Supplementary Materials: Identification and Functional Divergence Analysis of *WOX* Gene Family in Paper Mulberry

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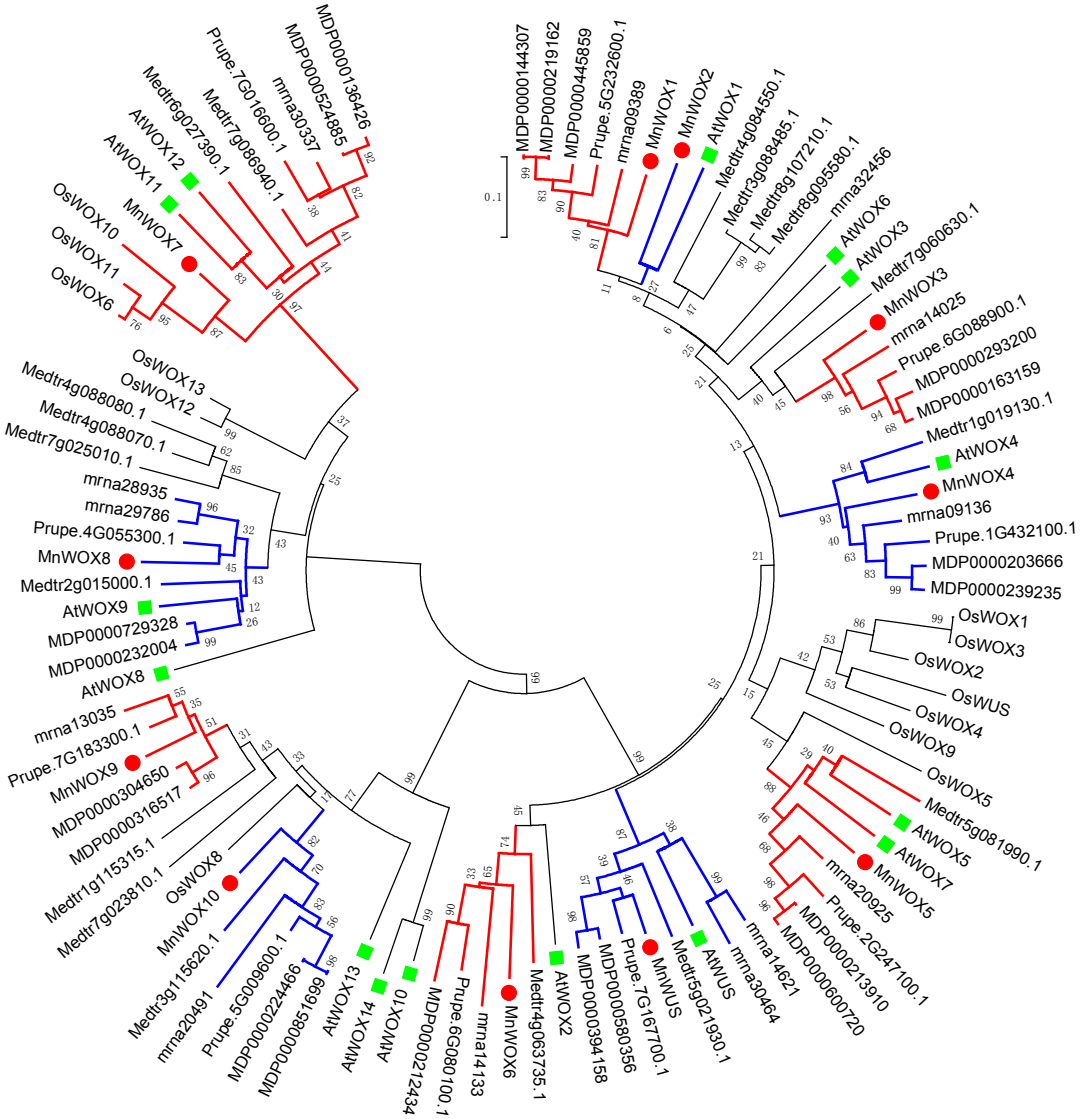

Figure S1. Phylogenetic analysis of *BpWOX* genes in *Morus notabilis*, *Fragaria vesca*, *Prunus persica*, *Malus domestica*, *Medicago truncatula*, *Arabidopsis thaliana* and *Oryza sativa*. There were eleven *WOX* genes in mulberry. Thus, we infered that there might be eleven *WOX* genes in paper mulberry. Each of subclade *WOX* gene from seven species were aligned to find the conserved region and design the degenerate primers. The selected sequences for alignment were labeled with red or blue line. The MnWOX proteins were labeled by red dots, and the AtWOX proteins were labeled by green square. *M. notabilis*, Mn; *F. vesca*, mrna; *P. persica*, Prupe; *M. domestica*, MDP; *M. truncatula*, Medtr; *A. thaliana*, At; *O. sativa*, Os.

Figure S2. The sequences of *WUS* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWUS*.

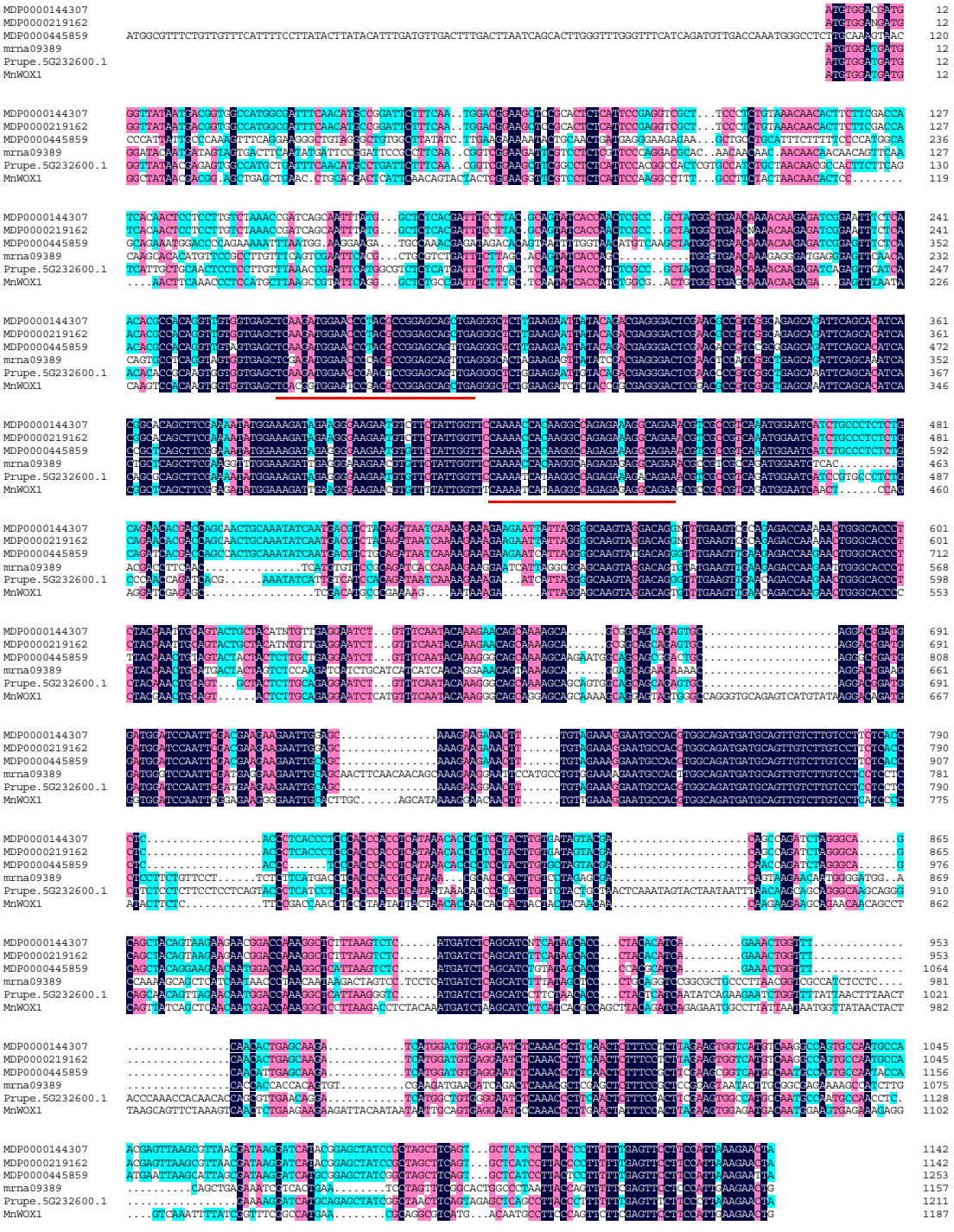

Figure S3. The sequences of *WOX1* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX1*.

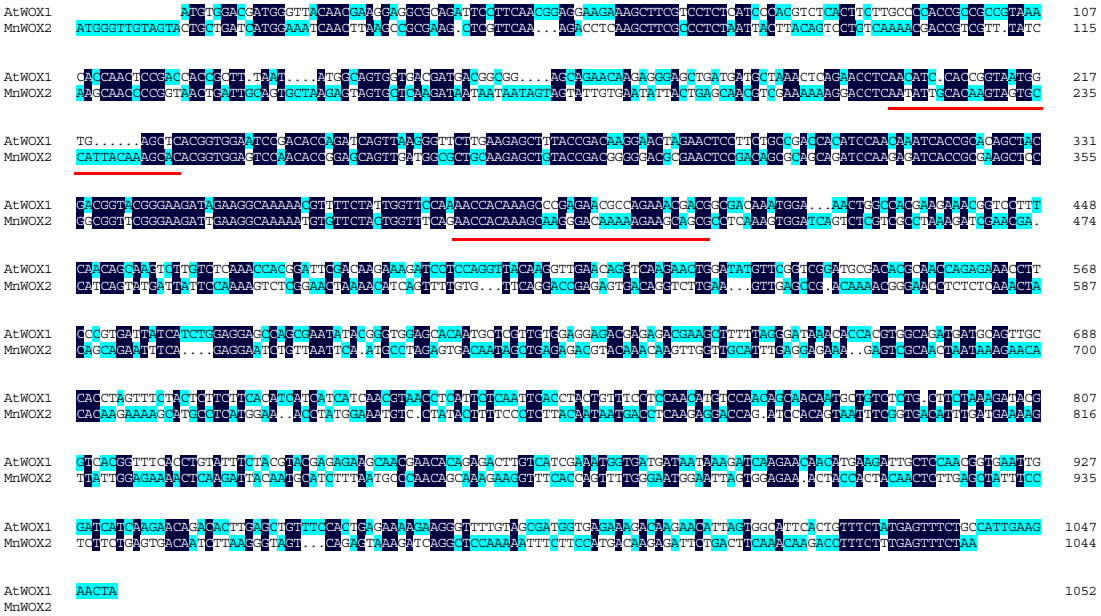

Figure S4. The sequences of *WOX2* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX2*.

Figure S5. The sequences of *WOX3* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX3*.

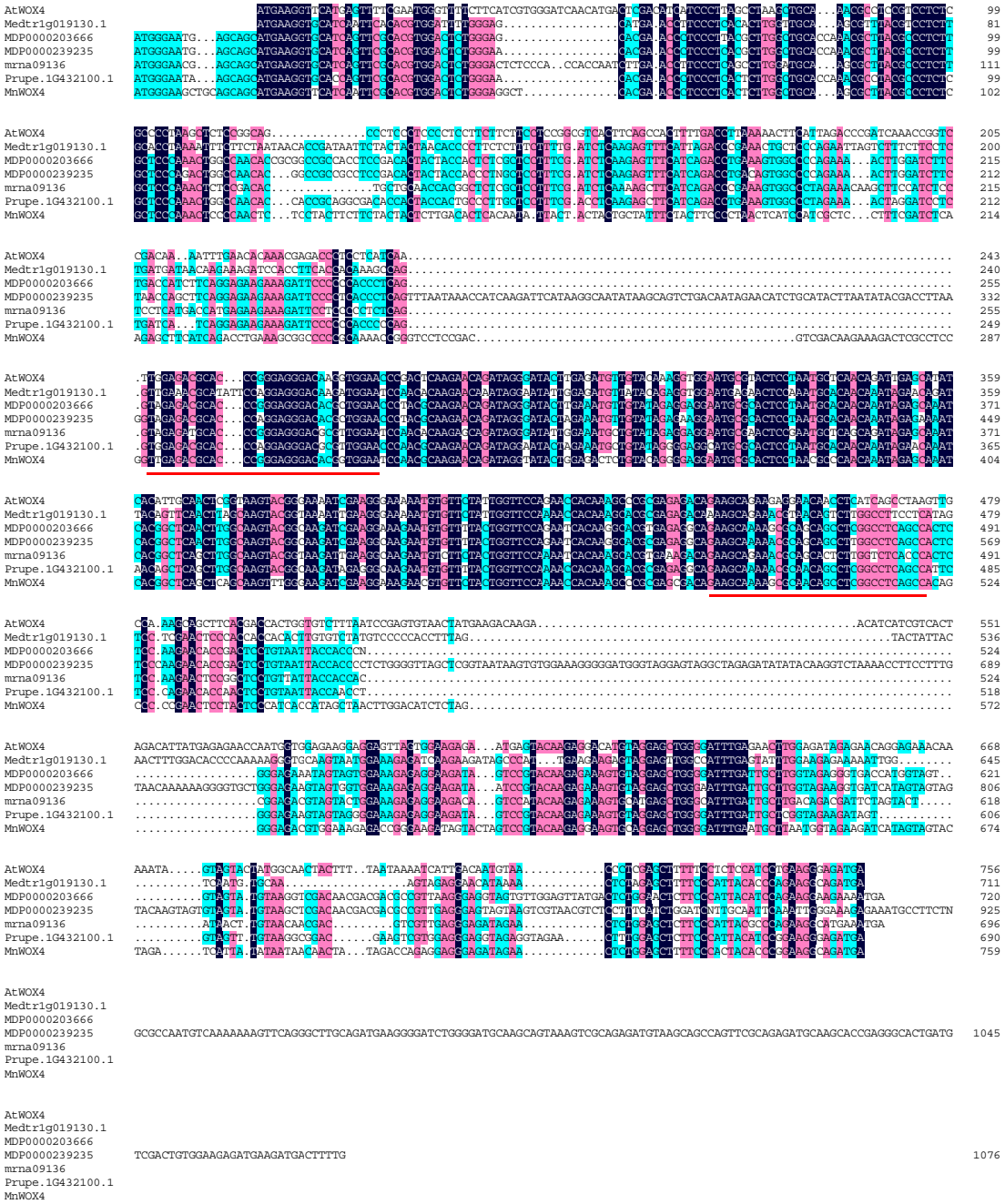

Figure S6. The sequences of *WOX4* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX4*.

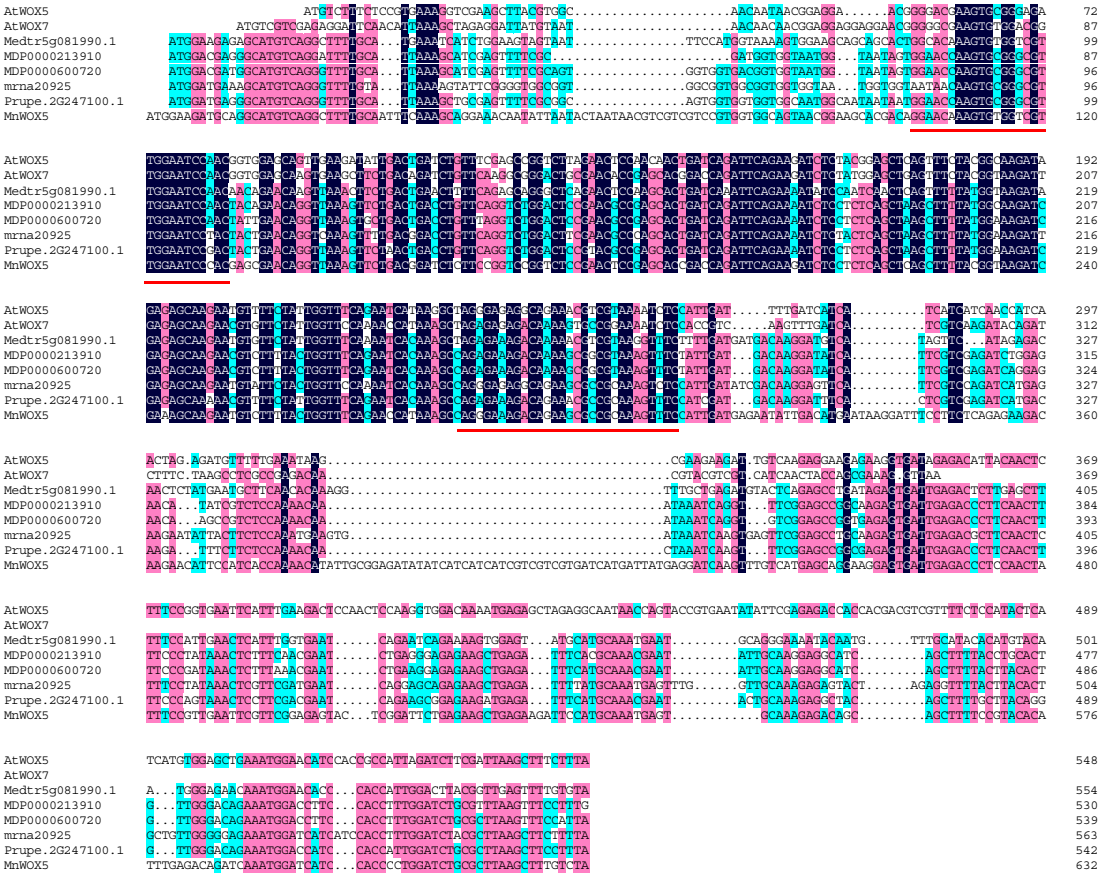

Figure S7. The sequences of *WOX5* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX5*.

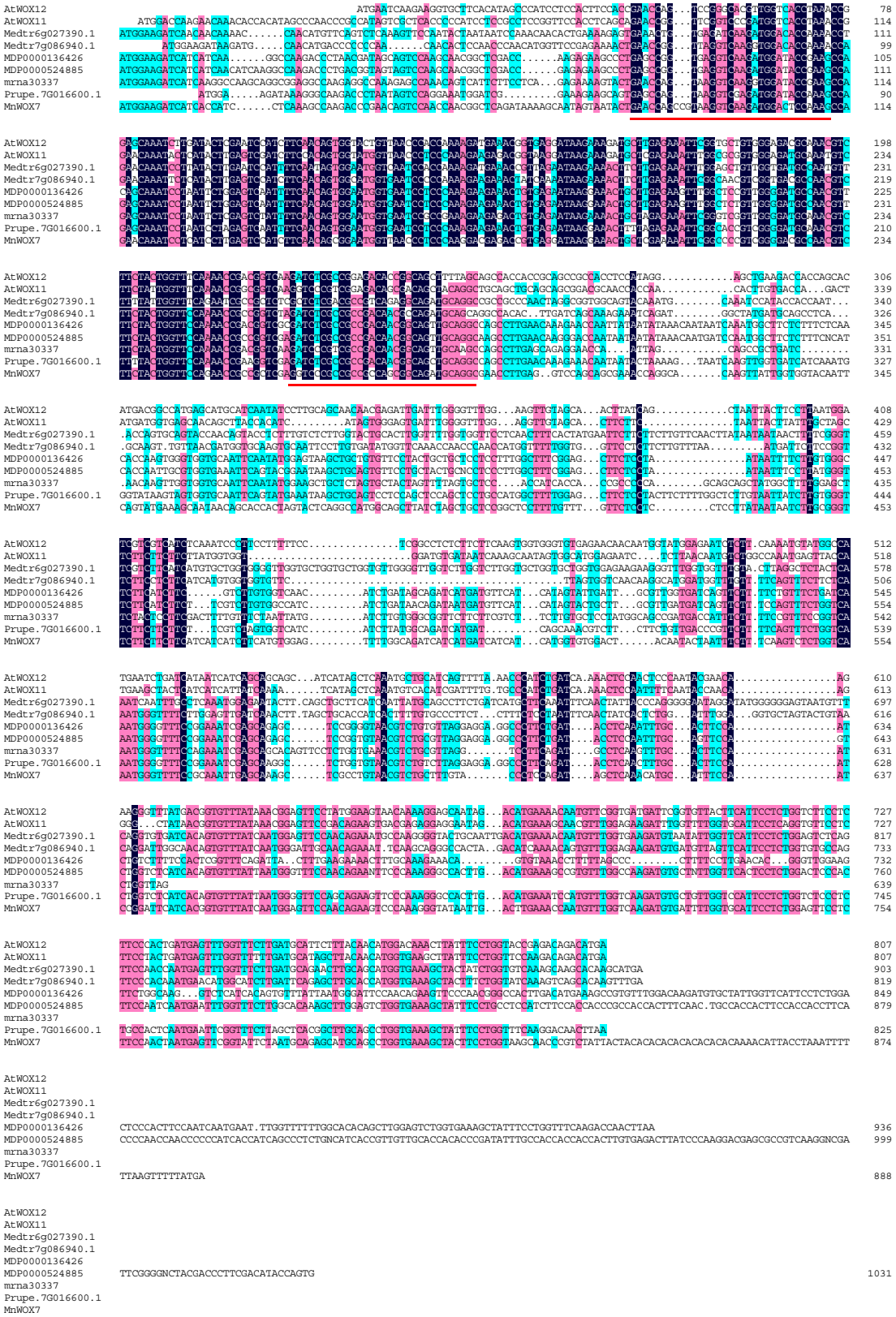

Figure S8. The sequences of *WOX7* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX7*.

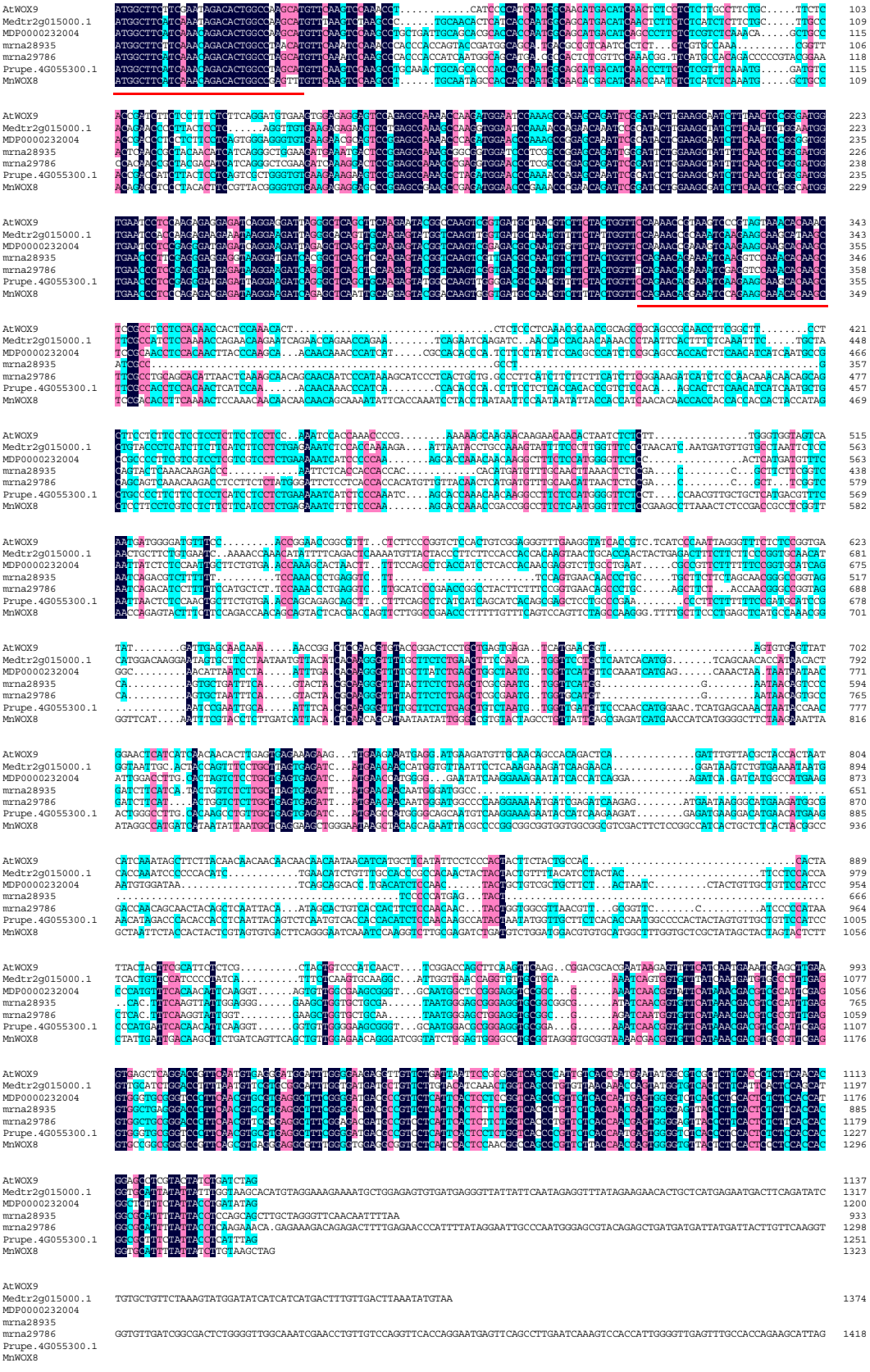

Figure S9. The sequences of *WOX8* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX8*.

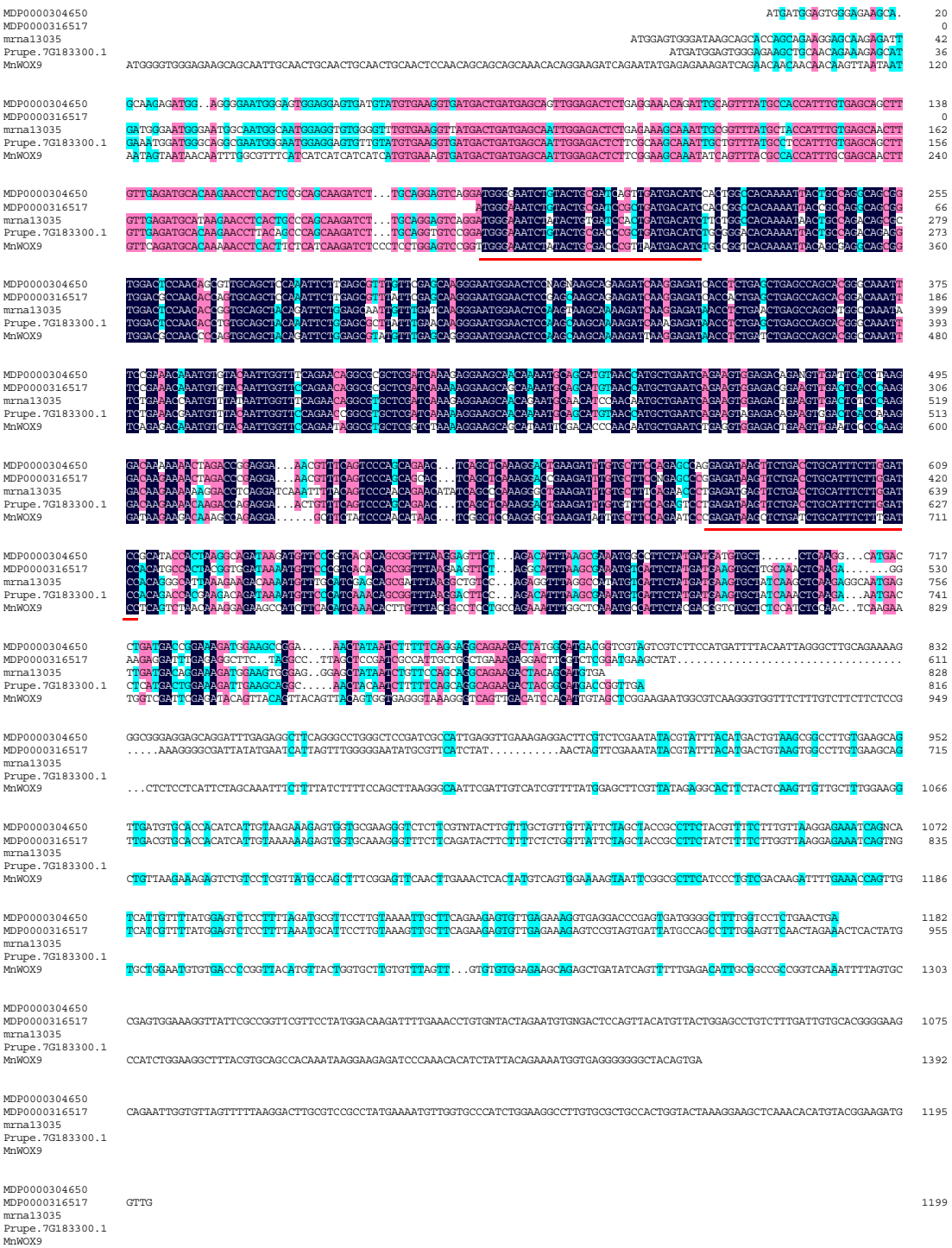

Figure S10. The sequences of *WOX9* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX9*.

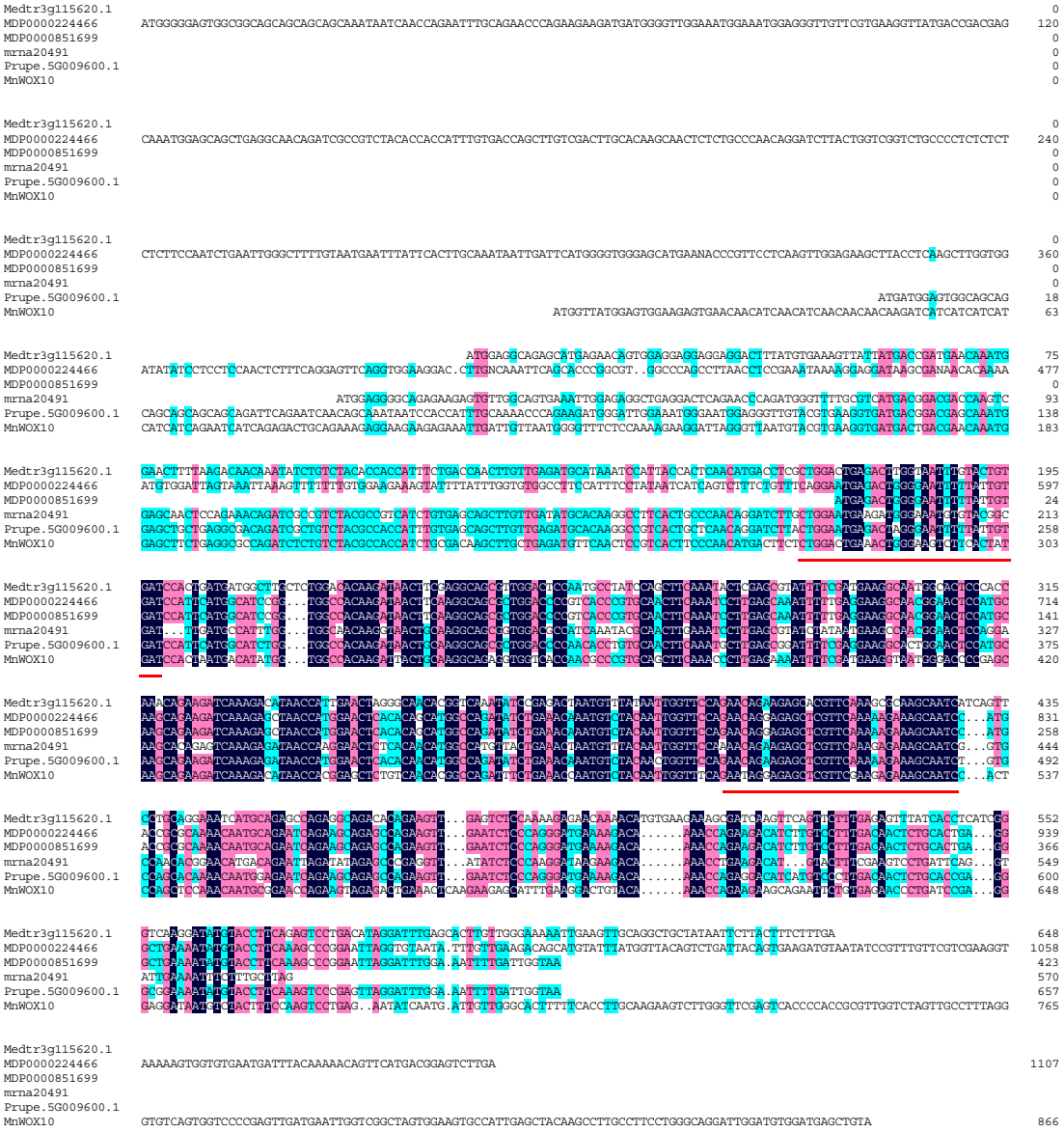

Figure S11. The sequences of *WOX10* subclade were aligned to find the conserved regions and design the degenerate primers. The red line was the location of degenerate primers for *BpWOX10*.

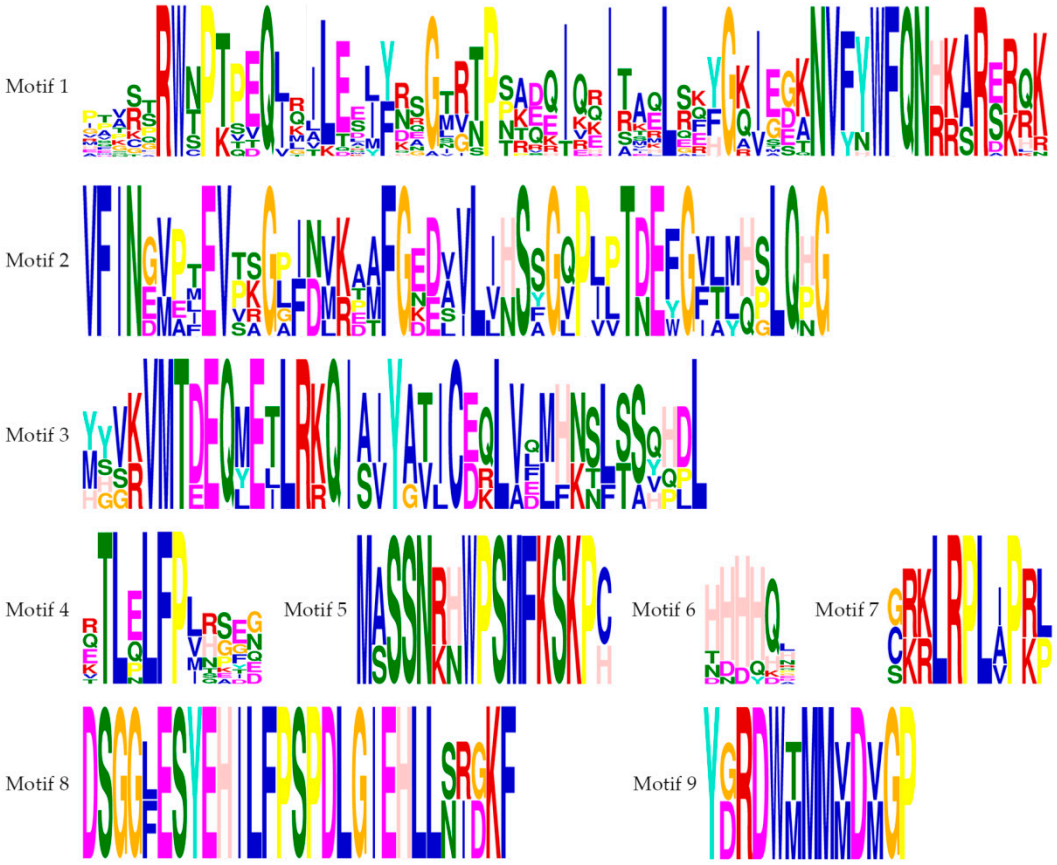

Figure S12. The conserved amino acid sequences of WOX protein in *A. thaliana* and *B. papyrifera*.

Table S1. The degenerate primer sequences of *BpWOXs* used to get fragments from paper mulberry.

Gene Name	Forward primer (5′-3′)	Reverse primer (5′-3′)
BpWUS	TGCMGGCAAAGCAGYACAAGRTGGACDCC	TGAACCTTTTCTTYTGCCTCTCNCGAGCYTT
BpWOX1	TCAAGATGGAACCCNACDGAGCAGYTGAGG	GYTTCTGCCTYTCTCTGGCCTTRTGRTTTTG
BpWOX2	AATATTGCACAAGTAGTGCCATTACAAAGCAC	CGCTGCTTCTTTTTGTCCCTTGCTTTGTGGTT
BpWOX3	GATGGTGCCCAACVCCCGAGCARCTGATGMTC	TTCTGYCTRTCYCTDGCCTTGTGRTTYTG
BpWOX4	GTDGAGACGCACCCRGGAGGGACRMGNTGGAA	GGCTGAGGCCRAGGCTGYTGCGYTTYTGCTT
BpWOX5	GGAACVAAGTGYGGDCGTTGGAATCCNAC	GARACYTTGCGGCGCTTCTGYCTYTCYCTG
BpWOX7	GAACCGNGCCGTNAGGTCAAGDTGGAYWCCAAAG	GCCTGCADCTGCCTBTGDCGGCGDCGRGABC
BpWOX8	ATGGCTTCWTCAAACAGACACTGGCCDAGCAT	GCTTGTGYTTGCTTCTBGATTTNCKGTTYTG
BpWOX9	TGGGAAATCTRTACTGCGAYACGYTGATGACATC	GGATCMAAGAAATGCAGRTCAGARCTYATCTC
BpWOX10	CTGGAMTGARRCTDGGDARTBTTCACTATGAT	GATTGCTTTCTYTTYGAACGAGCTCTYCTGTT

Table S2. The sequences of PCR products amplified with the degenerate primers in paper mulberry. The fragment sequences are used to design the RACE-PCR primers. The red backgrounds are the 3′-RACE primers, and the green backgrounds are the 5′-RACE primers.

Gene Name	Sequence (5′-3′)
BpWUS	TGCAGGCAAAGCAGCACAAGATGGACACCAACAAGTGACCAGATAAGGATTCTCAA GGACCTTTACTACAACAATGGCGTGAGGTCCCCAAGTGCAGAGCAGATTCAGAGGAT CTCTGCCCGGCTGAGGCAGTACGGCAAGATTGAAGGCAAGAATGTCTTTTATTGGTTT CAGAACCATAAAGCTCGCGAGAGGCAAAACAAAAGGTTCA
BpWOX1	GGTGGAACCCGACGCCGGAGCAGCTGAGGGCCCTCGAAGAGCTCTACCGCCGCGGG ACCCGAACGCCATCGGCCGAGCAAATTCAGCACATCACGGCTCAGCTTCGGAGATAT GGAAAGATTGAAGGGAAGAACGTGTTCTATTGGTTCCAAAATCACAAGGCCAGAGA GAGGCAGAAGC
BpWOX2	AATATTGCACAAGTGGTGCCATTTCAAAGCACGCGGTGGAGTCCGACGCCGGAGCAG TTGATGGCGCTGCAAGAGCTGTACCAGCGTGGGACGCGGACCCCAACGGCGCAGCA GATCCAGGAAATCACCGCGAAGCTCCGGCGGTTCGGGAAGATTGAAGGCAAAAACG TGTTCTACTGGTTTCAGAACCACAAAGCCAGGGACAAAAAGAAGCAGCG
BpWOX3	TCAAGATGGTGCCCAACACCCGAGCAGCTGATGATCCTGGAAGAGATGTACAGGGCT GGAACAAGAACTCCCAACGCGTCTCAAATCCAACAGATCACAGCCCATCTCTCGTTC TACGGAAAGATTGAAGGCAAGAATGTGTTCTACTGGTTTCAGAACCACAAGGCCAGG GACAGGCAGAAGC
BpWOX4	GTTGAGACGCACCCGGGAGGGACGCGGTGGAATCCGACGCAAGAACAGATAGGGAT ACTGGAGACGCTGTACAGAGGAGGAATGCGCACTCCGAACGCGCAACAAATAGAGC AAATCACGGCTCAGCTGGGCAAGTTCGGCAAGATCGAAGGCAAGAACGTGTTCTACT GGTTCCAGAACCACAAGGCCCGCGAGCGGCAGAAGCAGAAGCGCAACAGCCTCGG CCTCAGCC
BpWOX5	GGAACAAAGTGCGGCCGTTGGAATCCCACGAGCGAGCAGGTTAAAGTCCTGACCGA TCTCTTCCGGTCCGGTCTCCGAACCCCGAGCACCGACCAGATCCAGAAGATCTCCGC TCAGCTCAGCTTTTACGGCAAGATCGAGAGCAAGAACGTCTTCTACTGGTTTCAGAA CCACAAGGCCAGAGAGAGACAGAAGCGCCGCAAGGTCTC
BpWOX7	GAACCCGCCGTGAGGTCAAGGTGGACTCCAAAGCCAGAACAAATTCTCATCCTTGA GTCCATCTTCAATAGTGGAATGGTAAACCCTCCCAAGGACGAGACCGTGAGGATACG GAAGCTACTCGAGAAATTCGGGGCCGTTGGCGACGCCAACGTATTCTACTGGTTCCA AAACCGCCGCTCGAGGTCCCGCCGTCGCCAGAGGCAGATGCAGGC
BpWOX8	ATGGCTTCATCAAACAGACACTGGCCCAGCATGTTCAAGTCCAAGCCTTGCAACACC CACCCCCACCAATGGCAACACGACATCAACCAGTCTCTCATCTCAACTGGCTGCCAC AGAACTCCCTACACTTCAGTTGGCGGGTGCGAGGAGCGGAGCCCGGAGCCGAAGCC GAGATGGAATCCGAAGCCGGAGCAGATTCGGATCCTGGAAGCGATCTTCAACTCGGG GATGGTAAACCCGCCGAGAGACGAGATAAGAAAGATCAGGGCACAATTGCAGGAGT ACGGCCAAGTGGGTGACGCCAACGTGTTTTACTGGTTCCAGAACAGGAAATCCAGA AGCAAACACAAGC
BpWOX9	TGGGAAATCTATACTGCGACACGTTGATGACATCTGCGGGCCACAAGATCACGGCGA GACAGCGTTGGACTCCGACTCCTGTGCAGCTACAGATTCTGGAGAGCATGTTTGACC AGGGGAATGGAACTCCAAGCAAGCAAAAGATCAAAGAGATAACCTCTGAACTGAGC

	CAGCATGGCCAGATTTCGGAGACTAATGTCTACAATTGGTTCCAGAACAGGCGTGCT CGGTCGAAAAGGAAACAGCAGAATAATGCAGCACCCAACAATACTGAATCTGAAGT GGAGACTGAAGTTGAGTCACCTAAGGACAAGAAGACAAAGCCGGAGGAGTTTCTGT CCCAACAGAACTCGGCTTCGAGGGCTGAAGATATCTGCTTCCAGAGCTCCGAGATCA GCTCTGACCTGCATTTCTTTGATCC
BpWOX10	CTGGAATGAAGCTGGGAAGTCTTCACTATGATCCACTAATGACATATGGTGGCCACAA GATCACTGCAAGGCAAAGGTGGTCACCAACGCCTGTGCAGCTTCAAACTCTAGAGA AAATTTTCGATGAAGGGAATGGGACTCCGAGCAAGCAGAAGATCAAAGAGATAACC GTAGAGCTGAGTCAACATGGCCAAATTTCGGAAACCAATGTCTACAATTGGTTCCAG AACAGGAGAGCTCGTTCGAAGAGAAAGCAATC

Table S3. The primer sequences of *BpWOXs* used for full-length cDNA amplifications.

Gene Name	Forward primer (5′-3′)	Reverse primer (5′-3′)
BpWUS	ACATGGGGACCATCCCACATAACATTTT	GTGTCAAGACCATCGTCATATATAATAATCA
BpWOX1	GATAATAGTACTACACTACAATGCCTACCTCC	CCATTTTAAGGCAAACCCTCCTTTTTCA
BpWOX2	ATGTCCATTTGAAGCCTAGATATCAAACTA	AAATCTTCTATATTTTACTCACGTCCTTTATTC
BpWOX3	ACCCCAAGAGACAAAGACAAAAGTCGAATC	AGTCTTTTGAAGGTAAACAAGGCATTTC
BpWOX4	CCTCACCTCATCATTTGGTCTTGGTTATC	TGATCTGCTGCTTATTGGAACCAAAGAGCG
BpWOX5	ATACATGCACACGGGTTTCACATTG	TCATAAACATAAACTACCGATGTCCTACCGTAG
BpWOX7	CAATGGAAGATCATCACCATCATCAAGGC	GTTAAAGACGTAATATTTATGGGAGACTGGC
BpWOX8	ATCTCATCAGTACCAAAAACAAGAGCAAC	CCACGAAAAGCATTCATTTTTACTACAC
BpWOX9	GTTTGTCTCTTTCTTTCCAACCTTTTTC	GGTTCATCCATTCATATCCAATCATAAAATG
BpWOX10	AGTGTCAGTACTAAACACTTGCTTGCAATCTAAG	GGTTTTTCAATAGACCCAGTTCATCATAATCTG

Table S4. The full-length cDNA sequences of *BpWOX* genes. The gray backgrounds are the ORFs.

Gene Name	Sequence (5′-3′)
BpWUS	ACATGGGGACCATCCCACATAACATTTTCACTTTCTCTCTCCAAATTCCCTCTCTCTCTCTCTCT CTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTCTTGTTTGCT TCCTCTTTGTAATCTTCTTGTCTAATCTCACCATGGAACCTCAACAACAAAACCAATCAGCACC AAATGACCATGAAAATGGCGGCAACAAAGGAGGGTCGTTTCTTTGCAGGCAAAGCAGCACA AGATGGACACCAACAAGTGACCAGATAAGGATTCTCAAGGACCTTTACTACAACAATGGCGT GAGGTCCCCAAGTGCAGAGCAGATTCAGAGGATCTCTGCCCGGCTGAGGCAGTACGGCAAG ATTGAAGGCAAGAATGTCTTTTATTGGTTTCAGAACCATAAAGCTCGCGAGAGGCAAAACAA AAGGTTCACTTCTGACATGCAAAGACCTCCTCCCCCTGCTTCTTCTAATGGCCTAATTCCAAAT AATGCTACTTCTACTACTAATAATATTCATCAATCCTTTCACCCGCACCACAAGTACTCCAACAT ACCTCCTGCAGATTTTGCAGTTGTTCCATCAGGATCTCCTTCTTCGGCAAATATTGCTTGGTGTT AATGGACAGATGGGGCACTATGGATATGGAGCTATGACCATGGAGAAGACATTTAGGCTGCA GGACTGTGGAAGCAGTGGATCCATAAGCCACAACTTCGGGTGGGTCGGAGTGGACCCGTATT CTTCACCGTACGCTCTCTTTGAGAAGAGATCACCAATCCCATATGACCCTTATGATCAAGATGA TCATGATGAACACGAGGATCATGATCATCAAGAAACTGGAGGGAACATTGAAACCCTCCCAC TCTTCCCCATGCACGGCGAGGAGGACATCATGATGATCAACGGCTACGGCAACATGATCAAG CCCGGCTTCGCCGACCCCACCGCCACCGGAGGTGGCTACTACTCCGGTGGCCACGTCAGCTC TCGCACTTCCCTTGAGCTAACCCTCAACTCCTACGGGTCACCGGATTCGCTTTAAAAGCATTTC TAAACCCTTTTCAAGTTAATCACGTGTCAAATGTTAATTAACTCCTTAATCACTCCCATGCATGA AACATGGTGGATTAAATTAATTAGCTCAGCTAGCTACTTATAATTAATCATGGACGTTGATTAGT TATGTTATATTGTTACATGCTCTATTTATGATGATTGTGTGATTATTATATATGACGATGGTCTTGA CAC
BpWOX1	GCTCTCTCTCTCTCTCTCTCTAGATAATAGTACTACACTACAATGCCTACCTCCGAATGTCTC AAAACTAAATCATCACTTCACTGTTTCAGCTCCAACTAACCCCATTTTTCAACTCTAGCTAGCT TCAATAGTATCTCAATACTATACAGCCTTCTAAATACAAGCTCTATCCACTTTCTATTTCCCTTGC ATGTTCTGATCTATGTCCACTTTCGTAACTCGAAACAGTATCCAAACACCACTCTGAACCCTAT CATATCATAAAACACAGTAGCCCATTACGAAAGAAAAAAGAGAGTTAGAGAGAAATCCTAGA AAAAAAAAAAAAAACATGTGGATGATGGGCTATAACGACGGAGGTGAACTGAATCTTCACG ACTCTTTCAACAGCACTTCTCGTAAGCTTCGTCCTCTCATTCCAAGACCTTTGCCTTCTTCTAAC AACGCCCCAACCTCAAACCCTCCATGTCTAAGCCGTATTCATGCTTCTGCTGATTTCTTTGCTC AATATCACCATCTGGCTACTGTGGCTGAGCAAAACAAGAGAGAGTTCAATACAAGTCCGCAA GTGGTGGTGAGCTCGCGGTGGAACCCGACGCCGGAGCAGCTGAGGGCCCTCGAAGAGCTCT ACCGCCGCGGGACCCGAACGCCATCGGCCGAGCAAATTCAGCACATCACGGCTCAGCTTCGG AGATATGGAAAGATTGAAGGGAAGAACGTGTTCTATTGGTTCCAAAATCACAAGGCCAGAGA GAGGCAGAAGCGCCGCCGTCAGATGGAGTCGGCTCCAGACGAGACCGACATGTCCGAAAAG AACAAAGAATTAGGGGCAAGTAGGACAGTGTTTGAAGTTGAACAGACCAAGAACTGGGCAC CCCCTACTAGCTGCAGTACTCTTGCAGAGGAATCTCATGTTTCAATACAAAGGGCAGCAGCAG CAGCAAAAGCAAGAGTGGGCCAGGCTGCAGAGTCATGTATGAGGACAGATGGTTGGATCCA ATTGGGCGAAGGAGAATTGAATTTGCAGCAATATAGAAGGAACAACTTTGTGGAAAGGAATG CCACGTGGCAGATGATGCAGTTATCTTGTCCTCATCCCCATGCTCAGCCCACCAACCTCATAAA CACCCCTTGTAATATTAATAACAACAATAATATTATTAGTAATACCACCACCAGTAGTACTACTA

	CCACTACCACTACAGCTAGAACAACAGCATCAACAATGGACCAACAAAGGTTCATGAAGAC CTCTACACATGATCTAAGCATCTTCATCACGCCGGCCTACAGATCAGAAAATGGCCTTATGAAT AACATTGGTTATAACCACTTTAACAGTTCTAATGTCAACTCTGAAGAAGAAGATTACAACAAT TGCAGTGAGGAATCTCAAACCCTAGAACTGTTTCCGCTTAGAAGTGGCGATTACAACGGAAG CGAGAAAGAGGCTCATGATCGATTATCAGTTGCGGACATGAACGCCGCGGGCATCATGACCA CTCCTTTCCAGTTCTTTGAGTTCCTACCATTGAAGAATTGATCATGTGTTGATCAACAAAAGTTT GTAATCTCATTGGAAAACGAGACCTTTTTTTAAAATTTAATTTTAGTTTTTTTTTTCCCCTTTTCTT TTCTTGTTTTTGTTTCGATGTTTACATGTCGTGGAATTGGTGACTATGGTATATGTGGGAATGAA AAAGGAGGGTTTGCCTTAAAATGG
BpWOX2	ATGTCCATTTGAAGCCTAGATATCAAACTATCATTTCACTTTCTTCTTTCCCTCCTTGTTACAATA TCCTCCTCTACCCATCTCTTTGCTCAAAAACAGAATTCCTCTGTGAGAGAGAGCATTTTATACT ATATAGAGCACTGTCTACAATGTGGACGATGGGTCGTAGTACTACTGATCATGGAAATGAAGTT AAGATTCCTAGTTCCTTCAAAGACCTCAAACTTCGGCCTATAATTATTTACAGCCCTTTCAAAA CGACTGTCGTTTCTCCAACAACTCCGGTCACCGATTTCAGTGCTAAGAGTACTCAAGATAATA GTATTAATAGTAATATTGTGAATACCGAGCAACGTCGACGAAGAAAGGACCTGAATAATAATA TTGCACAAGTGGTGCCATTTCAAAGCACGCGGTGGAGTCCGACGCCGGAGCAGTTGATGGCG CTGCAAGAGCTGTACCAGCGTGGGACGCGGACCCCAACGGCGCAGCAGATCCAGGAAATCA CCGCGAAGCTCCGGCGGTTCGGGAAGATTGAAGGCAAAAACGTGTTCTACTGGTTTCAGAAC CACAAAGCCAGGGACAAAAAGAAGCAGCGACTCAAAATGGAGTCTTATAATAATCGCTCCA AGAATATTGATTATAATTCCAAAAGCCAGGTTGAAACGAAAACATCAGTTTTGTCCTTGGGAC CGAGAGTGACAGGGCTTGAATATGAGCAGACAAAACGGGAACCTCTCTCAAACTACAGCAG AATTTCAGAGGAATCTGTTAATTCAATACCTAGAGTGACAACTACAACAACAGCAGAGACATC AGGTACAAACAATAAGTTGGTTGCATTGGAGGAGAAAGAGAAGTCACAACTACTAACAACA AACAACATTTTTCAAGAAAAGCAAAATGCCTCGTGGAAACCTATGGAAATGTCCTACTCTTTT CCCACTTACAATAATTATGAGCTCAAGAGGACCAGTCCCACAGTAATTTCGTTGACATTTGATG AGAATTTAATGGTGAAAAAGCAAGATTACAGTGCCAGTGTATCTTTAATGCCCAACAGCAAAC CAAGTTTCACCAGTTTTGGGAATGGAGTCAATGGCGAAAAAGAAAGTACTGCTACAACTCTT GAGCTATTTCCTCTTCGGAGTGACAATCTAAAGGGTGCTCAGAGAACAGAAATTCATTCCGGC ACAAAAGATTCCGATTTCAAACCAGACCTCTCGTTGCGTTTCTTCCTCTGAAGAACTGACTCG AGCATTAGAGGACTAGTGATTGGGCCTTCCAACAGAAATAAAAAGTGTAGTGATTTTTATAAG TTTCTTTTATTTTGGTTTGGTTAGTTTTCTGTGTAATTTAATGTTTTCTTTTCGTGTCATGCATGGA CTGACATTAATGCAAAGTAAGAATAAAGGACGTGAGTAAAATATAGAAGATTT
BpWOX3	ACCCCAAGAGACAAAGACAAAAGTCGAATCTGATCTTTTCCCAAATCGAGTTTGCTCAACAT CATTGCACATTAAAAAAAAAAAAGAAAAAATCATCAATAAAATGTCTCCAGCAGCCAATTCA TCAAGATGGTGCCCAACACCCGAGCAGCTGATGATCCTGGAAGAGATGTACAGGGCTGGAAC AAGAACTCCCAACGCGTCTCAAATCCAACAGATCACAGCCCATCTCTCGTTCTACGGAAAGA TTGAAGGCAAGAATGTGTTCTACTGGTTTCAGAACCACAAGGCCAGGGACAGGCAGAAGCTC AGGAGGAAGCTCTACAAGCAGCTTCAGCAGCAACAGCTCTATCATCAGCAGCAGCAGCAAC AGCAGCAGCTAATGATCAACAGTGCTATTCAGCAAAACCACCATTTTCTTGGCTATTTTGACTC TAGTACTCCTAATAGTTCTGCTTCTTCTTCTTCTTCTTTGCATCATCAGCAGCTTTGTTGTTAT AACTCATCATCACCATCAGCTGGTTCTCTACCCCAGGTCCAGGGTGGAGTTGAAGATCATCAT CATGCATCAACTCATCATCATCAACTGATGGGCTACACTTGGAAGATGGAAATTCCCCTGCTTG AGAAGGAGAACTCCATGATGAGAATGTACGATCGTGATTGGACGATGATGGTGGACGTGGGC CCACCTAGTTCTCCATATTGTTGCAATAAACCCCTCAAGACCCTTGAGCTCTTCCCCATCACCG

	CTACTAATCTCAAAGAAGAGTGTACGACGTCAAAACATGTCCCTCATTCCACCCCAACGATGA CCATCTAATGACCAGTCTAAATTCCTATCTGCATGGCTCTCTTTCTCTCTCTCTCTCTCTCTCT CTCTCTCTCTCTAAGTCTATGTCTAGATGCTACAAGGGTAGGCTTGAAAGTGTCTGTGTGTTGTT TATTTTCTTGGTTTCTGTTATTTGTCTAGAGCTCTAGGAAGAGAAAGATCGCAATTGTCTAGCGA GTAATACGTTACTGGCTCTATTGTCCTATTACTACACCTACTCAATGAAATGCCTTGTTTACCTTC AAAAGACT
BpWOX4	CCTCACCTCATCATTTGGTCTTGGTTATCCCAAGCACCACCTCATTTCCCACTTTGGTGACTTTA ATCGTACCAGTACATTACTTTGCTATATAACCAGGGGTTTGTGTAGTGATTCAGTCCTCCACCAT GGGAAGAAGTAGCTGCAGCATGAAGGTGCATCAGTTCGCACGTGGACTCTGGGAGGCTCACG AACCCTCCCTCACGCTTGGCTGCAAACGCTTACGCCCTCTTGCTCCCAAGCTCCCTAACTCTCC TCCTTCTACTACCGACACTACTCACATTACTACCACTGCTTCTTCCCCCCACTCCATCGCTCCTT TCGATCTCAAGAGCTTCATCAGACCCGAAAGCGGGCCCCGAAAGCTCGGTTCCTCCGACGAC AAGAAAGACTCGCCTCCGGTTGAGACGCACCCGGGAGGGACGCGGTGGAATCCGACGCAAG AACAGATAGGGATACTGGAGACGCTGTACAGAGGAGGAATGCGCACTCCGAACGCGCAACA AATAGAGCAAATCACGGCTCAGCTGGGCAAGTTCGGCAAGATCGAAGGCAAGAACGTGTTCT ACTGGTTCCAGAACCACAAGGCCCGCGAGCGGCAGAAGCAGAAGCGCAACAGCCTCGGCCT CAGCCACAGCCCGCGAACCCCGACCCCAATCGCCATAGCCACCTGCGGTTTGGACACTAGGG GAGACTTGGACAGAGACCGGGAAGATAGTACTAGTCCGTACAAGAGGAAGTGCCGGAGCTG GGGATTTGAATGCTTGGTAGAAGAGCATAGTAGTAGAATATTGTATAACAATTATAGAGATCAG GATCAGGGAGATAGGACTCTGGAGCTTTTCCCATTACACCCGGAAGGCATGAGATGATGGGG GGTTTTGGGGAGAGAGAAAATACTAGTAATAATTCATCCTTCTTTCACCATCATATCATTTTTCA GCTTTAGTTTATGTGGCCGGTATATGAATATTATCAGCTTAATATGTGCTTTTCTTTCCTTTTTCTT CTTTTTTTCTTTCGCTTCGGGAAAAGAAGAAAAAAGAAGGTACTTGTCTGATCTCTTTTGTAGT ACTGATCTGCTGCTTATTGGAACCAAAGAGCG
BpWOX5	GCACACGGGTTTCACATTGAAAACTGATCAGAAACTGCTATATCACTAGGAAACTTCAGTGAC AGAGATCAGAAGATTTTGGAGCTCAAAAAATGGAAGATCATGGCATGTCAGGCTTTTGCATTA AAGCGGGACATAACATGGCTAACAACGTTGTCGTTCGCGGTACTACTGGAACCAACGGCAGC ACTGGAACAAAGTGCGGCCGTTGGAATCCCACGAGCGAGCAGGTTAAAGTCCTGACCGATCT CTTCCGGTCCGGTCTCCGAACCCCGAGCACCGACCAGATCCAGAAGATCTCCGCTCAGCTCA GCTTTTACGGCAAGATCGAGAGCAAGAACGTCTTCTACTGGTTTCAGAACCACAAGGCCAGA GAGAGACAGAAGCGCCGCAAGGTCTCCGTTGATGATCATGACAAGGATTTCGTTCTAAGAGA GGACAAGATTCCCTCTCCCAAACGTAATTTTGCGGAGATATATCACAGTCGCCATCATCATCAT CATCATCATCATCATGATCACGAGGAATATCAGGTTTCTGAGCCGGAAAGAGTGATTGAGACG CTCCAACTCTTTCCGTTGAATTCGTTCGGAGAGCCGGATTCGGAGAAGCTGAGATTCCATGAT CAGTGCAGAGAAACAGCGGCTTTTCCGTACACAATTGAGTCAGCAATAGAACATCCTCCAGT ACTGGATCTGCGCTTAAGCTTTGTCTAATTAAGCATGTTTAGTTTACATCTTAGCCCAAAAAAA AAGAAAGAAAGAAAAAGAGAGAGATAGGTTTTTGTCATCACGTATTAATTAGG
BpWOX7	CAATGGAAGATCATCACCATCATCAAGGCCAAGACGCTAACAGTCCAAGCAACGGCTCCGAG AAAAGTAGTAGTGCTAGTACCGAACCCGCCGTGAGGTCAAGGTGGACTCCAAAGCCAGAAC AAATTCTCATCCTTGAGTCCATCTTCAATAGTGGAATGGTAAACCCTCCCAAGGACGAGACCG TGAGGATACGGAAGCTACTCGAGAAATTCGGGGCCGTTGGCGACGCCAACGTATTCTACTGGT TCCAAAACCGCCGCTCGAGGTCCCGCCGTCGCCAGAGGCAGATGCAGGCCAGCCTCGAAGT CCAGCAGCGGAACCAGGCCGCACAAGGTGTTGGTGGTGCATTTCAGTATGAAAGCAATAATT ATAACAGCAATAGTACTACTCAGGCCATGGCCGGTTATGTAGCTGGTTCGGCTTCTTTTGTTTG

	CTCTCCTTCTTATAGTAATCTTGTGGGTTCTTCTTCTTCCTCTTCATCATCTTCATGCGGAGTTTTG GCAGATCATCATGATCACCATCATGGTTTGGACTACAATACCAATTTCTTTCAAGTCTCTGGTC AAATGGGTTTTCCGCAAATTGAGCAAAGCTCTCCTGTAACGTCTGTTTTGTATCCTCCAGATAG CTCAAACATGCACTTCGAATCTGGATTCATCACAGTGTTCATCAATGGGGTTCCAACAGAAGT TCCTAAGGGCCTAATTGACTTGAAACCAATGTTTGGAAAAGATGTGATTTTGGTGCATTCCTCC GGAGTTCCACTTCCAACTAATGAATTTGGCATTCTAATGCAGGGCTTGCAGCCTGGTGAAAGC TATTTCCTGGTGCCGAGAACAACGTTAAGTAATAACTGAAGCAGCATCTAGCTAGATTGCTAC CAATGGAAGCTTCCCTACATATTCCAATCTTGATTTCTTCATTCCTTTTTTTCTCTCCTTATACATT TATTATAGATTTCTATTTTGTGGTTTTAAGGATTTAAATTGAGAGTGCTATTATATATATGTGTGTG ATTATTAGAGACAATTAAGATCTATACATAAGAGTTGCCAATATCATGCATATGATTGCTTATTT GTAATGCCAGTCTCCCATAAATATTACGTCTTTAAC
BpWOX8	ATCTCATCAGTACCAAAAACAAGAGCAACAAAACGGCTACTTCATCTCATTGTTTCTCTTTTGT TTATCTACTTTAAATTACTTCTCAGATCATCAGTTTCATCATCATCATCATCATGGCTTCATCAAA CAGACACTGGCCCAGCATGTTCAAGTCCAAGCCTTGCAACACCCACCCCCACCAATGGCAAC ACGACATCAACCAGTCTCTCATCTCAACTGGCTGCCACAGAACTCCCTACACTTCAGTTGGCG GGTGCGAGGAGCGGAGCCCGGAGCCGAAGCCGAGATGGAATCCGAAGCCGGAGCAGATTCG GATCCTGGAAGCGATCTTCAACTCGGGGATGGTAAACCCGCCGAGAGACGAGATAAGAAAG ATCAGGGCACAATTGCAGGAGTACGGCCAAGTGGGTGACGCCAACGTGTTTTACTGGTTCCA GAACAGGAAATCCAGAAGCAAACACAAGCTCCGACACCTCCAAAACTCCAAACAACAACA ACAACAGCAAACTCAGAACAATCACCAAAACTCTCCGAACTCCAATTTTACCACCACTACAA CCACTAGTAGTACTACTACTCCTACCACCAGCACAAGAGCTCCTTCCTCATCGTCCTCGTCTTC CTCGGAGAAATCGTCTCCGAAAGCCCCGAACAGATCGCCGATCTTCTCGATGGGCTTCACCG AAGCCCTAAACTCTCCGACCGGCTCGGTCAACCAGAGCACCTTCTTTCAGACCAACGGTAGT ACCATCACTAGTACTGGTCACGACCCGTTCTTGGCCGAACCCTTTTTCTTCCCGGTGCAACAGT CCAGTACTAGTACTACTCAAGGGTTTTGCTTCCCTCATGATCAGCTCACGCCGACTGCGGTCCA TCAGATTATGCCCGCAGATCATTATCAACAGATTAACAACATCGGACCGTGCACTAGCCTCTTG CTCAGCGAGATCATGAACCATCATGGGGCTTCAACGAAAGGCCATGATCATGATCATCATAAG CTGCTACCGCTTAATTACACTCCGTTGGAGGCGGCGGCGACGACGGTGGCAAGGACTACTTCT CCGGCCAGTACTCCTCTCACTACGGCTGCTACTAGTACTATTGAATCTTCAACATCACAAAGGA ATCAAATCCAAGCAGGTGTTGGAGAACAGGGAACTTCTGGAGTGGGGCCAATCGGAGGGGG CGGTAAAACGACGGTGTTCATAAACGACGTGGCGTTTGAGGTGCCGGCGGGGCCGTTCAATG TGAGGGAGGCGTTTGGGGAGGAGGCTGTGCTCATCCACTCCTACGGTCAGCCAGTTCTCACC AACGAGTGGGGGGTCACTCTTCACTCCCTCCAGCCTGGTGCTTTTTATTATCTAATTTAGGAGC TTGGGAGATATATCTAGCTAGATATGAGAAAAACACACGCTGGCTGTGGTTCATTTAATTCACT ACATATATTTCTGCTCTTATCTCTTTAAGTTTGGATTAGGGCTTTCAATGACTTGTTATATTAGCTC TGTTAATTAGTCCGTTTAGTGACAACTTGAAAATTTGGTGGACTCATATTATATATATGTATTCTC TTTCAGTTGTTAAGTAGAGAATTATATCAAAGATGTGTAGTAAAAATGAATGCTTTTCGTGG
BpWOX9	GTTTGTCTCTTTCTTTCCAACCTTTTTCCTGTCTCTCTCTCCTCTCTCCGACTAAAGACTGGTTTT TTAGACAAACATACTCCTCCGTTTCCCAGACTGTGAGCCTGAGAAAGAGGAGAGAGAAAGA AGAGAGAGAGAGAGAGAGAGAGAGAGAGAGAGGGAGGATGATGGGGTGGGAGAAGCAGG AGGAGAGAGAAGGGCATAATAATAGTAACAGCAGTAATCTGTATCATCACCATGTGAAGGTG ATGACTGACGAGCAATTGGAGACGCTTCGCAAGCAAATCTCCATCTACGCCACCATTTGCGAG CAGCTCGTTCAGATGCACAAGAACCTCACTTCCCATCACGATCTCCCTGGCGTCCGATTGGGA AATCTATACTGCGACACGTTGATGACATCTGCGGGCCACAAGATCACGGCGAGACAGCGTTG

	GACTCCGACTCCTGTGCAGCTACAGATTCTGGAGAGCATGTTTGACCAGGGGAATGGAACTC CAAGCAAGCAAAAGATCAAAGAGATAACCTCTGAACTGAGCCAGCATGGCCAGATTTCGGA GACTAATGTCTACAATTGGTTCCAGAACAGGCGTGCTCGGTCGAAAAGGAAACAGCAGAATA ATGCAGCACCCAACAATACTGAATCTGAAGTGGAGACTGAAGTTGAGTCACCTAAGGACAAG AAGACAAAGCCGGAGGAGTTTCTGTCCCAACAGAACTCGGCTTCGAGGGCTGAAGATATCTG CTTCCAGAGCTCCGAGATCAGCTCTGACCTGCATTTCTTTGATCCGCATTCCAACAAAGGAGA AGCCATGTTCTCATCAAACAATTCTTTACGGCCTGCGAGGAATTTGACTCAAATGCCATTCTAC GACGGTCTGCTCTCGAACTCAAGAAATGAGCATCTGAGTGGAAAAATGGAAGTGCCAGGGA GTTATGGTCTTTACGAGCATGCGGAAAACTACAGCATGACGGGATGAGGCTATCGTCCGAGGG AGAAGTTAATATTGTGAATAGAAAGAGTACAGATTCCAGATGCAGCTTGGTGGATGTGTTATTA GCAATCATTGCAATTGGGTGCCGTACAAACAGTCTTGGATATGGAAATGTACCTGAACCCACC TACTTAGTAAAGAGTACAAAGCTAACTTAGCAGAGTTTAATGTTTCTCTTTTTGTCTTCATTTTT ATCTGGTCCAGTTTTATCAGGGAGTAGAATGTCATGGTTTTGATTGGTGAACAAACAAACTTGA GTCTCTTTAAGTTCCTGTTTAACTTTTGATAAATGTGAGGACTTTTTGCCCTTTTTGTGTTTTGGC TGATAGTTGATCCGTGAGTTCCTTTTGCTTTTGTCAATACAATGAACCCATTTTATGATTGGATAT GAATGGATGAACC
BpWOX10	AGTGTCAGTACTAAACACTTGCTTGCAATCTAAGGCTGACTCTCTCTCTTTGTTTCTCTTTCTCT GTCTAAGTCAGATTCTCTGACAGAGGTTGAAGATCCAGGGCTTTTTGACAAATGGTTTAACTA ACTCTGGACTGCTCTACTTTTGTTTGTGTCAAGAAACAGGAGTGAGAAAGAGAGCAATTATAG TTAAGGAAGATGATGGAGTGGAAGATTCAACAACAACAACAAGATCATCATGATCATGATCA TGATAAACATGATCATCAGATGGAGATGGGAATATTGCAGAAAAAGGAAGATCAAGAGAATT CAACTATTGTTGGGGTTGTTCCTCCTCCAAATCCAAAAGATGGGTTAGGGTTAATGTACGTGAA GGTTATGACTGACGAGCAAATGGAGCTTCTCAGGCGCCAGATCTCCGTCTACGCCACCATCTG CGAGAAGCTTGCTGACATGTTCAACTCCTTCTCTTCCCAACATGATCTCGCTGGAATGAAGCT GGGAAGTCTTCACTATGATCCACTAATGACATATGGTGGCCACAAGATCACTGCAAGGCAAA GGTGGTCACCAACGCCTGTGCAGCTTCAAACTCTAGAGAAAATTTTCGATGAAGGGAATGGG ACTCCGAGCAAGCAGAAGATCAAAGAGATAACCGTAGAGCTGAGTCAACATGGCCAAATTTC GGAAACCAATGTCTACAATTGGTTCCAGAACAGGAGAGCTCGTTCGAAGAGAAAGCAATCCG TTCCAGCTCCAAACTGCGTGGAACTAGAAGTAGAGACCGAAACTCAAGAGCATTTGAAGGAC AGTGCAAAACCAGAAGATACTGAATTCTGTGACAACTCGGCTGCAGGGGAGGATCATGTGTA TTTTCCAAGTCCTGAGGAGTTGATCAACTGGTCCGCGAATGGAAGTGCCATTGAGCTGCATGC CTTGCCTTCATGGGGAGGATTTGATGTGGATGAGCTCTAGTTGGGATTCTTATATGGTCCTGTTG TTGCTCTTCAGCTGATCTTATTATAAATTTCTGTTCAATGGATTAGAATTTTACATTAGAGAGAA CTTCATTATTAAAATATTATAGTCATAGGTAATTTAGCAATCACTGACAATCTGACATGTGGACT TATAAAATCGTATGTGTCAGACTTGGCTAAAAAACTAAACTGATAGCGAATGTCTTTGATGTTA GCATGTATATGTAATCTTTACAATCAGATTATGATGAACTGGGTCTATTGAAAAACC

Table S5. The species information used to reconstruct the phylogenetic tree. Letter A represents the ancient clade, I represents the intermediate clade, and W represents the WUS clade.

Species	The numbers of WOX gene	A	I	W
Ostreococcus lucimarinus	1	1	0	0
Physcomitrella patens	3	3	0	0
Selaginella moellendorffii	8	7	1	0
Picea abies	18	4	8	6
Amborella trichopoda	9	1	2	6
Oryza sativa. ssp. Japonica	14	1	6	7
Brachypodium distachyon	13	2	5	6
Populus trichocarpa	18	3	4	11
Medicago truncatula	19	3	7	9
Morus notabilis	11	2	2	7
Broussonetia papyrifera	10	2	2	6
Prunus persica	10	2	2	6
Cucumis melo	10	2	2	6
Vitis vinifera	11	3	2	6
Gossypium raimondii	20	4	4	12
Arabidopsis thaliana	15	3	4	8
Solanum lycopersicum	10	1	2	7
Theobroma cacao	11	2	2	7
Utricularia gibba	17	1	4	12
Total number	228	47	59	59

Table S8. The primer sequences of *BpWOXs* used in qRT-PCR.

Gene Name	Forward primer (5′-3′)	Reverse primer (5′-3′)
BpWUS	TGAGCTAACCCTCAACTCCTACG	TCACACAATCATCATAAATAGAGCATG
BpWOX1	GCCGGCCTACAGATCAGAAAATG	CTTCAATGGTAGGAACTCAAAGAACTG
BpWOX2	ACTGCTACAACTCTTGAGCTATTTCC	ACTCACGTCCTTTATTCTTACTTTGC
BpWOX3	GAAGGAGAACTCCATGATGAGAATG	GAGAGCCATGCAGATAGGAATTTAG
BpWOX4	CTAGTCCGTACAAGAGGAAGTGCC	CATATACCGGCCACATAAACTAAAG
BpWOX5	GCATTAAAGCGGGACATAACATG	GTCCTCTCTTAGAACGAAATCCTTGT
BpWOX7	CGTTAAGTAATAACTGAAGCAGCATCT	ATGGGAGACTGGCATTACAAATAAG
BpWOX8	GACGACGGTGGCAAGGACTAC	AGGCTGGAGGGAGTGAAGAGTG
BpWOX9	ATGCGGAAAACTACAGCATGAC	CAAAACCATGACATTCTACTCCCTG
BpWOX10	CTAGAAGTAGAGACCGAAACTCAAGAGC	CTGAAGAGCAACAACAGGACCAT
BpGAPDH	TCAACATCATTCCTAGCAGTACCG	AGTCAGTGGAAACCACGTCATC

Table S9. The restriction enzymes and primers used to construct the recombinant expression vectors for subcellular localization (SL) and transactivation activity assay (TA).

Gene Name		Forward primer (5′-3′)		Reverse primer (5′-3′)
BpWUS-SL	*Xba*I	GCTCTAGAATGGAACCTCAACAACAAAACCAATC	*Sal*I	ACGCGTCGACAAGCGAATCCGGTGACCCGTAG
BpWOX1-SL	*Xba*I	GCTCTAGAATGTGGATGATGGGCTATAACGACG	*Sal*I	ACGCGTCGACATTCTTCAATGGTAGGAACTC
BpWOX2-SL	*Xba*I	GCTCTAGAATGTGGACGATGGGTCGTAGTACTA	*Pst*I	AACTGCAGGAGGAAGAAACGCAACGAGAGG
BpWOX3-SL	*Xba*I	GCTCTAGAATGTCTCCAGCAGCCAATTCATCAAG	*Sal*I	ACGCGTCGACGATGGTCATCGTTGGGGTGGAATG
BpWOX4-SL	*Xba*I	GCTCTAGAATGGGAAGAAGTAGCTGCAGCATGA	*Sal*I	ACGCGTCGACTCTCATGCCTTCCGGGTGTAA
BpWOX5-SL	*Xba*I	GCTCTAGAATGGAAGATCATGGCATGTCAGGCT	*Sal*I	ACGCGTCGACGACAAAGCTTAAGCGCAGAT
BpWOX7-SL	*Xba*I	GCTCTAGAATGGAAGATCATCACCATCATCAAGG	*Sal*I	ACGCGTCGACGTTATTACTTAACGTTGTTCT
BpWOX8-SL	*Xba*I	GCTCTAGAATGGCTTCATCAAACAGACACTGGC	*Sal*I	ACGCGTCGACAAATTAGATAATAAAAGCACCAGG
BpWOX9-SL	*Xba*I	GCTCTAGAATGATGGGGTGGGAGAAGCAGGAG	*Sal*I	ACGCGTCGACTCCCGTCATGCTGTAGTTTTC
BpWOX10-SL	*Sma*I	TCCCCCGGGATGATGGAGTGGAAGATTCAACAAC	*Sal*I	ACGCGTCGACGAGCTCATCCACATCAAATCCTC
BpWUS-TA	*Sma*I	TCCCCCGGGGATGGAACCTCAACAACAAAACCAATC	*Sal*I	ACGCGTCGACGGTTAAAGCGAATCCGGTGACCCGTAG
BpWOX1-TA	*Sma*I	TCCCCCGGGGATGTGGATGATGGGCTATAACGACG	*Sal*I	ACGCGTCGACGGTCAATTCTTCAATGGTAGGAACTC
BpWOX2-TA	*Sma*I	TCCCCCGGGGATGTGGACGATGGGTCGTAGTACTA	*Pst*I	AACTGCAGCCTCAGAGGAAGAAACGCAACGAGAGG
BpWOX3-TA	*Sma*I	TCCCCCGGGGATGTCTCCAGCAGCCAATTCATCAAG	*Sal*I	ACGCGTCGACGGTTAGATGGTCATCGTTGGGGTGGAATG
BpWOX4-TA	*Eco*RI	CCGGAATTCCGGATGGGAAGAAGTAGCTGC	*Sal*I	ACGCGTCGACGGTCATCTCATGCCTTCCGGGTGTAA
BpWOX5-TA	*Sma*I	TCCCCCGGGGATGGAAGATCATGGCATGTC	*Sal*I	ACGCGTCGACGGTTAGACAAAGCTTAAGCGCAGAT
BpWOX7-TA	*Sma*I	TCCCCCGGGGATGGAAGATCATCACCATCATCAAGG	*Sal*I	ACGCGTCGACGGTCAGTTATTACTTAACGTTGTTCT
BpWOX8-TA	*Sma*I	TCCCCCGGGGATGGCTTCATCAAACAGACACTGGC	*Sal*I	ACGCGTCGACGGCTAAATTAGATAATAAAAAGCACCAGG
BpWOX9-TA	*Sma*I	TCCCCCGGGGATGATGGGGTGGGAGAAGCAGGAG	*Sal*I	ACGCGTCGACGGTCATCCCGTCATGCTGTAGTTTTC
BpWOX10-TA	*Sma*I	TCCCCCGGGGATGATGGAGTGGAAGATTCAACAAC	*Sal*I	ACGCGTCGACGGCTAGAGCTCATCCACATCAAATCCTC