGGUGAGA	GCGAGGGCGCCGCCGUCGGUGA	
Nove121	6	7404512	7404639	+	UUGGCACGACAAAAAACUCGCACCGGGUGCUCUAAUCGGCGGUCGAUUACAGCGUCCAGUGCGAGUUCUUUGCCGUGCCAAAAUUGAAAGGAGGUCGGCUCGGAUGCCGGGGCAUGCAUACAGGACC	UGGCACGACAAAAAACUCGCA	CGAGUUCUUUGCCGUGCCAAAA
Nove122	6	91184717	91184896	+	AACUCAUCCGUGCACAUAUGCACAUAUUAAAUCUGGACCCUUCAUCUAAUAAUCAGCGGCUGAACUUGCACCUGAGUGUGGGGGAGUGGAGUGCCAAAGGGUUUUUCUGUAAAUAUACCAGCCAUUGAUUGUUGGACGAAGGGUCUAGAUUUAAUAUGUGCAUAUAUACACGGAUGGGUC	UUAAAUCUGGACCCUUCAUCU	ACGAAGGGUCUAGAUUUAAUA
Nove123	7	153554237	153554455	-	AACCCGGAGGGAAUUGGAGGGGCUAAAAUCCCCUCCUUAUUCAAUUUUGAAUAAGAGGUGGAUUUUAUCCCCUUCAAUUCCCUCUGGUUUUGUGUCUCCCAAACUAGCCCUUAACAUUGGAAACAAGACAUGUUUAGAAUAACCGGGAAUAGAAACUCGAGCGAGAUAAAAGGGUGUACAAAAAUGAACGGGAAUAUUAAGCGGAAACUCAUAAUUUAA	CGGAGGGAAUUGGAGGGGCUA	UCCCCUUCAAUUCCCUCUGGU
Nove124	7	25824509	25824665	-	ACUUGCACACAUAGUCCCGAAUUGUGGAGAGAUUUUGAUAUUUAGGACUCAAUUUGCAUGCCUUUCGAGAUUUGACACCCCUAUCACAGUGACAUGUGGGGUCAUUGACAUGUGGCCAGAGUGUCAAAUCUUGAAAGGCAUGCGAAUUGGGUCCCAA	AGGCAUGCGAAUUGGGUCCCA	GGACUCAAUUUGCAUGCCUUU

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove125	7	5206366	5206460	-	AUGCCUGGCUCCCUGUAUGCCACUCGCACGGCUACCACACCCCCGGUGGCCGCUGCGGCUGGCGUGCGAGGUGCCAAGCAUGG	UGCCUGGCUCCCUGUAUGCCA	GCGUGCGAGGUGCCAAGCAUG
Nove126	8	105396488	105396571	-	GUCCAAGUCAAUGCAUCAUUGCCCCUAGUUUUGCCAUCAAAGAAGGCGAAGGCAGGGGCAAUGGUGCAUUGACUUGGUCAAAU	AUGGUGCAUUGACUUGGUCAA	GUCCAAGUCAAUGCAUCAUUG
Nove127	8	110490994	110491210	-	UGGCCCUUAGAUCUGACACGGUAUGCGGGUCAGCAGCCAGCAUGGCAUGCUUGCCAAGUUAGAUCUAAGGGCCAAACAAAGGGGUAUGGACCUGUGGUGAACCACUUAAAAGUUUUUGGACCCGGAAGUUGAAUCUAAGGGCCAAAUGAAAGGGUAUGGACUUGCGGUGAACCACU	UGGCCCUUAGAUCUGACACGG	AAGUUAGAUCUAAGGGCCAAA
Nove128	8	174852885	174853005	-	UCCAUUUUAGUCCAUAAAUUGCCAAACACAGGGACUAAAAGUACUAAAACCUUGUUUUUAGUCCCUUUGUUUGGCAAUUUAAGGACUAAAAAAGUAAAAAUUAGUCCCUAGAAACCAAACG	UUUGGCAAUUUAAGGACUAAA	UAGUCCAUAAAUUGCCAAACA
Nove129	8	4080515	4080718	+	CACAAGAAUGGAGAUGUGAGGAUCUUUUUAAAAAUAUCCAGUGCGAGGUGGAAGGGUUGAUUUGGAAUAUGAUAUUUUUAAAAAGGUCCUCCCACCUCCAUUCUUGGAUUGGUUUGCACAGUUUACACCUAAAAUGUUUCAUACUACAUAGGGCCAAUAAUCUUAUUACUGUAUUGUGGGAUGAGUGGUGGGAGGUGG	AAGAAUGGAGAUGUGAGGAUC	UCCUCCCACCUCCAUUCUUGG
Nove130	8	46527943	46528072	-	AGGUUGUGAAGGCUAAGAAGUGUUUGUUUGGGAUUAUAAUCUACUCAGAUUAUGUAAUCCAACUUAUUUUGAAUUAAGUGCAACUUUAAAAUAAGUUGGAUCAUAUAAUCUAG	AAGUUGGAUCAUAUAAUCUAG	AGAUUAUGUAAUCCAACUUAU
Nove131	8	62820042	62820127	-	GGAGGGAUUGGAGGGGCUAAAAUCCCCUCCUUAUUCAAAAUUGAAUAAGGAGGGGAUUUUAGCCCCUUCAUUCCCCUCCGGUU	AGCCCCUUCAUUCCCCUCCGG	GGAGGGAUUGGAGGGGCUAA
Nove132	8	75383833	75383955	+	CUCGGAGGGGAUUGAAGGGGCUAAAAUCCUCUUAUUCAAAUUUGAAUACGGAGUGCAUUUUAGCCUCUCCAAUCCCCUCUGGAUU	CUCGGAGGGGAUUGAAGGGGC	CUCUCCAAUCCCCUCUGGAUU
Nove133	8	96093889	96094099	+	UUGGUCCGUUAGAUUUAGAUCUAACCGUAGAUGCGAUCAUGGUUUGUUAGGAGCUUUUUUUAUAAAGCUACACGAGGUGGUGGUGGAAGGGUUUAAAUGCUAAAUAUGACAUACGGUUGGAUCUAGAUCUAACGGACCAAGAGGCCUGCUUGCACGCUUACUUAAUUACUGCUUGCAUAGUAGUAGUUGCCU	UUGGUCCGUUAGAUUUAGAUC	UCUAGAUCUAACGGACCAAGA

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove134	9	1345048	1345229	-	UCAUCCAGCGUAUCCAAUCUGAAGUCCCAGGCGAGAGGUGAUUAUCUUCCUAUCGCUCUAUGGCUGAUUCAAGCCCACUUAGAUUUGAUCCAAUUGAAAGCAAAGGUGACUGAGAAGAUGAGGGGAUUAUCACCUCUUACUGGGCCAUUCAGACUGGAUCACAUGGAUGGGA	AUCUGAAGUCCCAGGCGAGAG	CUUACUGGGCCAUUCAGACUG
Nove135	9	35218864	35218964	-	AUUGUAAGUCGUUCUAGCUUUUCUAAAUACAUAGAUUUUGCUACAUGCCUAGUAAAGCUAUGUAUCUUGAAAAGCUAGAACGAUUUACAAUUUGGA	UGAAAAGCUAGAACGAUUUACA	UAAGUCGUUCUAGCUUUUCUAA
Nove136	10	15564152	15564296	+	AGAUUGUAGGGGCUAGAAUCCCCUUCUUAUUCAAAAUUGAAUAAGAAAGGGAUUCUAGCCCCUCCAAUCCCCUCCGGAUUUGUGGCUCCC	AGAUUGUAGGGGCUAGAAUCC	AUUCUAGCCCCUCCAAUCCCC
Nove137	1	246675660	246675752	-	GUGGAUUGAGGGGGAUUGGAGAGGAUUAAAUCCUCUCCCAUACAAAUUUAUAUAGGAGGGGAUAUAAUUCCUUCCAAUUCCCUCAAUCCACCU		UUCCUUCCAAUUCCCUCAAUCC
Nove138	1	68549295	68549369	-	UCGGUUACCGGCCCUGAGCCAAGCUUAUAGCCUGUGGACCGACGACU	GCUUAUAGCCUGUGGACCGACG	UCGGUUACCGGCCCUGAGCCA
Nove139	2	192385214	192385333	+	UGGGACCAAGUGAAAUGGAGAGAAUUGAGGGGACUAUAAUCCCUUGUUAUUUAAAAUUGAAUAGCAAGGGAUUAUAGCCCCCUCAAUUCUCUUUGUUCCACUUACUCCCAAACAAGCCCU	GAAUUGAGGGGACUAUAAUCC	AUUAUAGCCCCCUCAAUUCUC
Nove140	2	41027838	41027974	+	GGAGUAGGUGGAACAAAGAGAAUUGAGGGGACUAUAAUCCCUUGCUAUUCAAUUUUGAAUAACAAGGGAUUAUAGCCCCCUCAAUUCUCUUUGUUUCACUUGGUCCCAAACAAGCCCUAAGUAGU	GAAUUGAGGGGACUAUAAUCC	AUUAUAGCCCCCUCAAUUCUC
Nove141	3	133857695	133857933	+	GAAGACGAGAUCUGGCCAGCCUGUGAUGAGAUACCGGAUCGAGCAUCUCUUGGAGACGGCACUGAGCAAAUAACACGAUGCCACCGUCAUCUUGGCAGAUUUUGUAGUUCCGCUGUCCAAUCGAUUUGUUGGUUUUAACUGACUUUGUCACCUUUUUAGUUUGCAAAAAUGGACAAUCUAAGUGACAAAGCCAGUUAAAACCAACAAAUUGGUUGGGCUGCGGAACUACAAA	UGUAGUUCCGCUGUCCAAUCG	GUUGGGCUGCGGAACUACAAA

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove142	3	174892164	174892459	-	CUCAAUCCGGACGCCGAUGUGGCGUGCCACGUUGGAGCAUACUAAUGAAAGUUCCGAGACCCAGUGACACAACAUGUCAAGUUUGGGACCCGAGUGACACAACAUGCCAAGUUCGAGGACCCAAGUGACUCUAACGUGGUACGCCACGUCGGUAUCCGGUUUGAGCAAAACCGGUUUUGUAUAGUUUUGCACGCGCCGACAAAGUUAGAUGACCCGUUUUUGCUGGUUUUCUAAGUUUGGUGACUGAAGUGACACAACGUGCCAAGUUCGAGGACCGAUACUGUAUUGUACUCAAA	UCAAUCCGGACGCCGAUGUGG	ACGUCGGUAUCCGGUUUGAGC
Nove143	3	197784121	197784247	+	UUGUUUGAGAGCCAAGGGAAUGGAGGGAAUUGGAGGGGUUAAAAUCCCCUUGUUAUUCAAAAUUGAAUAGGAAGGCGAUUUUAGCCCCUCUAAUCCACUUCAUUCCCCUUGCUUCCAAACAUGUCCU	UUGUUUGAGAGCCAAGGGAAU	UCCCCUUGCUUCCAAACAUGU
Nove144	4	28394972	28395101	+	UCCGGAGAGGAUUAGAGGGACUAAAAUCCCCGUUUUAUUUAAAAUUGAAUAAGGAGGAGAUUUUAGUCUCUCUAAUUCCCUCGGGUUUUGUGUCUCCCAAACUAGCCCUU	UCCGGAGAGGAUUAGAGGGACU	UCUCUCUAAUUCCCUCGGGUU
Nove145	6	171571090	171571198	-	CUAAAGAUCCAAAUAGGAAGCACUAAAACUGAUUAUAGUGGUGAAAAAAGUAUCAAUUUAGUCACUUUUAGCUCUUCCUGUUUGGAUAUUUAGCUCC	UUCCUGUUUGGAUAUUUAGCU	CUAAAGAUCCAAAUAGGAAGC
Nove146	8	125530731	125530942	-	AUAUUUGUUCGGGUCUCUAUCAGGUCCUAACGGGUUGUUAUGGCCCACAUGUUAGUCGUCGAGGAAGGAGAUAGAAGGGUGGGUGGGAUCCAACAGACAACGGCAACUGAUAUGUGGGACACAACAAUCCGUUAGGACGUAAUAGAGACCCGAACAAAGAUUGGGUCCUUAAAAGACAUACUUUAAAAGUUUAUGGACCGUGUUGACACA	GACACAACAAUCCGUUAGGAC	CCUAACGGGUUGUUAUGGCCC
Nove147	9	139046330	139046415	-	GUUGAAACCCAGCAAUCGAACAUAUAUUUUGUUGUAUAUCUGGUAAUACUUCAGAAUAUAUGUUCAAUUGUUGGGUUUCAACUU	UUCAAUUGUUGGGUUUCAACU	UUGAAACCCAGCAAUCGAACA
Nove148	4	10215889	10216062	+	AGAAUGUUUGCAGUCCCUCACAAAAAGGAAGAUAGACCCACCCAUAGCAGCAAUAACACAACUAAAACAUUAUCUGAUGGACCUACAGGUAAGGUCUAUAUUCUUUUUUGUGGGGGGCUGCAAACAUUCUGG	GGGGGGCUGCAAACAUUCUGG	AGAAUGUUUGCAGUCCCUCAC

ID	chromosome	start	end	strand	Precursor_seqence	miRNA_seqence	miRNA*_seqence
Nove149	3	216140788	216140927	+	UUAAGGCCUUGUUCGGUUGUGCCUGGAUCGAAUGAGAUUGGGGGGAUUAAAUCUUCUUCUAUUCAAUUUUGACUAGGAAGAGAUU UAAUCUCCUCCAAUCCCCUUCGAUCCAGACGUAACCGAACAAGCCCU	UCCAGACGUAACCGAACAAGC	UUGUUCGGUUGUGCCUGGAUC

Table S2. The m6A modification in the upstream or downsteam 1 Kb of the miRNA precursors.

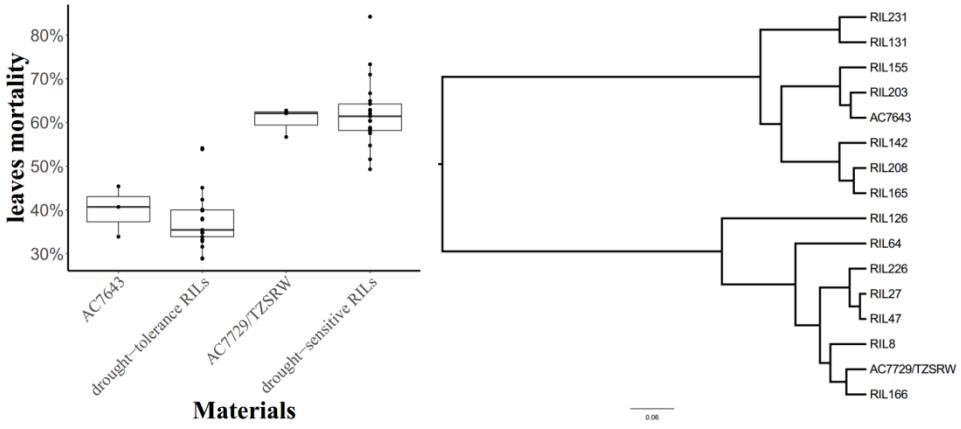
miRNA Precursor (±1 Kb)	WW_fold_enrichment	WS_fold_enrichment	WW_location	WS_location
zma-MIR171k		11.18145		chr10: 138535210-138535901
zma-MIR171h	18.31629	24.88063	chr2: 18025427-18026191	chr2: 18025474-18026204
zma-MIR397b		3.08616		chr5: 84611244-84611443
zma-MIR167h	9.71453	5.94429	chr6: 95986825-95987245	chr6: 95986795-95987233
zma-MIR156j	5.25355	5.85345	chr7: 134662891-134663096	chr7: 134662821-134663020
zma-MIR319d	5.47325	4.70044	chr8: 27607568-27607791	chr8: 27607550-27607771
zma-MIR408b	18.0161	20.98938	chr8: 39584967-39585399	chr8: 39584978-39585425
zma-MIR169j	3.61262		chr2: 198436951-198437178	
zma-MIR164a	10.96522		chr2: 223402053-223402359	

Table S3. The detail of miRNA/target pairs for qRT-PCR verification.

miRNA	Target	p.value	Estimate
zma-miR166d-3p	Zm00001d048527	3.596e-05	-0.3735
zma-miR159a-3p	Zm00001d053589	4.062e-05	-0.3651
zma-miR319b-3p	Zm00001d053545	1.560e-05	-0.6979
Novel-31*	Zm00001d003518	3.469e-06	-0.5013

Additional file 1 Table S1. The detail of the novel miRNAs. miRNA stands for the miRNAs came from 5'-end of hairpin molecule, and miRNA* stands for the miRNAs came from 3'-end of hairpin molecule. **Table S2.** The m6A modification in the upstream or downsteam 1 Kb of the miRNA precursors. **Table S3.** The detail of miRNA/target pairs for qRT-PCR verification.

Figure S1



Additional file 2 Figure S1. The classification of RILs by leaf mortality.