

## **Coding and amino acid sequences of the *Tropaeolum majus* genes identified in this study**

### **TmPAP1**

ATGGAAAAC TACTCGGTAGGTTTGAGAAAAGGAGCATGGACTAGTGAGGAAGACGATCTATT  
AAGGAAGTGCATACACAAATATGGAGAGGGAAAATGGCATCAAGTACCTCTTAAAGCAGGGT  
TGAATAGATGCAGGAAAAGTTGTAGACTGAGGTGGTTGAATTATTTGAAACCAACATCAAG  
AGGGGAGAATTTGCTGAAGATGAGGTTGATTTGATTCTAAGGCTTCATAAGCTTCTCGGAAAC  
AGGTGGTCATTAATCGCGGGTAGAATCCCGGGAAGAACGGCGAACGATATAAAAAATTACTG  
GAACACCCGTCTCCGAGGAAAAGAATATCCTTTGAAAAAATATCCATACGTAACAAAAGGGA  
AAACAATAGAGAAAAAATAGAAGTAATTAACCTCAACCTCGAGCCTTCACAAAAATAAC  
ATTTACTCCAAAAATCGTGTGAGCATCCATTATGCATCAACGACAACCATTTGAAACCTCAA  
CCGAAAACAAACCAATGAACTCGATACCTAAGGACGAAAACGATGAGGACATTATGTGGTG  
GAAAAGATTACTAGCCGAGTCCGAAACCGAAACCATATTGTTCAACGAAGAAACCCAGTCGG  
GTGATCTTGGGTTTACGGGTGGAATCTTGGGTCATGATTTGGACCACATTTGGAGTTTTTTAAA  
TGCAGATTCAGAAGATAATGTTGGTATTTGA

MENYSVGLRKGAWTSEDDLLRKCIHKYGEGKWHQVPLKAGLNRCRKSCRLRWLNLYLKPNIKR  
GEFAEDEVDLILRLHKLLGNRWSLIAGRIPGRTANDIKNYWNTRLRGKEYPLKKYPYVTGKTIEK  
KIEVIKQPRAFTKNNIYSKNRVEHPLCINDNHLKPQPKTNPMNSIPKDENEDEDIMWWKRLLAESE  
TETILFNEETQSGDLGFTGGILGHDLDHIWSFLNADSEDNVI

### **TmPAP2**

ATGGAAAGCTGCTTGGTAGGTTTGAGAAAAGGAGCATGGAGCAGTGATGAAGACGATCTATT  
AAGGAAGTGCATACACAAATATGGAGAGGGAAAATGGCATCAAGTACCTCTTAAAGCAGGGT  
TGAATAGATGCAGAAAAAGTTGTAGGCTGAGGTGGTTGAATTATTTAAAGCCAAACATCAAG  
AGAGGAGAATTTGCAGAAGATGAGGTTGATTTGATTCTAAGGCTTCATAAGCTACTTGAAAC  
AGATGGTCTCTAATTGCTGGTAGAATCCCTGGAAGAACGGCGAATGATGTGAAAAACTATTG  
GAACACTCGTGTACGCAAAACGAACCATCACTTGAGAAATTATCCGCACGAAACAAAAAGCA  
TACATAAGGTGAAAGCAATCAAACCTCAACCGCAAGCTTTCAAAAATAATAACAAATACTCC  
CAAGAAATACCTACAATCGCTAAAACACAAGAAAAATGTTGTGCAAAAACGATTATGCATCGG  
CGAAAACCATTTGAAACTTCCTACTACAACAACCACCATGATGTGTTCCATACCTACGGACGA  
CAATGATGATGATATTACATGGTGGCAGAGATTATTAGCCGAGATCGAAACCGAAGAAGTAT  
TGTTTGACAAAGAAATTCAGTCCGATGATGCGGGTTTCTCGAGTGGAGTTTGGGTCATGATG  
TGGACCAAGTTTGGAGTTTCTTAAATGATGATTTAGATTGA

MESCLVGLRKGAWSSDEDDLLRKCIHKYGEGKWHQVPLKAGLNRCRKSCRLRWLNLYLKPNIKR  
GEFAEDEVDLILRLHKLLGNRWSLIAGRIPGRTANDVKNYWNTRVRKTNHHLRNYPHETKSIHKV  
KAIKPQPQAFKNNNKYSQEIPITAKTQENVVEKRLCIGENHLKLPTTTTTMMCSIPTDDNDDITW  
WQRLLAETEEVLFDEIKQSDDAGFSSGVLGHDVDQVWSFLNDDLD

### **DN12074**

ATGGAACGTTACGCAGGAGTGAGAAAAGGTAGATGGATCGAAGAAGAAGACAATCTTTTAAG  
AAAATGTATTGAAAAGCATGGAGAAGGAAAATGGAGTGAAGTTCCTCTCAAGGCAGGCCTAA  
ACAGATGCAGAAAAAGCTGTAGATTGAGGTGGTTGAACTATTTGAAGCCAGATATAAAAAGA  
GGAAAATTCATAAGGATGAATCTGATCTGATTATCAGACTTCATAAACTTTTGGGTAATAGA  
TGGAATGATTGCTGATAGATTACCGGGAAGAACAGATAACGATATTAAGAATTATTGGAA  
AGCTCATATCTTTAAGAACTCGTCAATGAGAACAATGAAAAAGAAGAGATGATAAATGAAG  
ATTTTATCGCGACTATGTTGATAATGAATGTCAATACAAAAAAGATGAAGAATAA

MERYAGVRKGRWIEEDNLLRKCIKHGEGKWSEVPLKAGLNRCRKSCRLRWLNLYLKPDIKRGK  
FTKDESDLIRLHKLLGNRWKMIADRLPGRTDNDIKNYWKAHIFKKLVNENNEKEEMINEDFYRD  
YVDNECQYKKDEE

**DN20611 (partial)**

ATGGGGAGAGTTGCTTGGAGTGAAGAAGAAGATCTTTTGCTCAAGAAATACATAGAGCAATA  
TGGAGAGGGGAAATGGCATCGTGTACCTCTTTTAACCGGACTTAATAGATGCCGGAAGAGCT  
GTAGATTGAGATGGCTAAACTACTTACGACCCAATGTTAAAAAGAGGGAGCTTTGCAGATGAT  
GAAGCTGATATTATTATCAAGCTCCATGACATCTTGGGTAATAGGTGGTCACTAATAGCCGCA  
AGACTACCGGGAAGAACGGCCAATGATGTCAAGAATTATTGGAATTGTCATTTGAGCAAAAG  
ACTTAATATCAAAAATAATGAAAACACACCGACCAAAAAACCTCAACTTTCTAAAAACAAGAA  
CCAAGATCAACGTTAACATTACTGCAACAAGTTCAACAATTCCACAAGATCAAGAACTAACT  
CGTATTCAACACCAACGATGCACTACCTTTCACCTTGATGGAGAGGAATGCAATGAGATACCAA  
AA

MGRVAWSEEDLLLKKYIEQYGEKGWHRVPLLTGLNRCRKSCRLRWLNYPNVKRGSFADDE  
ADIIKLHDILGNRWSLIAARLPGRANDVKNYWNCHLSKRLNIKNNTPTKKPQLSKTRTKINV  
NITATSSTIPQDQETNSYSTPTMHYLSLDGEECNEIPK

**TmGL3**

ATGAGCAAGCTAATCGACGATTATCTGTTTGGTTCTTGTTTTATTGCTGAATCTTGTTGGTGGGA  
CTCATCTTCATCAGAGCGCATCCATTACAGACTGTTGTATGCTTTCCATTTTCGGGAGGTGTGGT  
TGAGCTTGGCGTGAAGTACTGATATGGTGAAGGAGGATTTTTGTCTCATCACGTATGTCAAGACTTC  
ATTCTTGGAAGTCCCCTACTCGATAGTCTCCGATATATTGGCTCCTCAGGTAGAGAAGACCCA  
AACCGACCAAGTAATCCCTCATTCTGCGGTCGATCTTCAGATTCTTGATGATAATCTGATCCCA  
GGCATCGGCTGCGAGGAGTTGCAAACGGTTTCTCATGATAGTAGCTCAAATGGCTTTGAAATG  
GAACCAATGGAAGATTCACTCATACTCGAAGGGCTAAATGGTGAAGATTCTCGATTACAAAG  
CTGGATATTTCATGGAGGACGAGATCAGTAACCTGTATCCATCAGAGTTCCAATGATGCCGATTG  
TATATCTCAATCCTTTGTACAGCCTTTGGAGGTCATACCCGTTACACCGGTCGAAAAGGAAAA  
CAGTCATTCCCTTCAAGACATTCAAGACAATAACCACACAAAACCTGGCATCGGTTGATCTTCA  
AGCCGATGACTTGAAGTACCAAGTGTATCTTGACCCTTTTTAATAAGACTTCCCACCAGTTG  
ATGTTGGGACCAAAATGTGAAGAGATCTGACCACAAATCTAGCTTTGTTCCCTGGACGAAACGT  
AGACGTGTGAACCTCAGAAATCAGCTCACAAAACCCATCAAACACTACTGAAAAAAGTATT  
ATTCAAAGTTCCTCGGACTTATGAAAACACAACGCTAGGTTTCCCAGATGGCACTGGGCTTAA  
AGGTGTAGCTTGGAGGCCAAAAGTTGATGAAATCACAACCATGTGTTATCGGAGAGGAGGC  
GAAGAGATAATCTAAACCAAAGATTTACGGTTTTGAAATCTATAATCCCGACGATCACAAAG  
GTTGACAAAGTATCTATTCTAGACGACACGATAGAATACCTCCAAGAACTTGAGAAAAGGGT  
CGAAAAGTTGGAAGCTTGCAGAGAAACCGGTGAAGTGAAGCCGGAATGAGGAGAAAACAT  
CACAATGCTGCAGAAAGAACATCTAATAACACAAACGATAAACTACTAACAGAAAGAAATC  
GTTGGTAAACAAGAGGAAAGCAAGTGAAGTACGATAACGCAGGTAAAGATGTTGACTTTGTTA  
TACAGAAAGATGGTTTACGCCGATAACGTAAAGATTAGTACGAGTGACAACAATGTTGTGATT  
GAGATCAAGTGTCCACAGAGAGAAGGAGTTATGCTCGATATCCTGGATGCAGCAAGCAGCCT  
TCATTTAGATCCTTACTCAGTTCAATCATCTACTACTGATGAAATGATTTCTGTGACTATCCAA  
TCTAAGTACAAAAGATCGAAATTTGGCCTCAAGAGATCAGATCAAACAGGTACTTCAAAGAGT  
TGCTTGAATTCTTAA

MSKLIDDYLFSGCFIAESCGGTHLHQSASIQTVVCFPFSGGVVELGVTDMMVKEDFCLITYVKTSFLE  
VPYSIVSDILAPQVEKTQTDQVIPHSVDLQILDDNLIPGIGCEELQTVSHDSSSNGFEMEPMEDSLI  
LEGLNGEDSRLQSWIFMEDEISNCIHQSSNDADCISQSFVQPLEVIPVTPVEKENSLSLQDIQDNNHT  
KLASVDLQADDLHYQSVILTLFNKTSQMLGPNVNRSDHKSSFPWTKRRRVNPNQSAHKTHQ  
TLLKKVLFKVPRTYENTTLGFPDGTGLKGVAWRPKVDEITNHVLSERRRRDNLNQRFTVLKSIPTI  
TKVDKVSILDDTIEYLQELEKRVEKLEACRETGELEAGMRRKHHNAAERTSNNTNDKTTNRKKS  
VNKRKASDYDNAGKDVFVIQKDGSADNVKISTSDNNVIEIKCPQREGVMLDILDAASSLHLD  
YSVQSSTTDEMISVTIQSKYKRSKLASRDQIKQVLQVAVNS

**DN6405**

ATGATGGTCGATACACTGGTTTTAGACAACCTGTTTACAGATGACGTCGAGTTTAACCCAGAA  
AGAACTAAAGCAAATGATGAATACAACATAGATTCCCCGACAGAATGTTCAAACGAGTGTGA

TCATAACCACCAGACAGAAGACTCATTTATGCTTGAAGGTATGAACGGTGGTATAGCTACTTC  
TCAAGTCGAAAGCTGGAAATTCATAGCTGATGAATTCCCGGGTGGTGTTCGAAACTCTATAAC  
CTCGAGTGATTGTATCTCTGAAGCTTATCTGAATCATGAAAACCGCGAAAAGGCCAGCAACAG  
CCTTAATCACACAAAATAAGCTCTTTACATCTTGGAGGGGGCGAAGAAGAAGAAGATTAC  
ACTACAGAAATACTCTTTCGGCTATTCTCAAGAGTCAAAGTTTGTGACTAAAGCACGATGCT  
TCGAAAGTTGTGATTTCAAGTCGAGCTTCGAGAGCTGGAAGAGAGGAGGAGGAGGGGGTT  
TTTGATCGTCTGCTCGCTCGTGGTCGCGGACACCGTTGCCGCAGAAAGTTTTGAAAAAGGTGTTG  
TTTGAAGTCCCTTTGATGTATGGTGGCTCTCCTCAGTCCCTAAAAGAAACTACCCAAAACGAC  
TTTAACGGTATTAAGCGCGGCGGAGGACATGTTTCGGATAAAACGAAAAGAAGACGAGAAGTT  
TCTTGCACTACGATCGCTGGTTCCTTGCAATTAGTGAGATTGACAAAGCAACAATATTAAGCGA  
AACGATCAAGTACTTACGAGAGCTCGAAGCAAGAGTAGAGGAGTTAGAATCTTGCAATGGATT  
TCGAGGCGAGAACGAGAAGGAATCATGTAGACGTTATAGAGCGTACATCAGATAACTACGAG  
TTTGATAAGGGGAAGAAGAGTTGGGTAAATAAGAGGAAGGCGCGCGATATTGATGAAGCTAG  
ACCGGAATTTGATAGGATCGTCCATGAGGATGACATGATATCATCAAACAACCTGAAAGTTAT  
TGTCAAAGAGCAAGAGGTTTCGATTGAGATGAGATGTCGTTATCGACCGTATATATTAGTCGA  
TATCATGGATGCTATCAACAATCTACACTTGGATGCACACTCGGTTTCGATCTTCTACACTTGAT  
GGTTTTCTCACATTGACCCTCAACTCTAAGTTTCGAGGCACAGCAATAGCACCAGCTGGAATG  
ATCAAGCGAGCTCTCCGGAAGCAGCAGGGAGGTGCTGA

MMVDTLVLDNLFDDVEFNPERTKANDEYNIDSPTECSNECDHNNHTEDSFMLEGMNGGIATSQ  
VESWKFIADFEPPGVRNSITSSDCISEAYLNHENREKASNSLNHTKLSSLHLGGGEEEEEDSHYRNTL  
SAILKSQSLLTARCFESCDFKSSFESWKRGGGGGVFDRRRSWSRTPLPQKVLKKVLFVPLMYG  
GSPQSLKETTQDNDFNGIKRGGGHVSDKRKEDEKFLALRSLVPCISEIDKATILSETIKYLRELEARVE  
ELESCMDFEARTRRNHVDVIERTSDNYEFDKGKKSWVNKRKARDIDEARPEFDRIVHEDDMISSN  
NLKVIVKEQEVSIEMRCRYRPYILVDIMDAINNHLDAHSVRSSTLDGFLTLTLNSKFRGTAIAPAG  
MIKRALREAAGRC

#### **TmTTG1**

ATGGAGAATTCAACCCAAGAATCTCACCTAAGATCAGAGAATTCCATCACCTATGAATCCCCT  
TACCCACTCTACGCCATGGCCGTATCTTCTCTCCACCTCGTACCCAAAACCATTCTCAACGCA  
TCGCCGTGGTAGTTTCCTCGAGGACTACACAAACCGGGTTGATATAGTCAACTTCGATCTCG  
ATTCGTTATCCATGAAGGCTCACCCGACTCTTTCATTGACCATCCATACCCGCCTACAAAGCT  
CATGTTTCAACCCAATTACCATCAACCTAAACTCATCTTTCGATCTCCTCGCCTCTTCCGGC  
GATTTCTCCGTCTCTGGGAGGTTTCGAGATTTCGTAATCGAACCCGTAACGGTTCTCAACAAC  
AGCAAGACAAGTGAATTCTGCGTCTCTCACTTCCTTCGATTGGAATGAGGTCGAGCCGAAG  
AGGATTGGGACGTCGAGTATCGACACAACCTGCACGATTGGGATATTGAAAGAGGTATCGTT  
GAAACGCAGCTCATTGCGCACGACAAAGAGGTTTACGACATCGCTTGGGGAGAAGCTAGGGT  
TTTCGCTTCGGTTCCGCTGATGGATCGGTTTCAATTTTCGATTGAAGGGATAAAGAACACTCC  
ACGATCATATACGAAAGCCCTCAACCTGATACCCCTCTGCTTAGATTAGCTTGAACAAACAG  
GATTTGAGGTACATGGCGACGATTTTGATGGATAGTAATAAGGTTGTGATTTTGGATATACGA  
TCTCCATCAATGCCGGTTGCTGAGTTGGAGAGGCATACCTCGAGCGTTAACGCTATAGCTTGG  
GCTCCACAGTGTCTCGGCACATTTGCTCCGCCGGAGATGACTCGCAAGCGCTTATTTGGGAG  
GCTGCCCCAACGGTGGCTGGACCTAACGGAATTGACCCAAAAGGCCATGTACTCGGCTGGTCC  
GAGATTAACCAGCTCCAATGGTCCTCCGCTCAGCCTGATTGGATTGCTGTTGCCTTCTCCAACA  
AGATGCAGCTATTGAAAGTTTAA

MENSTQESHLRSENSITYESPYPYAMAVSSSPRTQNHSQRIAVGSFLEDYTNRVDIVNFDLDSLS  
MKAHPTLSFDHPYPPTKLMFHPNSPSTLNSSFDLLASSGDFLRLWEVRDSSIEPVTVLNNSKTSEFC  
APLTSFDWNEVEPKRIGTSSIDTTCTIWDIERGIVETQLIAHDKEVYDIAWGEARVFASVSADGSVRI  
FDLRDKEHSTHIESPQPDTPLLRLAWNKQDLRYMATILMDSNKVVILDIRSPSMPVAELERHTSSV  
NAIAWAPQCPRHICSAGDDSQALIWEAAPTVAGPNGIDPKGHVVGWSEINQLQWSSAQPDWIAVA  
FSNKMQLLKV

#### **TmLWD1**

ATGGGCGTGAGCAGCGACCCAAATCCAGACGGATCCGACGAGCAGCAGAAACGGTCGGAGA  
TCTACACTTACGAGGCACCATGGCATATATACGCTATGAACTGGAGTGTTTCGTCGAGACAAGA

AGTACCGTCTCGCAATAGCCAGCCTCGTCGAGCAGTACCCTAACCGTGTTGAAATAGTCCAGC  
TTGACGATTCTAATGGCGAGATTCGATCCGACTCTAGTCTCTCTTTCGAACACCCTTATCCCC  
ACAAACCATATTCATACCCGACAAAGACTGCCAAAAACCAGATCTACTTGCTACTTCCGGTGA  
TTTCTTACGGATATGGCGCATCAACGACGACGACGACGATGACAACTTCCAGTCCAAGGGTTC  
TAAGGTTGAGCTCAAGAGTGTTCTTAATGGTAACAAGAACAGCGAGTTTTGCGGGCCACTCAC  
TTCCTTTGACTGGAACGAAGCTGAGCCAAGGCGTATTGGTTCCTCTAGCATCGACACCACATG  
TACGATATGGGATATCGAGAGGGAAACGGTTGATACCCAGCTTATTGCCCATGACAAGGAAG  
TATACGACATAGCTTGGGGCGGCGTTGGTGTCTTCGCTTCTGTCTCAGCAGATGGTTCGGTTAG  
GGTTTTTGATCTCCGAGACAAGGAGCACTCAACTATAATATACGAGAGCTCCGAACCTGACAG  
TCCTTTAGTTTCGTCTCGGATGGAACAAGCAAGATCCAAGGTACATGGCTACTATAATTATGGA  
CAGTGCCAAGGTTGTAGTCCTGGATATTTCGCTTCCCTACACTTCCCGTAGTTGAGCTCCAGAG  
ACACCAAGCTAGCGTCAACGCTATTGCATGGGCCCCACACAGCTCCTGCCACATATGCACGGC  
CGGTGATGATTCCCAAGCCTTGATTTGGGACCTCTCCTCCATGGGTCAGCCCGTTGAAGGAGG  
GCTTGATCCCATTTTGGCTTACACTGCTGGAGCAGAAATCGAACAACCTGCAGTGGTCTTCTTCC  
CAACCGGATTGGGTAGCCATCGCATTCTCCACTAAGCTTCAGATTCTGAGGGTATGA

MGVSSDPNPDGSDEQQRSEIYTYEAPWHIYAMNWSVRRDKKYRLAIASLVEQYPNRVEIVQLD  
DSNGEIRSDSSLFEHPYPQTIFIPDKDCQKPDLLATSGDFLRIWRINDDDDDDNFQSKGSKVELKS  
VLNGNKNSEFCGPLTSFDWNEAEPRRIGSSSIDTCTIWDIERETVDTQLIAHDKEVYDIAWGGVG  
VFASVSADGSVRVFDLRDKEHSTIIYESSEPDSPLVRLGWNKQDPRYMATIIMDSAKVVVLDIRFPT  
LPVVELQRHQASVNAIAWAPHSSCHICTAGDDSQALIWDLSSMGQPVEGGLDPILAYTAGAEIEQL  
QWSSSQPDWVAIAFSTKLQILRV

#### **TmC4H**

ATGGATCTCCTCCTCTTGAGAGAAGGCGCTGTTAGCGACATTCATTGCAGCGGTAATCGCCATT  
ACCATATCGAAGCTCCGTGGAAAAGCGGTTCAAGCTTCCTCCGGGTCCAATACCGGTACCTGTG  
TTCGGTAACTGGCTTCAAGTTGGCGATGATCTTAACCACCGGAATCTTTCGAAATGGTGAAG  
AAATACGGACAGATTTTCTTCTGCGGATGGGCCAACGGAACCTCGTGGTGGTTTCATCGCCG  
GAGCTTTCGAAGGAAGTGTTGCACACGCAGGGGGTTGAGTTCGGGTCGAGGACTCGAAATGT  
TGTGTTTGATATTTTACAGGTAAGGGGCAGGATATGGTGTTCACGGTGTACGGTGAGCACTG  
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TTACGGGTGGGAAGATGAGGCACGTCACGTGGTTGAGGATGTGAAGAAGAATCCAGAAGCGG  
CTACAAATGGAATCGTGCTGAGGAAACGGTTACAATTGATGATGTATAACAATATGTACAGG  
ATTATGTTTGATAGAAGATTTCGAGAGTGAGGATGATCCTCTGTTTCCTTCAGCTCAAAGCGGTG  
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TTGAGGCCGTTTTTGAGAGGTTACTTGAAGATCTGTAAGGAGGTTAAGGAGAGACGATTGAA  
GCTCTTCAAGGATTACTTCATTGACGAGAGGAAGAACTTGCTAGCACTACTGGCACGAACAA  
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AACTCGACAAAGTTCTAGGACCCAATCAAATCACCGAGCCCGACATTGAAAAACTCCCTTACC  
TTCAGGCTGTCGTGAAAGAACTCTCAGGTTTCGAATGGCGATTCCGCTCCTCGTCCCTCACAT  
GAACCTCCACGATGCTAAGCTTGCGGCTTTGACATCCCCGCAGAGAGCAAAATCTTGTTGAA  
TGCATGGTGGCTAGCAAACAACCCCGACAACCTGAAAAAAACCAGAAGAATTCAGGCCGGAGA  
GGTTCTTGGAAGAGGAATCAAAAGTTGAAGCTAATGGAAACGACTTCCGTTTCATTCCGTTTG  
GTGTCGGAAGGAGGAGTTGCCCGGAATCATTCTTGCGTTGCCTATTCTTGGTATCACTTGG  
GGCGGTTGGTGCAGAACTTTGAGCTGTTGCCTCCTCCGGGACAGGCGAAAAATCGATACTTCTG  
AGAAAGGTGGGCAATTCAGCTTGCACATTTTGAAGCACTCTACCATTGTTTTGAAGCCAAGGT  
CATATGTTTAA

MDLLLLLEKALLATFIAAVIAITISKLGRKFKLPPGPIPVFVGNWLQVGDDLNRNLSEMVKKYG  
QIFLLRMGQRNLVVSSPELSKEVLHTQGVVEFGSRTRNVVFDIFTGKGQDMVFTVYGEHWRKMR  
RIMTVPFFTNKVQQYRYGWEDEARHVVEDVKKNPEAATNGIVLRKRLQLMMYNNMYRIMFDR  
RFESEDDPLFLQLKAVNGERSRLAQSFYNYGDFIPILRPFLRGYLIKICKVKERRLLKLFKDYFIDER  
KKLASTTGTTNEGLKCAIDHMIEAQEKGEINEDNVLYIVENINVAAIETTLWSIEWGIAELVNNPD  
VQRKLRAELDKVLGPNQITEPDIEKLPLYLQAVVKETLRFMAIPLLPHMNLHDAKLGGFDIPAES

KILVNAWWLANNPDNWKKPEEFRPERFLEEEESKVEANGNDFRPFPGVGRRSCPGIILALPILGITL  
GRLVQNPELLPPPGQAKIDTSEKGGQFSLHILKHSTIVLKPRSYV

#### **TmCHS**

ATGTCTGGTTTAGCAGCATCATCACCATCCATTGAAGAGATCAGAAAATCCCAAAGAGCTGAT  
GGTCCGGCCAACATCTTAGCCATCGGTACAGCCACCCCTAACCACTGCATCACTCAGTCTGAG  
TATCCTGATTACTACTTCAGGATCACCAACAGTGAACACATGACTGATCTCAAGGAGAAGTTC  
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GAAGCAGAATCCAAACATGTGTGCTTACATGGCGCCATCTCTAGATGCACGTCAAGATATTGT  
TGTGTTGGAGGTGCCGAAGCTTGGGAAAGAAGCTGCGGTGAAAGCTATTAAGGAATGGGGAC  
AGCCGAAATCGAAGATCACGCATTTGGTTTTCTGCACTACTTCCGGCGTCGACATGCCCGGAG  
CCGATTACCAACTTCTTAAGCTGCTAGGTCTTCGTCCTCGTCAAACGTTTGATGATGTATCA  
ACAAGGCTGTTTCGCCGGCGGTACCGTCCTTCGTTTGCGGAAGGATCTCGCCGAGAATAATAA  
AGGTGCACGTGTCTCGTCGTTTGTCTCGAGATCACTGCTGCTCACTTTCCGAGGACCGTCGGA  
GACTCATCTGGACTCGCTTGTCTGGTCAAGCGCTTTTCGGTGACGGAGCGGCGGCGCTCATTGT  
CGGTGCTGATCCGGACGTATCGATCGAGCGACCTTTGTTTCAGGTTGTGTCTGGCTGGTCAGAC  
GATCTTACCGGACTCAGACGGCGCGATCGACGGACACTTGCGTGAAGTTGGTTTAACGTTTCA  
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AGGTGTTGAGCGAGTACGGAACATGTCTGAGTGCTTGCCTTTGTTTCATATTGGATGAAATGA  
GGAAGAAATCGGTTGAAGAAGGGAAAACAACAACCGGTGAAGGGTTGGATTGGGGTGTTCTG  
TTTGGGTTTGGACCCGGTTTAACGGTTGAAACGGTTGTGTTACACAGTGTTCCGATTCAACCA  
ACTATTTGA

MSGLAASSPSIEEIRKSQRADGPANILAIGTATPNHCITQSEYPDYYFRITNSEHMTDLKEKFKRMC  
DKSQIKKRYMHLTEDFLKQNPNCAYMAPSLDARQDIVVLEVPKLGKEAAVKAIKEWGQPKSKI  
THLVFCTTSGVDMPGADYQLLKLLGLRPSVKRLMMYQQGCFAGGTVLRLAKDLAENNKGARVL  
VVCSEITAVTRFPSETHLDSL VGQALFGDGAAALIVGADPDVSIERPLFQVVSAGQTILPDSDAI  
DGHLREVGLTFHLLKDVPTLISKNIEKNLVEAFGLGINDYNGVFWIAHPGGPAILDQVELKLGLE  
KEKLRSTREVLSEYGNMSSACVLFILDEMRRKSVEEGKTTTGEGLDWGVLFGFGPGLTVETVVLH  
SVPIQPTI\*

#### **TmCHI**

ATGGCAACGTCACCGTCACCGTCGCCGTCATCGGTCGTCACCGGAGTCCAAATCGAGAACATT  
GCGTTCCCGCCTACTGTTAAGCCTCCGGGATCCACAAAACTCTGTTTCTAGCTGGCGCAGGG  
GCGAGAGGGTTGGAGATCCAAGGCAATTTCTGTGAAGTTTACAGCGATAGGGGTTTACTTAGA  
AGATACAGCTCTCTCGGCTATGGCTGCGAAGTGGAAGGGGAAAAGTGTCTGAGGAATTGACGG  
AATCCGTTGAGTTTTTCCGGGACATTGTACAGGTCCCTTCGAGAAAATTCACACAGGTGACAA  
TGATCTTGCCACTAACCGGTGCTCAATACTCAGAGAAGGTAAGCGAAAAGTGTGTTGCAATCT  
GGAAGTTGCTCAGTATTTACTGATGCAGAAGCCAAAGCCATTGAAAAATTTCTAGAGGTTT  
TGAAGGATGAAACATTCCCACCGGGCACATCTATTCTCTTACCCAAACACCAAATGGATCAT  
TAACAATTAGCTTTTGGAAAGATGGATCGATACCAGAAGTGGCGAATGCAGTGATAGATAAC  
AACTACTTGCAGGAGCAATACTGGAGTCTATTATTGGTAAGCATGGTGTTTCTCCTGAAGCA  
AAGCAGAGCTTGCTTTGAGATTTTGGGAGTTGTTAAAGGAGTTTGAATCCGATGAAGGTA  
CCAGAAGTTAAGAAGGTGACAGGAGAAGAGGTTCGATGCCGGAAAAGTAAGTCTGATG

MATSPSPSPSSVVTGVQIENIAFPPTVKPPGSTKTLFLAGAGARGLEIQGNFVKFTAIGVYLEDTALS  
AMAAKWKGKTAEELTESVEFFRDIVTGPFKFTQVTMILPLTGAQYSEKVSENCVAIWKLLSIYTD  
AEAKAIEKFLEVLKDETFPPGTSILFTQTPNGSLTISFWKDGSIPEVANAVIDNKLLAGAILESIIHGH  
GVSPEAKQSLALRFWELLKEFESDEGKPEVKKVTGEEVDAGKVTA\*

#### **TmDFR**

ATGGATTTGAGTCTAAAGATCCTGAGAACGAAGTGATAAAGCCAACAATAAATGGGGTGTT  
AAACATAATGAAAGCATGTGCAAAAGCAAAAGGTGTGAAGAGGCTTGTTTCACTTCATCAG  
CCGGGACTGTGGGCGTCGAACAAAATCAGAAACTGGTTTATGATGAGACTAATTGGAGTGAC

TTGGAATTTATCCAAACCAAAAAGATGACTGGATGGATGTACTTTGTGTCCAAAACCTTTGGCA  
GAACAAGCAGCCTGGAAGTTTGCTAAGGATAACAACATTGATTTAATCAGTATCATACCATCT  
CTTGTTGTGGGTCCATTTATCATGCAAACATATGCCACCAAGTCTTATCACTGCACCTTCCCTTA  
TTACAAGAAACGAACCACATTATTCAATCATAAAACAATGTCAATATGTTTCATCTTGATGACC  
TATGTAATGCTCATATATATTTGTTTCGAGAATCCTAAAGCTGAAGGTCGATACATTTGCTCGTC  
AAACCATTGTACCATCTTTGATATTGTCAAATTGCTCAACAAGAAGTATCCTGAATACAATGT  
ACCTACAAAGTTTAAAGACATGGACGATAGTTTGAAGAGTATTGCTTTTCAGCTCGAAAAAGAT  
TATCGAATTAGGGTTCGAGTTCAAATATAGTTTGGAGAGCATGTTTGTAGGAGCTGTTGAGAC  
ATGTCGCGTGAAAGAATTGATACCGCTTTCTTATAAGGACGAACAACCAAATAACAACGTCA  
AAGCTGAATTTCTTACGCAAGTCAATGAGAAATTTGAGGAGATCAATGTTTGA

MDFESKDPENEVIKPTINGVLNIMKACAKAKGVKRLVFTSSAGTVGVEQNQKL VYDET NWS DLEF  
IQTKKMTGWMYFVSKTLAEQAAWKFAKDNNIDLISIIPSLVVGPFIMQTMPPSLITALSLITRNEPH  
YSIIKQCQYVHLDDLCNAHIYLFENPKAEGRYICSSNHCTIFDIVKLLNKKYPEYNVPTKFKDMDDS  
LKSIASFSSKKIIELGFEFKYSLESMFVGAVETCRVKELIPLSYKDEQPNNNVKAEFLTQVNEKFEEIN  
V

#### **TmANS**

ATGGCTATGCTTGGTGGTTCTCTTGCTGTTCCAAATGTTCAAGAAATGGTTAAACAACCAATC  
ACTACTATTCCTTCCAGATTTCACTACCATGATCATCCAGACCCTTCTTTGATTATATCCAAAC  
CAACTTCTTCCACCAAGTTCCAATCATGATATGCACAACTGTTATCAGGAGACTCCATGG  
AAACTGAACTCCATAAGTTGCATCTTGCTTGTC AAGAGTGGGGCTTCTTTCAGTTGGTGAATC  
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CCAATTGAAAAGAAGAAAGAATATTGGCAACAACCAGGAGTCGATATGGAGGGGTTCCGACA  
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ACCTAAATCTTTGAGAAAACCTCGTCTTTTCCCGAAGCTCCCTACTTCTTACAGAGATACCATG  
GATGCTTATTCGGATGAAGTTAAAAATCTAGCATGGGAAATACTTAAGTTGATGGCAAAAGC  
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AACTACTACCCACCATGTCCAGAACCAAGACCGTGTGATTGGACTGAAACCACACTCTGACGC  
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TTGATTACCCCTCAAACCTCTGCAGTATTTAAGGAAATCTGTGTGCGGAATACTTAAAGGGG  
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AATGCATAA

MAMLGGS LAVPNVQEMVKQPIITIPSRFHYHDHPDPSLIISKPTSSPQVPIIDMHKLLSGDSMETEL  
HKLHLACQEWGFFQLVNHGVSIELMEKVKSETEKFFNLPIEKKKEYWQQPGVDMEGFGQAFVKS  
EQQKLNWLD MFYIVTQPKSLRKPRLPKLPTSYRDTMDAYSDEVKNLAWELKLMAKALNMEVK  
DLNGLFGDMAQAMTTNYYPPCPEPDRVIGLKPHSDAGGLTILLQVGDMEGLQLKKGDIWIPVRPL  
PNAFILNIGDCLEIVTNGIYHSNVHRAVVNSVKERISIA TFCNPKLDEVMGPAPSLITPQTPAVFKEIC  
VAEYLGFFSVDLKGRSYIDVVRVNQ NENA

#### **TmUF3GT**

ATGGATTTTCCTTCCCTGGGTTTTCCGCCATCCGTACCATGGACATGCCCCAAGGCGTAATAACC  
GAAGACCTTAAATCTCCGATTCCATCAATGCTAAACAAGCTCGGAACATATCTTCCACGCGCA  
GCAGCAGTTCCCACAACTCCTATGAAGAACTAGATCCACCTGTAGTCCAAATCCTCAAATCA  
AGATTTTCGCTTCATCAACATCGGTCCCTTCGCGTTAACGTCGTCGTCATCGCCGCCGTCATCCA  
ACTCAGACGACCAACACGGATGTCTAACATGGCTAGACACCCAAGCGCCAGCATCCGTCGCC  
TACATCAGTTTTCGGCAGCGTGATAACGCCGCCACCGCAAGAGCTCGCCGCGTTAGCCGAAGC  
GTTAGAGGAAAGGAACATCCCGTTTCTTTGGTCGTTTCGAGGGAATCCCGAGAAACATTTCTC  
CGAAGAGTTTTTGTCCGCCGGAAGTTTGTACCGTGGGCTCCGCAGGTGAAAGTATTGGAACA  
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AAGCTTTGGAATCGGTGATTTTCGAGCGATCGAGGGAAGATAATGAGAAAGAACTTGTAGCG  
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TTGGTAGATATTGTGACAAAGTAA

MDFLPGFSAIRTMMDPEGVITEDLKSPIPSMLNKLGTLYLPRAAAVPTNSYEELDPPVVQILKSFRFI  
NIGPFALTSSSSPPSSNSDDQHGCLTWLDTQAPASVAYISFGSVITPPPQELAALAELEERNIPFLW  
SFRGNPEKHFSEEFLSAGKFVPWAPQVKVLEHKSVGVFVTHCGWNSVLESIIGGVPMICRPFFGDQ  
PLNVRTVEADWGVGVGIEGGRFTKDGTKKALESVISSDRGKIMRKKLVAYREQALNAVKPGGSS  
AENFKILVDIVTK

### **TmACT2**

CDS 1134bp

ATGGCAGAAGGTGAGGATATCCAGCCACTCGTCTGTGACAATGGAACAGGAATGGTCAAGGC  
TGGATTTCGCTGGTGACGATGCTCCCAGGGCTGTGTTTCCTAGCATTGTAGGTCGCCCACGTCA  
CACTGGTGTAAATGTTGGGATGGGCCAAAAGGATGCATATGTCGGTGATGAGGCTCAATCCA  
AGAGGGGTATTTTAACACTGAAATACCCAATTGAGCATGGTATTGTGAACAACTGGGATGATA  
TGGAGAAGATTTGGCATCACACCTTCTATAATGAACTTCGAGTGGCTCCAGAAGAACATCCAG  
TTCTTCTTACTGAAGCACCTCTGAATCCAAAGGCCAATCGTGAAAAAATGACCCAAATCATGT  
TTGAGACCTTTAATACTCCTGCTATGTATGTCGCCATCCAGGCTGTTCTCTCCCTTTATGCCAG  
TGGTTCGTACAACTGGTATTGTTCTGGACTCTGGTGATGGTGTGAGCCACACTGTCCCTATCTAT  
GAGGGATACGCTCTCCACACGCCATCCTCCGTCTCGATCTTGACAGGTCGTGACCTTACCGATT  
GCCTCATGAAAATCTTAACAGAGCGTGGCTATTCCTTCACCACTACAGCAGAGCGTGAAATCG  
TGAGGGACATGAAGGAGAAGCTGGCATAACATAGCTCTCGACTATGAGCAGGAGCTGGAAACC  
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GGTGCTGAGCGTTTCAGATGCCCAGAGGTTCTTACCAGCCATCCATGATCGGAATGGAAGCT  
GCGGGTATTCATGAGACCACATACTCTATCATGAAGTGTGATGTGATATCAGGAAGGAC  
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GAGGAAGTACAGTGTCTGGATCGGTGGCTCTATCTTAGCATCTCTCAGCACTTTCCAGCAGAT  
GTGGATTGCAAAGGCTGAATACGATGAATCAGGTCCATCTATTGTGCACAGGAAATGCTTCTA  
A

**TmACT2-F:** GTTGGGATGGGCCAAAAGGA

**TmACT2-R:** CGACCACTGGCATAAAGGGA