

SUPPLEMENTARY DATA

Protein sequences and corresponding accession numbers that were used for the phylogenetic analyses.

>At-CAT1 (At4g21120)

MASGGGDDGLRRRGCSCTKDDFLPEESFQSMGNYLKALKETPSRFMDRIMTRSLDSDEINEMKARSGHEMKKTLT
WDDLMMWFGIGAVIGSGIFVLTGLEARNHSGPAVVLSYVVSGVSAMLSVFCYTEFAVEIPVAGGSFAYLRVELGDF
MAFIAAGNIILEYVVGGAAVARSWTSYFATLLNHKPEDFRIIVHKLGEDYSHLDPIAVGVCAICVLAUVGTKGS
SRFNYIASIIHMOVILFVVIAGFTKADVKNYSDFTPYGVRGVFKSAAVLFFAYIGF'DAVSTMAEETKNPGRDIP
GLVGSMVVTTVCYCLMAVTLCLMQPYQQIDPDAPFSVAFSAVGDWAKYIVAFGALKGMTTVLLVGAIGQARYMT
HIARAHMPPWLAQVNAKTGTPINATVVMLAATALIAFFTCLKLILADLLSVSTLFIIFMFVAVALLVRRYYVTGET
STRDRNKFLVFLGLILASSTATAVYWALEEEGWIGYCITVPIWFLSTVAMKFLVPQARAPKIWGVPLVPWLP
SASIAINIFLLGSIDTKSFVRFAIWTGILLIYYVLFGLHATYDTAKATLKEKQALQKAEEGGVADNCSAT

>At-CAT2 (At1g58030)

MGFLVDTQKEGGHSGWYVRSRSLVRRKQVDSANGQSHGHQLARALTVPHLVAIGVGATIGAGVYILVGTVAREHSG
PSLALSFLIAGIAAGLSAFICYAELSSRCPSAGSAYHYSYICVGEVAVIIGWALILEYTIIGSAVARGISP
NLALIFGGEDGLPAILARHQIPGLDIVVDPCAAIVLVVVTGLLCMGIKESTFAQGIVTAVNVCVLLFVIVAGSYL
GFKTGWPGYELPTGFFPFVGDGMFAGSATVFFAFIGFDSVASTAEVNRNPQRDLPIGIGLALLLCCSLYMMVS
IVIVGLIPYYAMPDPTPISSAFASHMQWAVYLITLGAVMALCSALMGALLPQPRILMAMARDGLLPSIFSDIN
KRTQVPVKATVATGLCAATLAFMDVSQLAGMVSVGTLLAFTMVAISVLILRYVPPDEQPLPSSLQERIDSVS
FICGETTSSGHVGTSDSSHQPLIVNNDALVDVPLIKNQEALGCLVLSEETRIVAGWSIMFTCVGAFLLSYAAS
SLSFPLIRYPLCGVGGCLLLAGLIALSSIDQDDARHTFGHSGGYMCPFVPLLPICILINMYLLVNLGSATWA
RVSVWLLIGVIVYVYFGRKNSSLANAVYVTTAHAEEIYREHEGSLA

>At-CAT3 (At5g36940)

MGCLRSLVRRKQFDSSNGKAETHHHHQQLAKALTFPHLIAIGVGSTIGAGVYILVGTVAREHSGPALALSFLIAG
ISAALSAFICYAELSSRFPSAGSAYHYSYICIGEGVAVIIGWALILEYTIIGGSTVARGISP
NLAMIFGGEDCLPTILARHQIPGLDIVVDPCAAIVLVFIVTGLCCLGVKESTFAQGIVTTANVFMIFVIVAGSYL
CFKGTGWVGYELPTGYFPYGVDMGTGSATVFFAYIGFDTVASMAEEVKNPRRDPLGIGIGISLLLCCLLYMMVS
VVIVGLVPYYAMPDPTPISSAFSSHGIQWAAYLINLGAVMALCSALMGSILPQPRILMAMARDGLLPSYFSYV
NQRTQVPINGTITTGVCAAILAFFMDVSQLAGMVSVGTTLVAFTMVAISLLIVRYVPPDEVPLPSSLQENSSSHV
GTSIRSKQPLLGKVVDSVVDKENAPGWSVNLKKNRRKRFAGWSIMFTCIGNFLLSYAASSFLLPGLLRYSLCGV
GGFLVGLIVLICIDQDDARHSFGHSGGFICPFVPLLPICILINMYLLVNLGAATWVRVSVWVFLGVVVYIFYG
RRNSSLVNAVYVSTAHLQEI RRTSGHSLA

>At-CAT4 (At3g03720)

MNSLVRKQVDSVHLIKNDGPHQLAKKLSAVDLVAIGVGTIGAGVYILVGTVAREHTGPALAVSFFIAGVAAA
L SACCYAELASRCPSAGSAYHYAICLGEIAWLVGWALVLDYTIIGSAIARGITPNLASFFGGDLNLPVFLARQT
IPGVGIVVDPCAAALLIMIVTILLCFGIKESSTVQAIVTSVNVCTLVFIIIVGGYLACKTGWVGYDLPSGYFPFGL
NGILAGSAVFFSYIGFDTVTSTAEVKNPQRDLPLGIGIALLICILYMLLSVVIVGLVPYYSLNPDPTPISSAF
GDSGMQWAAAYILTTGAILTALCASLLGSLLAQPRIFMAMARDGLLPAFFSEISPRTQVPVKSTIAIGVLAALAF
FMDVAQLSEMVSVGTLMFAFTAVAVCVLVLRYVPPDGVPLSSSSQTLSDTDESRAETENFLVDAIESSDSPLLGNET
ARDEKYFGKRRKIAAWSIALVCIGVLGLASAASAERLPSFPRFTICGVSAVILLGSLITLGYIDEDERHNF
GHKGGFLCPFVYPLVLCILINTYLIINIGAGTWIRVLIWLLIGSMIYIFYGRSHSLNNAVYVPTMTCTRKT
TDHLA

>At-CAT5 (At2g34960)

MEGEERGYWRWSKRDFPEESFQSFSGSYRAALSQTCSRFKNRLVRSDDENERFELKKQSEHEMKRCLTWDDL
VWFGFGSVIGAGIFVLTGQEAHEQAGPAIVLSYVVSGLSAMLSVFCYTEFAVEIPVAGGSFAYLRVIELGDF
AAAFITAGNILLESIVGTAAVARAWTSYFATLLNRSPNALRIKTDLSSGFNLLDPIAVVVIAASATIASISTRKTS
LLNWIASAINTELVIFFVVIAGFIHADTSNLTFFLPFGPEGVFRAAAVVYFAYGGFDSIATMAEETKNPSRDI
PIGLLGSMSIITVIYCLMALSLSMQKYTDIDPNAAYSVAFAQSVGMKWKYLVALGALKGMTTVLLVGA
LQARYVTHIARTHMIPPIFALVHPKTGTPINANLLVAIPSAIAFFSGLDVLASLLSISTLFIFTMMPIALL
VRRYYVRQDTPRVHLIKLITCLLFFVVSSMGTSAYWGMQRKGSWIGYTVTPFWFLGTLGIVFFVPQQRTPK
VWGVPLVPWLPCLSIATNIFLMGSLGAMAFVRFVGVCTLAMLLEYFLGLHATFDMAHQQIVPRT

>At-CAT6 (At5g04770)

MEVQSSSNNGGHSSFSRLRVYLNSLSATPSRSLRRAISVSTSSDEMRSRVRAVSGEQMRRTLRLWYDLIGLGIGGMV
GAGVFVTTGRASRLDAGPSIVVSYAIAAGLALLSAFCYTEFAVHLPVAGGAFSYIRITFGGEFFAFFTGANLVMY
VMSNAAVSRSTAYLGTAFGISTSKWRFFVVSGLPKGFNEIDPVAVLVVIVITVVICCSTRESSKVNMMIMTAFHIA
FIFVIVMGFIKGDSDKNLSSPANPEHPSGFFPFGAAGVFNGAAMVYLSYIGYDAVSTMAEEVENPVKDI PVGVSG
SVAIVTVLYCLMAVSMMLLPYDLIDPEAPFSAAFRGSNGWEVWTKVVGIGASFGILTSLLVAMLGQARYMCVIG
RSRVVFFWFAKIHPKTSTPVNASTFLGIFTAALALFTDLNVLLNLVLSIGTLFVFMVANALIFRRYVPVGP
PTLCLTLFSITSLVFTLIWKLVPKPKAFMLGASAVVAIAIVLSFQCVPVQARKPELWGVFPMPWTPCVSIFL
NIFLLGSLDAPSYVRFGGFFSGLVIVLVYLFYGVHASSDAEANGSFGVKDQVMKELIEV

>At-CAT7 (At3g10600)

MEAQYRNHDGDTSFSSLRVYLNSLSDTPSRFSRRAVSVSTSYDEMRSRVRAVSGEQMRRTLRLWYDLIGLGIGGMIG
AGVFVTTGRASRLYAGPSIVVSYAIAAGLALLSAFCYTEFAVHLPVAGGAFSYIRITFGGEFFAFITGANLIMDYV
LSNAAVSRGFTAYLGSAGFISTSEWRFIVSGLPNGFNEIDPIAVIVVLAFTFVICYSTRESSKVNMLTALHIAF
IVFVIVMGFSKGDVKNLTRPDNPENPSGFFPFVGVGVFNGAAMVYLSYIGYDAVSTMAEEVKDPVKDIPMGISGS
VAIVIVLYCLMAISMSMLLPYDLIDAEAPYSAAFSEKSEGEVWTRVVGIGASFGILTSLIVAMLGQARYMCVIGR
SRVVPWFVFAKIVHPKTSTPVNASAFGLIFTAVLALFTDLNVLLNLVLSIGTLFVFMVANAVIFRRYVTVGYTEPWP
TSLFLCLFSITSLVFTLVWQLAPSGPPKWFILGASTVTAIAIVQIFHCVVPQARIPFWGVPLMPWTPCVSIFLN
IFLLGSLDAPSYIRFGFFSGLVIVLVYVYFYSVHASDAEGDGLDFKDVESLERINRVLS

>At-CAT8 (At1g17120)

MIPASMEEAHQLESRDDLSQRRSYWRWRKQDFPFESFQSFSTYKSALSATCPRLADRLLSRSSDAYELDAARR
ESENPMRRLCTWDDLWLSFGSVVGVGVFVITGQEARVGGAPVVLVSYAISGVSALLSVLCYAEFGVEIPVAGGS
FSYLRVELGDFIAFIAAGNILLEAMVGAAGLGRSWSSYLAASLVKNDSDYFRIVKVSFAKGFDDLDPVAVAVLLVA
NGIAMTGTKRTSWNLITSMVTVCIIVFIVVVGFTHSKTSNLVPPFFPYGAKGVVQSAVVYWSYTGFDVANMAE
ETEKPSRDIPIGLVGSMSMITVVYCLMALALTMVVKYTEIDANAAYSVAFAQIGMKWAKYLVGICALKGMTTSL
VGLGQARYTTQIARSHMIPPWFALVHPKTGTPIYATLLVTLSSII SFFTSLEVELSSVFSFATLFI FMLVAVAL
LVRRYVYKDVTPAAGLTKFLGFLFLIIASSIGVSALWNSGVKGIAYTVTGVIWFIGTLGLALLPKYRVPKVWGV
PLVPWLPSFSIAMNLFILGSLGYVAFLRFI ICTMVMLLYYL FVGLHATYDVAHQPLEEAKFEGER

>At-CAT9 (At1g05940)

MGGHEGFSNQRLSSATWFSHFRAALRSKSLPPPSSQTAVRSTSGDSLVRRLGLFDLILLGVGASIGAGVFVVTG
TVARDAGPGVTISFLLAGASCVLNLCYAEISSRFPVAVVGGAYMYSYSAFNEITAFVLFVQLMLDYHIGAASISR
SLASYAVALLELFPALKGSIPLWMSGKELLGGLLSNLILAPILLALLTLVLCQGVRESSAVNSVMTATKVVIVL
VVICAGAFEIDVANWSPFAPNGFKAVLTGATVVFVSYVGFDAVANSAAEESKNPQORDLPIGIMGSLVLCISLYIGV
CLVLTGMVPSLLEDAPLAEAFSSKGMKFVSI LISIGAVAGLTTTLLVGLYVQSRRLYLGLGRDGLLPSIFSRH
PTLHTPLHSQIWCIVAGVLAGIFNVHLSHILSVGTLTGYSVVAACVVALRLNDKKDRESSNRWTSWQEGVIC
LVIIACSGFGAGVFYRFSASVIFILLVGVAVVASAVLHYRQAYALPLGSGFSCPGVPIVPSVCIFFNIFLFAQL
HYEAWIRFVVVSVLATAVYALYQYHADPSMLDYQRAPETESDA

>Os-CAT1.1 (Os03g43970)

MAFVAAGNILLEYCIGGAAVARAWTSYFATLLNHPNDFRIHAASLAADYSRLDPIAVAVIAIICLLSVLSTKAS
SRFNIVLSVLHVAVIAFII VAGLTKADAANLTRDFMPYGPGRGVFAASAVLFFAYIGFDAVSTMAEETRDPA
VGLVGAMALTTALYCALAVTLCMLVPYGEIDPDAPFSVAFADRGMGWAKYVVAFGALKGMTTVLLVSAVGGQARYL
THIARTHMPPWLARVHPGTGTPVNATVAMLLATAVIAFFTDLNVLSNLLSISTLFI FMLVAVALLVRRYVYVSGE
TSRADRNRLAACIAAILASSVATATCWGLDRGGWVYAVTVPAWLAATASLWALVPQARAPKLWGVPMVPWLPSA
SIAINVFLGSDSKSFMRFGIWTAALLVYYL FVGLHASDYDTAKALAADA VAGKVEDGDAKTSAPPM

>Os-CAT1.2 (Os12g41890)

MAEAAAGGEVRRRGCCGGGGGGGLFPEESFASWGAYGRALMETGPRLVERPTARSAAAVEVNEVRGRSGAEMK
RNLTWDLAWFGVAVIGAGIFVLTGQEARDAAGPAVVLVSYAVSGVSAMLSVLCYTEFAIEIPVAGGSFAYLRVE
LGDFVAFIAAGNILLEYCIGGAAVARAWTSYFATLLNHRPNDFRIHAASLAADYSRLDPIAVAVIAVVCALSVLS
TKASSRFNYALSIAHLAVLVFIVTAGLSRRLSNLTADFAPFGARGVFAASAVLFFAYVGFDAVSTMAEETRDPA
RDI PAGLVGAMAVTTAAYCALAATLCLMQPYREIDPDAPFSVAFSAAGMGWARYVVAFGALKGMTTVLLVSAVGG
ARYLTHIARAHMAPPCLARVHPRLGTPVNATVAMLAATAAIALFTDLGVLNLLSISTLFI FMLVAVALLVRRYV
ATGETARGDRNRLAGCLAVIVASSVATAAYWGLGGDGGGWAAVAVPAWLAATLFLQLRVPMARTPEKGVPLV
PWLPSASIFINIFLLGSDGRSFMRFVWTAALLAYYFFFGLHASDYDTAKALAAEVAAGKVEEGGSKPAVGGAG
N

>Os-CAT2.1 (Os03g45170)

MALDGGGEVGRRRRRRGWGGGFPSLMRRKQVDSDRVRAAEGEGQPQLAKELNIPALVAIGVGSTIGAGVYVLVGT
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ISPNLALFFGGPDSLWPILSRHQLPWFDVIVDPCAAALVFVVTVLLCVGIKESSAVQELITVLNACVMIFVIVAG
SYIGFQIGWVGKVDGYFPHGINGMLAGSATVFFAYIGFDTVASTAEVKNPQRDLPLGIGAALSICCCLYMMV
SVVIVGLVPYFAMDPDTPISSVFAKHGMQWAMYIVTSGAVLALCSTLLGSLLPQPRILMAMARDGLLPSFFADV
KRTQVPVKSTVVTGLCAAALAFFMDVSQLAGMVSVGTLLAFTIVAVSILILRYIPPDEVPLPSSLQETFCLSQEY
DEERVSGILGDERCKTSETKDVILAESMEDPLIEKKITRKMDEMRRKVAAFSIGSVCVGMVLTSAASATWLPF
LPMCIGCIVGALLLVAGLGLLCWIDQDDGRHSFGQSGGFCTPFVPLLPVLSILVNTYLLINLGGAEAWMRVGIWLL
IGVLVYILYGRNTSSSLKDVIVPVAQADEIYKSSSGYVS

>Os-CAT2.2 (Os12g42850)

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AGVAAALSFAFCYAEASRCPSAGSAYHYSYICVGEVAVLIGWALILEYTIIGGSAVARGISPNLALFFGGQDSL
WFLARHELPWFDVVDPCAAFLVLLVTTALLCKGIKESSEVQGVTVLNCVMLFVVIAGSYIGFQTGWVGKQVAG
GFFPYGANGMLAGSATVFFAYIGFDSVASTAEVKNPQRDLPLGIGTALSVCSSLYMLVSVVIVGLVPYFAMDP
TPISSAFARHGMHWAMYLVTGAVLALCSTLMGSILPQPRILMAMARDGLLPSFFSDVNQRTQVPVKSTIVTGIC
AACLAFFMDVSQLAGMVSVGTLLAFTIVAVSILILRYAPPDEVPLPSSLEASFRLSQEYDEEKVRGPPVDANHEQ
LSSVVESINDTLIEKKQDTSVEESKRKAAVCSISSVCVGVVLTTSASFTFLPFLLRCCFFCVFGLLLLAGLV
LCYIDQDDGRHSFGHSGGFICPFVPLLPVMCILVNTYLLVNLGGGTWMRVGVWLVGMGVFVYIFYGRTHSSLTDVV
YVPVAQAEIYSSSSSGFVA

>Os-CAT4 (Os10g30090)

MARRLSWQDLQASGSAIATRLSLQDLQCLVRRKPACSAADRAESSAAGAPAGGGKGRHLAKALSVPDLIAIGVGS
TIGAGIYVLVGTVAREHAGPALTLSFLIAGIAALSALCYAELSCRFLAGSAYHYSYICIGESVAVLIGWALIL
EYTIIGSSVARGISPNLALFFGGHEKLPFFLTQIHVKWFETPLDPCAAILVLIIVTALLCLGIKESSEVVEGII
NIVIVMLFVICAGGYLAFQNGWWSGYNDEQGYFPKGVAGVLSGSATLFFAYIGFDAVASTAEVKNPQRDL
TSLSCCFLYMMVSIIVIVGLVPYALDPNTPISSAFACYGMQWAVYIISTGAVFALIASLIGAILPQPRIVMAMAR
DGLLPPLFSAVDPTTQVPTLSTILSGICAAIALFMDVSELAGMVSVGTLLAFTMVAISVLIIVRYAPPNEIATKV
ALPGSSSELTSDSGYSEPDEENSEDLGQVQDIPTANEANKIRRQKAIACIILIFLGVVTVSSVSFSFFPLFLR
SIAGAFGSLLLVSATIALWFIGQDKSSLRQTGGFMCPFPVILPVCCILINVYLLMNLGIHTWIRVSMWLAVGAI
YVIFYGRKYSSLTGVAYQRISPA

>Os-CAT5 (Os01g11160)

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LRVELGDVAAFIAAANLILESIIIGTAAVARSWTSYLAASLINKPASALRIQTSLAEGYNELDPIAVVVIIVTATLA
ILSAKGTSRVNWVASAVHVLVIAFVIVAGFLHAKTSNLTFFMPHGVPGVFRAAAIVYFAYGGFDNIATMAEETKN
PSRDIPLGLLGSMSVITAIYCVMALVLSMMQPYTAIDRSAAYSVAFSNVGMRWAYVVALGALKGMTTVLLVGL
GQARYTTHIARSHIIPVVFALVHPRTGTPVHATVLIAAAGACIGLFSLLDVLSSLLSVSTLFIIFMMATALLVRR
YYVRGVTSRTHARRLVALLSVVIGSSAGIAAYWGAAPERWVGYTVLVPAAAGTLGIQLLVPAARAPKVVGVPLV
PWLPSLSIATNLFMLGSLGAQAFIRFGVCTAIMLLYVVLVGLHATYDVAHGACSGDDVDEEVYADAHAHVDDAKAA
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>Os-CAT6 (Os11g05690)

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AAFLTGANLIMEYVFSNAAVARSFTAYLGTAVGVDAPSKWRIAVPGLPKGFNEVDLIAVGVILLISVCICYSTKE
SSVVMVLTAVHVAFILFIIVMGFWRGDTRNLTRPVDLAHNPPGGFFPHGAAGVFNGAAMVYLSYIGYDAVSTMAE
EVERPSRDI PVGVS SVVLTLLYCLMAASMSMLLPYDAIDTEAPFSGAFKGS SGWGWVSNVIGAGASLGILTSL
MVAMLGQARYLCVIGRSGVMPAWLAKVHPCTATPVNASAFGLVFTAALALFTEL DVLLNLVSI GTLFV FVMVANA
VYRRYVAADDDADHRRAPTLVFLAASFSLVALCFTLLWQFAPAGRARTGLLAACGAAAVATVGAFRALVAEAR
RPELWGV PAMPVPAASVFLNVFLLGSLDRPSYVRFGGFTAAAVLVYVLYSVHASYDAEEGGGAGAGAAALDGA
VQDEAADFKV

>Os-CAT7 (Os12g06060)

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VTFGELAAFLTGANLIMEYVFSNAAVARSFTAYLGTAVGVDAPSKWRIAVPGLPKGFNEVDLVAVGVIILLITVCI
CYSTKESSSVNMVLTAVHVLFIIMFVIVMGFWRGDTRNLTRPADPEHNPPGGFFPHGAAGVFNGAAMVYLSYIGYDA
VSTMAEEVERPSRDIPIGVSGSVVLVTLTYCLMAASMSMLLPYDAIDTEAPFSGAFKGSWGWSNVIGAGASL
GILTSLMVAMLGQARYLCVIGRSGVMPAWLARVNPRTATPVNASAFGLGVFTAALALFTELDILLNLVCIGTLFVF
YMVANAVVYRRYVAAAEDDEEGRRRGAVPTLAFLLAFLSLVALCFTLVWKLAPRGGARTGLLVACGAAAAAAVAAF
RALVPQARRPELWGPAMPWPVPAASVFLNVFLLGSLDRPSYVRFGGFTAAAALVYVLYSVHASYDADEAAAAALDG
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>Os-CAT8 (Os06g34830)

MATAAAAGEGGSGRRYWRWSKADFFPEPSFASWRSYGGALAATVPRLVDRVGSRSSEAAEAGTLRAVSENPLRRC
LSWLDLAFGLFGSVVSGVFLVTGQEARFDAGPAIPLAYAAAGFSALLSSFCYAEELATEIPSAGGSFSYLRVELG
DIAAFLAAGNILLEAVVGAAGLGRSWSYLAALLGRDTSRLRHVPALAEGFNLLDPIAVVVLVSTSAVAMSGAR
LTSTLNSLASVVGIAIIAFVLAAGFSHFADAGNLAFFFFGAAGVFRAAGVVYWSYTGFDVATMAEETKNPGRD
VPLGLISSMSITVVYCLMSLALVGMQRYTEIDANAAYSVAFAAAGMRWARYVVALGALKGMTSGLLVGALGQAR
YTTQIARTHMIIPPYFALVHPTTGTPIYATVAVTLGAACVALFSSLDVLASVSSISTLFIIFALVAVALLVRRYHVA
GATTPGQLRFTFLAFLALVVLSSIGVSAYYNSRYARRWPGYAAFSGCWAAGAAGLAACAQKQARPRVYGAPLVPWL
PAMSIATNFLMGLSGLTAAYARFGICTAAMLVYVYVLFVGHATYDVAHADDAADNLEHGKIAAAPAPTTPA

>Os-CAT9 (Os02g43860)

MTQEPTSLLPVWARAPTRRPKTRRHPLHLHEAAMEEEGADHRPPSSSSGGRGFLSGLCAAALRRKPI SAHAAHA
ASGEGLVRLQGVFELVLLGIGASIGAGIFVVTGTVARDAAGPGVTISFVLGAAACVLNLCYAEELASRFPAVVGGA
YLYTYAAFNELTAFLVFTQLMLDYHIGAASIARSLASYFVQFLELIPFLKGHIPTWIGHGEEFFGGVSVNIIAP
ILLIILTITILCYGVKESAVNTFMTTLKIVIVIVVVVAGVFEVDVSNWSPFMPNGFKSVVVTGATVVFAYVGFDA
VANSAAEAKKQQRDLPIGILGSLACVLLYVAVCLVITGMVPTYLLGEDAPLAEFAAKGLKFVTVLISIGAVAG
LTTTTLLVGLYVQSRLYLGLGRDGLLPSIFAKVHPTRHTPLHSQIIVGCVAAVLAGLNFVHELSHILSVGTLTGYS
VVSACVITLRWNDKTTSCRSLGNMSIWQEGVLCVLI IALCGFVAGMCRYFSYAI AFMI IALLIAVAAGFALQFRQ
VYVDPGPGFSCPGVPIVPMVSVFFNMLLFAQLHEEAWYRFVILSLLAVGVYAGYGYHAVPSSSDHPPAVAYHGI
PSEAP

>Os-CAT10 (Os04g45950)

MAALRDVLLSIAQTPHRLRRRALVTWTPAQETSEVRDRSGARMKRRLEWYDLVGLGVGMLGAGVFTTGRVARD
TAGPAVFASYVIAGVSALLSSFCYAEFSVRVPAAGGAFSYLRVTFGELVGGGANILMEYVLSNAAVARSFTDY
LASTCGITEPDAWRIQVDGIAKGYNALDFPAVALILVLTCLCYSTKESAMLMVITVFHLLFFVFI ILAGLWNG
SARNLVSPHGLAPYGVGVLDGAAIVYFSYIGYDSASTMAEERDPARALPVGIAAGSVLVVSALYCLMSLALCAM
LPYTEIAESAPFSAVFREKAGWEWAGSVVGAGASLGIVASLLVAMLGQARYLCVIARARLVPAWLAKVHPSTGTP
MNATIFLGLCTASIALFTELQVVFEMISIGTLLVLYLVANALIYHRYAKLGANRSLHVLLFLLIILTSSSLGFSLS
RRIHQCRWGMALFGATSVTITAMFHCARRDMPEPPSEWMVPLMPWPAASVFLNVFLMTTLKVMFQRFGLWS
FVIIVFYVCYGVHSTYSAEENEAVNAMIHANMDIS

>Pt-CAT1 (Poptr1_1:570928)

MGGVQADRGEIGIKKRGCSCTKDDFLPEESFRSWTNYVHAIRQTPVRFSDRLLTRSLDSTELNEIKSRSEHDMKKN
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DFMAFIAAGNILLEEYVIGGAAVARSWTSYFATLCNHQPDDFRI IAHSPLDDYGHLDPIAVVSSSLICVLAVLSTK
GSSRFNYITSIMHVAVIVFII IAGLTKADRGNYPFMPYDVRGIFVGSVAVLFFAYVGFDAVSTMAEETENPARDI
PIGLGSMITVTVAYCLLAATLCLMVPYKQLDGEAAFFSAFDYVGLHWAKYIVALCALAGMTTALLVSAVGQARY
LTHIARTHMMPPWLAHVNAKTGTPVNATVIMLGATAIVAFFTKLNILSNLLSISTLFIIFTLVAVALLGRRYVSG
VTTVPVNHKIFILCIATILGSSSTATSIIWGLGGDGWVGYVITVPIWFLGLTALAEVLVLPQARDPKLWGVPLVPWLPS
ASIFINIFLLGSIDKASFERFGVWTGILLIYYFLFGLHASYDTAKESGENKAADGWKKMEEGVVSSQVEPEPESLNA
NSAN

>Pt-CAT2 (Poptr1_1:571264)

MGFLVGSQNGVRGGGCFRSLIRRKQVDSVHFKRHHQLAKELSVPHLIAIGVGSTIGAGIYILVGTVAREHSGP
ALFISFLIAGIAAALS AFCYAELASRCPSAGSAYHYSYICVGEVAVLIGWALILEYTIIGGSAVARGISP NLALF
FGGQDSL PFFFLARQHIPGLDVVVDPCA AVLVLVVTGLLCVGIKESTLAQAVVTSINVCAMLFII IAGSYLGFKTG
WAGYELPAGYFPFGVDGMLAGSATVFFAYIGFDSVASTAEVKNPQRDLPLGIGLALSICCCLYMLVSVVIVGLV
PYYAMPDPTPISSAFAAYGMQWAAAYLVAAGAVMALCSTLMGSI LQPRI LMAMARDGLLPSFFSDINKKSQVPVK
STLVTGLGSAVLAFFMDVSQLAGMVS VGTLLAFTMVAISVLILRYVPPNEVPFPSSLQEI IDSVSLRYSTGSPDV
TKEKSGFYAGTSMDSNLPLL GKATAIEYPIIVEQE AQGNFVINEGSRRKIAGWTITATCVGAFLLAYAASDLNLP
RLLRFIVCGIGGALLLFLGLIVLTCIEQDDARHTFGHSGGFICPFVPLLP IVCFLVNIYLLINLGAATWTRVSVWL
IVGVLVYTFYGRTHSSLLDAVYVPATHADEIYRSSGESSA

>Pt-CAT3 (Poptr1_1:573976)

MGFLVDSHKGCGVGGGCFRSLIRRKQVDSVHSHKGGHRLAKELSILHLIAIGVGSTIGAGVYILVGTVAREH
SGPALFLSFLVAGIAAALS AFCYAELASRCPSAGSAYHYSYICVGEVAVLIGWALILEYTIIGGSAVARGISP NL
ALFFGGQDNLPTFLARQHIPGLDVVVDPCA AVLVLVVTGLLCVGIKESTLAQAVVTSINVCAMLFII IAGTYLGF
KTGWAGYELPTGYFPFGVDGMLAGSATVFFAYIGFDSVASTAEVKNPQRDLPLGIGLSLSICCSLYMLVSVVIV
GLVPPYAMPDPTPISSAFSVHGMQWAAAYLITAGAVMALCSTLMGSM LQPRI LMAMARDGLLPSFFSDVNRSTQV
PVKSTLVTGFGAAVLSFFMDVSQLAGMVS VGTLLAFTMVAISVLILRYVPPDEVFPFPSSLQETIDSVSLRYSSQD
VYEEKAAIHAGTSKDSKPLLLGKAKTIEYPLLVKQEAQSNFV LNEGKRREIAGWTIAATCIGAVLLTYAASDLSL
PSPLRFTTCGVGGALLL SGLIVLTCIEQDDARHSFGHSGGFICPFVPLLP IVCILVNIYLLINLGAATWTRVSVW
LIVGVLVYVFYGRKHSSLRDAVYVPATHADEIYRSSGESLA

>Pt-CAT4 (Poptr1_1:248775)

RRKQVDSHRVSSHSGGQTQQLAKILSVVDIIAIGVGATIGAGVYILVGTVAREQTGPALTVSFFIAGIAAALS AF
CYAELVCRCP SAGSAYHYTYICIGEGA AWLVGWALILEYTIIGGSAIARGLTPNLALFFGGQDNLPSYLARHSIPG
LGIVVDPCA AVLILVVTLLLCIGIKESSFAQT VVTVNVFGLLFI IIVGGYLAFKTEWIGYELPSGYFPFGVNGM
LAGSAVFFSFIGFDVASTAEVKNPQRDLPLGIGVALSIC CILYMLVSVVIVGLVPPYALDPDPTPISSAFASH
GMQWAVYI IITGAVTALCASLMGSLLPQPRMFMAMARDGLLPSFFSDI SERTQVPVKSTVI IIGILAAALAFVMDV
SQLAGMVS VGTLLAFTSVAVSVLILRYVPPNEVPLHPSLQQLIDSPSLQFN SDSQDIAYQNPKGEQNEQKRRKIA
AWNIALVCVGVFVLSAASVENIP SILRFTLCTVGGAI FLCSLIVLACLAQDNARHSFGHSGGFVCPFPVFLPVA
CILVNTYLLVNLGAGTWFRVSIWLLIGALVYLFYGRTHSSLLKNAVYVPT

>Pt-CAT5 (Poptr1_1:800060)

MSDEIQHKS YWRFSKQDFLPEESFQSWGNYSALSETCFRFDRLISRSDDVNEIGELRKQSENEMKRCLTWDDL
TWFGFGSVV GAGIFVLTGQEAHEHAGPAIVLSYVASGVSAMLSVFCYTEFAVEVPVAGGSFAYLR IELGDFVAFI
TAGNILLESIAGSAAVARAWTSYFTNLLNRPSNSLR IHTNLAEGFNLLDPIAVGVLVIAATIAI ISTRKTSLINW
IATALNTAVILFV IAGFAHANTS NLKPF LFGAKGIFQAAAIVYFAYGGFDNIATMAEETKNPSRDIPIGLLGS
MSIITVIYCLMAL TLSMMQKYTEIDKGAAYSVA FQSVGMNWARYLVALGALKGMTTVLLV GALGQARYTTHIARA
HMIPPFALVHPKTGT PINATLLITISSALIAFFSSLDV LASLLSVSTLFI FMMMAVALLVRRYHVRDITPQTNL
LKLALFLLI IISSSMGTSAYWGLNPNGWVGYAITIPFWFLGTIGLSMLPQQREPKVWGVLPVLPWLP SLSIAINIF
LMGSLGAEAFERFGICTVVM LIYYVFFGLHATYDMAHLHRKAQSTEVNNE DMIGRKG P

>Pt-CAT6 (Poptr1_1:264766)

VRLRSGADMMRKLKWDLI ALGIGGMLGVGVFVTTGLVAHQISGPSVFISYI IAGISALLSSLCYTEFSVQIPVA
GGAFSYLRVTFGEFVGYFAGANILMEYVLSNA AVARTFTEYLCHAVGENPNSWRFEVDGLVEGYNKLD FPAVALI
LLLTLCLTKESSV LNLVMTVFHLIFFGFII IAGFYKGS AKNLVEPGGLAPFGVKGILDGAATVYF SYIGYDSVST
MAEEIRNPAKSLPVGIVGSVLIVTGLYCLVALS LCFVYPNMIDK DASFSVAFQKIGWKWAGNVV GAGASLGIVA
SLLVAMLGQARYLCVIGRARLVPSWLAKVNPSTGTPLNATLFLGLCTASIALFTELHII IDIISISTLLV FYLVA
NALIYRRYVIVSHNPPSQ TLLFLFLSSCSIGFSMSWKLEEQWVLPVFGGFMITITAFFQYMVPSICQTNEEWS
VPFMPWPAVASIFLNVFLV TSLKIPSFQRFGIWA CLITLFYVLYGVHSTY

>Pt-CAT7 (Poptr1_1:423928)

YLQSLSQTPHRLRKRMLATWTPDQELNQVRLRSGADMMRKLKWDLI ALGIGGMLGVGVFVTTGPVALKTSGPSV
FISYII IAGISALFSSLCYTEFSVQIPVAGGAFSYLRVTFGEFIFGYFAGANILMEYVLSNA AVARTFTEYLCHAVG
ENPSSWRIEVDGVAEGYNMLDFPAVALI LLLTLCLCHSTKESSILNLIMTVFHVIFFGFII IIVGFSKGSARNLVE
PGGLAPFGVKGVLDGAAIVYF SYIGYDSVSTMAEEIQNPAKSLPVGILGSVLIVTGLYCLMALS LCVLPFN MID
KDASFSVAF EKIGWKWASNVV GAGASLGIVASLLVAMLGQARYLCVIGRARLVPSWFAKVN PSTGTPLNATLFLG
LCTASIALFTELSIILEI ISISTLLV FVMANALIYRRYVVISHNPPSRTLLFLVLLSSTAIGFSMSWKLDEQWW
ALPVLGGFMIAITAFFQYKVP SVCQPNEEWSVPFMPWPAVTSIFLNVFLMTTLKARSFQRFGIWA FLITLFYVLY
GVHSTYRAE

>Pt-CAT8 (Poptr1_1:798197)

MDVQDSPRKSYSWRCSKQDFPFPEPSFKDLSSYRTALSQICPRLKDRLLSRSTETHELVTLRRESENPQKCLTWWD
LMWMSFGSVVGSIGFVITGQEARNDAGPAIVLSYALSQFSGALLSVFCYTEFAVEIPVAGGSFSYLRVELGDFIAY
LAAGNILLEAIIIGAAGLRSSWSSYFASMINSKNPDMRIKIDSFADGFNLLDPLAVVVLLVANSIAMSQKTRTSF
LNWIASIATAFIIAIIIVVGFIFHKSSNLVYPFKGAEGVFVSAVVYWAYTGFDMVATMAEETKNPSRDIPIGL
VGSMSIITVIYCLMAMALTGMVKYTEIDPNAAFSVAFAQIGMNWATYLVSIKALGKMTTSLMVGSLGQGRYTTQI
ARSHMIPPWFARVHPKTGTPINATLLTTILSAIVAFFSSLDVLSVFSICTLLIFMLLAVALLVRRYYVKDVTSK
NDSVTFVSLFTIVGSSIGVTALWNSGVRGWIGYVVASVIWCSGTLGISLLHKKHRVPKVVGVPLVPWLPSLSIAM
NVFLLGSLDYEAFRLFIIICSAVMILYYLMIGVHATYDVAHQPKETEAEEGR

>Pt-CAT9 (Poptr1_1:755066)

MGAQKTPSPSSSSSSSSWFSHFCSALRTPINSPLDTILVSRNSTDALVRRRLGLLDLILLGVGASIGAGIFVVT
GTWARDAGPGVTLSEFILAGLSCVLNLCYAEASRLPAVVGAYLYTYSAFNELTAFLVFGQLMIDYHIGAASIA
RSLASYVVTILEMFPVFKDNIPSWIGHGGEFFGGTSLINLLAPFLLALLTVILCLGVGESSIVNSFMTVLKVII
VIIIVIFVGAFEVDVSNWSPFAPHGVKEILTGTATVVFAYVGFDAVANSAAESRRPQACSVDLRDLPLGIIGSLVI
CIALYIGVCLVLTGMVPYLLGEDAPLAEAFSTKGLKYVSIISIGAVAGLTTTLLVGLYVQSRLYLGLGRDGLL
PSLFSKVHPTRHPTIHSQVWVGIVAGTLGGLFNVHVLSHILSVGALTGYSVVSACVLALRWKDKTASQFSSRWTS
AWREGVLCIVTVACCGFAAGLFYRFSASFIFLVAVVIAIALATAALCCRQTYTNPPGFCPGVPIVPAVCVFFNM
FLFAQHLHEAWVRVFLSIIIMVGIYAFYQYHAKPGSDESIYQRAPTEATR

>Pt-CAT10 (Poptr1_1:567910)

MESSHGSSFSSSLNSYIQALAQTPARFARRAGSVSTSYEEMSRVKARSGSDMQRTLRLWYDLVGFVIGGMVAGVVF
TTGRASRVCTGPSVIIISYAIAGLCALLSAFCYTEFAVDMPPVAGGAFSYLRVTFGEFAAFLTGANLIMDYVMSNAA
VARSFAYLGSAGISTSKWRVVVHVLDPDFNEIDI FAVLVVLAITLIICYFRLLNMTSLFLVDSTRESSVNM
VLTALHILFIGFVILMGFWKGDWKNFTEPADPKNPSGFFFPFAGPVGFNGAAMVYLSYIGYDAVSTLAEVHNPVK
DIPIGVSGSVIIVTVLYCLMSASMSMLLPYDMIDADAPFSAAFRGKSDGWKWSNVIGIGASFGILTSLLVAMLG
QARYMVCVIGRSNVVPAWFARVHPKTSTPVNASAFLGIFTAAIALFTDLNVLNLSIGTLFVFMVANAVVYRRY
VAIGTTNPWPTLAFLCSFSLTSILFTLIWHFMPQGGKAFMLGACAVIAIAIQLFHCLVLPQARKPEFWGVPMLP
WIPCVSIFLNIIFLLGSLGGPSYVRVFFSALAVLVYVLYSVHASFDAEAEGSFGQKNGGILKESGESDQDPSFKV

>Pt-CAT11 (Poptr1_1:806659)

MRRRRGCGCCTKNDLPEESFQSIGNYLQALKETPMRFKDRLLTRSLDSTELHEIKSRSDHEMKKNLTWWDLIW
FGIGAVIGAGIFVLTGLEAKEHAGPAVLSYVVSGVSAMLSVFCYTEFAVEIPVAGGSFAYLRVELGDFMAFIAA
GNIILEYVIGGAAVARSWTSYFATLCNHKPDDEFRIIAHSLPEDYGHLDPIISVFCVAAICVLAVLSTKGSRFNYV
ASIIHVVVILFIIIVAGLAKADTKNYADFSPNGARGIFVASAVLFFAYIGF'DAVATMAEETRNPAARDIPIGLVGS
SITTIAYCLMAVTLCLMVPYKIDEDAPFSVAFETVGGWGWAKYVVAAGALKGMTTVLLVSAVQARYLTHIARTH
MPPWLAHVNERGTGPVNATIVMLAATAIVGFFTKLDILSNLLSISTLFI FMLVALALLVRRYYVSGITTOENRV
KLIMCIVAILGSSIATAVFWGTADEDSWLGYVITIPWFCATLALKLLVPQARDPKLWGVPLVPWLPSASILINI
FLLGSIDKKSFIIRFAAWTGFLLVYVYFLFGLHASYDTAKASGENKVEDGLKNVEEGAVPSRNGS

>Pt-CAT12 (Poptr1_1:808200)

MGGGDIHIDHQEEGLRRRGCGCSCSKNDLPEESFQSGFNYLQALKETPMRFKDRLLTRSKDTTEIHEIKARSEH
EMKKTLTWWDLIWFGIGAVIGAGIFVLTGLEAREHAGPAVLSYVVSGVSAMLSVFCYTEFAVEIPVAGGSFAYL
RVELGDFMAFIAAGNILLEYVIGGAAVSRAWTSYFATLCNHKPDDEFRIIAHSLPDDYGHLDPIAVLVGVVICILA
VLSTKGSRFNYVASIIHVVVILFIIIVAGLAKADTKNYADFAPNGAHGIFTASAVLFFAYVGFDAVSTMAEETKN
PARDIPIGLVGSMAITTLAYCLLAVTLCLMVPYKMIIDVAPFSVAFESVGGWGWAKYIVAAGALKGMTTVLLVSAV
QARYLTHIARTHMMPPWLAHVNAKTGTPVNATVVMLAATAIAFFTKLDILSNLLSISTLFI FMLVAVSLLVRR
YYVSGVTTVPVNRVKLIVCIVAILVSSIATALIWGTSQASWIGYVITIPWFFATLALKISVPQAKDPKLWGVPL
VPWLPSASILINMFLGSDVQSFKRFAVWTGILLIYVYLLFGLHASYDTAKASGENKDEGGFKNVEDGTVSSQND
AL

>Sb-CAT1.1 (Sb01g013690)

MAVGGEVGRQRQRCSCCTKADFFPEESFSSWSAYGRALRSTVSRSLADRVTSRSLLETTELHEVRARSGADMKRDLT
WWDLAWFGVAVIGAGIFVLTGQEARNDVGPVAVIISYVVSGVSAMLSVFCYTEFAVEIPVAGGSFAYLRVELGDF
MAFVAAGNILLEYCIGGAAVARAWTSYFATLLNHQPSDFRIHASGLDANYSELDP IAVVVIALVCI FASASTKGT
SRFNYVLSVHVIAVIFIIIVAGLTKADAANMRDFMPFGVGRGIFSAVAVLFFAYIGF'DAVSTMAEETKNPARDIPI
GLVGAMTLTALYCVLAVTLCLMQPYSSIDADAPFSVAFSARGMDWAKYIVAFGALKGMTTVLLVSAVQARYLT
HIARTHMMPPWLAQVHPRTGTPVNATVVMLVATAVIAFFTDLGLILSNLLSISTLFI FKLVAVALLVRRYYVAGET
TTANRNKLAACIAAILATSTATATCWGVDINGWVYAVTVAWFVSTVCLWAFVLPQARAPKLWGVPLVPWLPSAS
IAINVFLGSDSKSFMRFYWTAAALLVYVYLFVGLHASYDTAKALAAESAIAKVENGDDKPARGAVHNGV

>Sb-CAT1.2 (Sb08g021380)

MAASGGGKGGGGEGGCCGGTTLFPEESFRSWSAYGRALLEGTGPRLRDRLTARSLDATEVNEVRGRSGADMRRNLT
WWDLIWFGIGAVIGAGIFVLTGQEAKEAAGPAVVVSYAISGVSAMLAVFCYTEFAIEIPVAGGSFAYLRVELGDF
MAFIAAGNIILEYICIGGAAVARSWTSYFATLLNHHPDDFRVHAAALAEGYSELDP IAVAVTAAICALAVLSTKGS
SRFNYSILHLVVI AFIVVVGLTKANAANLTADFAPFGARGIFAASAVLFFAYIGF DAVSTMAEETKNPARDIP
VGLVGAMTLTTAVYCLLALVLCMQPYTEIDANAPFSVAFTAVGMDWAKYIVAFGALKGMTTVLLVGAVGQARYL
THIARTHMVPPCLAQVHPRFGTVPYATIVMMVATAVIALFTNLGILSNLLSISTLFI FTLVAMALLVRRYVAGE
TTASDRNKLVAACLAVIVASSTATAACWGTSSGGGGWVAVVTVAAWLAATAYLQWGVPKARAPKMWGVPLVPWL
PSASIFINIFLLGSIDGASFMRFLIWTAALLAYYFFVGLHASDYDTAKAVAAEAEAEARVEEGARKVAVGGCRFD

>Sb-CAT2 (Sb01g013100)

MALEAGSSGGGGRGWGGGFRSLMRRKQVDSDRVRAKQPQLAKELNVPELVAIGVGSTVGAGVYVVLVGTVAREHA
GPALTISFLIAGIAAALS AFCYAE LASRCSAGSAYHYSYICVGEVAVLIGWALVLEYTIGGSAVARGISP NLA
LFFGGQDSL PWILARHQLPWF GIIVDPCAAALV FVVTVLLCVGIKES SFAQGVVTVLNACVMIFVIVAGSYIGFQ
IGWVGKVS DGYFPHGVNGMLAGSATVFFAYIGFDTVASTAEVKNPQRDLPLGIGAALAI CCVLYMAVSVVIVG
LVPYFAMDPDTP ISSAFTEHGMQWAMYVVTSGAVLALCSTLMGSLLPQPRILMAMARDGLLP SFFSDVNKQTQVP
VKSTIVTGIFAAALAFAMDVSQ LAGMVS VGTLLAFTIVAVSILILRYVPPDEVP LPPSMQESFHLNQECDEETDR
GLLVGNCNLSQTKNVI VVSVKDP LIDKRLHKGKMD ETKRRKIASLSIASVCVGV LILTSSASATWLPFLPIC
IGCIIGVMLLLAGLSLLSWIDQ DAGRHSFGHSGGFTCFVPVLPVLCILINTYLLINLGGDTWMRVGIWLLMGVL
VYVYGRTHSSSLTDVVYVPVAQADEIYRSSSGYVS

>Sb-CAT4 (Sb01g021240)

MAMGGPSWTNLQCLVRRK LATASSAGWAEDADRGGGQRLARTLSVPHLAAIGVGSTIGAGIYVVLVGTVAREHTGP
GLTLSFLIAGVAAALSALCYAELSCRFP SAGSAYHYSYICIGESVAVLIGWALILEY TIGGSSVARGMSPNLALF
FGGQDKLPFFLAQVHVKGLDTP LDPCAAILVLI V TALLCLGIKES SVEGIITTANIIVMLFVICAGGWLGFRNG
WGYKVP EGYFPNGVSGVLSGSATLFFAFIGFDTVASTAEVKNP RRDLP LGMAL TSLCCFLYMMVSAVVVGLV
PYHAMDPDTP ISSAFARYGMQWAEYVSSGAVLALVASLIGGILPQPRIIMAMARDGLLP LFSVDNRR TQVPIL
STVLIGICAILAFFMDVSQ LAGMVS VGTLLAFTTVAISVLVRYAPPYEMPEVALAGSSESLASFSGNLEHDE
QNSDPFGNVQEALTVIEGASKVRRQKAIGSIVL I CVGAILISAVSVSFLPFSVQT IACTVGGLVVLS SSVILL
CIGQDKRFLGQTGGFMCPLVPLLPICCIIVNLYLLMNLGSH TWIRVSIWLVAGALIYFFYGLKHSSLAGMAYHRI
SPL

>Sb-CAT5 (Sb03g002130)

MAPAEHDEGAGKAAVPARSYWRWHRDDFFPEPSFASWGAYRRALGETPSRLRDRLAGRSTDAEELGALRRRSENE
MRRCLTWWDLTWFGFGSVIGAGIFVLTGQEAHDHAGPAIVLSYVASGLSAML SVFCYTEFAVEIPVAGGSFAYLR
VELGDAAAFIAAANLILESVIGTAAVARSWTSYLASLINKPASALRIHAPGLAPGYDELDP IAVVVIAVTATLAM
LTAKGTSRVN WVASAVHVVVIGFVIVAGFIHANPANLRPFMPYGVPGVFRAAAI VYFAYGGFDNIATMAEETKNP
SRDIP LGLLGSMSVITAIY CIMALVLSMMQPYTAIDTSAAYSVAFASVGMHWAQYVVALGALKGMTTVLLVGALG
QARYTTHIARSHIIPVFALVHPRTGTPVHATALIAVCSACIALFSSLDVLS SLLSVSTLFI FMMMATALLVRRY
YVRGV TTRTHALRFTALLLLIVASSVGI AAYWGTSPERWQGYVVLVPAWAAATLGIQLLVPAARAPKVWGVPLVP
WLPSLSIATNLFMGLSGKDAFIRFGVCTAVMLVYVVLVGLHATYDVAHGACGG EEDDDGDAADGEKKKVVAAS
DVEKADAAGGAL

>Sb-CAT6 (Sb05g003440)

MDKAALVSESTDDVGPAGGSSSSSFSGLRAYGRALAQT PRRLARRACAATAPHEEMSRVRARS GTRMARALRWWD
LVGLGLGGMV GAGVFVTTGRAARLYAGPGLVVS YAIAGLCALLSAFCYTEFAVDMPVAGGAFSYLRVTFGEFAAF
LTGANLIMEYVFSNAAVARSFTAYLGTAVGVDAPSKWRIPVPGLP EGFNQVDLVAVGVILLLSVCICYSTKESSV
VNLVLTGVHVAFILFIIVMGFVHGDARNLSRPADPVHNP GGFPHGAAGVFNGAAA VYLSYIGYDAVSTMAEEVE
RPDRDIPAGVSGSVLVTALYCLMAASMSMLLPYDAIDPEAPFSGAFKGRDGM AWVSNVIGAGASLGIL TSLMVA
MLGQARYLCVIGRSGVVP AWLARVDRRTATPVNASAF LGLLTAALALFTELDVLLNLVSI GTLFV FVMVANAVVY
RRYVGDPCPAGTGT AHETRAWPTLAFIGAFSLIALSFTLLWQFAPGGA AKAVMLSATAAAAVAVVA AFQALVPQA
REPEVWGVPGMPVWPAASVFLNVFLLGSLDRPSYARFGFFSAAVVLYVLYSVHASYDAEEGGAAADGGAGAGDK
LQDHGCEV

>Sb-CAT7.1 (Sb08g003570)

MSRVRARSGADMARALRWDDLVLGLGGMVAGVFTTGRAARLHAGPGVVVSYAIAAGLCALLSAFCYTEFAVDL
PVAGGAFSYLRVTFGELAAFLTGANLIMEYVFSNAAVARSFTAYLGTAVGVDAPSQWRITVHALPDGFNQVDLVA
VAVILLITVCICYSTKESVVMVLTAVHVAFILFIIGMGFRHGDARNLTRPADPSRSPGGFFPHGAVGVFNAAA
MVYLSYIGYDAVSTMAEEVQRPARDIPVGVSGSVVVVTVLYCLMAASMSMLLPYDAIDPEAPFSGAFKGRERCAW
VSNVIGAGASLGILTSMLVAMLGQARYLCVIGRSGVMPAWLARVNPRTATPVNASAFGLGVFTAALALFTELDILL
NLVCIGTLFVYFYMVANAVVYRRYVGGGGGARWPTLAFLLVFSLSALAFTLAWKLAPPEPRGVRAGLLAACAALAV
TAVAAFQALVPQARVPELWGPVPGMPWVPAASVFLNVFLLGSLDRPSYVRFAlFSAAALLVYVLYSVHASYDAEES
GRLDVGDDGGGKVQDEACTVV

>Sb-CAT7.2 (Sb08g003530)

MSRVRARSGADMARALRWDDLVLGLGGMVAGVFTTGRAARLHAGPGVVVSYAIAAGLCALLSAFCYTEFAVDL
PVAGGAFSYLRVTFGELAAFLTGANLIMEYVFSNAAVARSFTAYLGTAVGVDAPSQWRITVHGLPDGFNQVDLLA
VAVILLITVCICYSTKESVVMVLTAVHVAFILFIIGMGFRHGDARNLTRPADPSRSPGGFFPHGAVGVFNAAA
MVYLSYIGYDAVSTMAEEVQRPARDIPVGVSGSVVVVTVLYCLMAASMSMLLPYDAIDPEAPFSGAFKGRERCAW
VSNVIGAGASLGILTSMLVAMLGQARYLCVIGRSGVMPAWLARVNPRTATPVNASAFGLGVFTAALALFTELDILL
NLVCIGTLFVYFYMVANAVVYRRYVGGGGGARWPTLAFLLVFSLSALAFTLAWKLAPPERRGVRAGLLAACAALAVT
AVAAFQALVPQARVPELWGPVPGMPWVPAASVFLNVFLLGSLDRPSYVRFAlFSAAALLVYVLYSVHASYDAEESG
RLDVGDDGGGKVQDEACTVV

>Sb-CAT8 (Sb10g021160)

MTSAAVRGEPAAGHRRYWRWSKADFFPEPSFQSWRAYGGALLSTGPRLRDRVTSRSSEAVEAGTLLAQSENPLRR
CLSWVDLAFGLFGSVVGVFVLTGQEARFDAGPAIPLAYAAAGFSALLSSFCYAEELATEIPSAGGSFSYLRVEL
GDLAFFIAAGNILLEAVVGAAGLGRSWSYLAALIGRSDALRIHVPALADGFNLLDPIAVVVLCTTSALAVSGA
RLTSTINSVASVVGIAIVAFVLAAGFSHFEPANLAPSFPPFGAAGVFRAAAVVYWSYTGFDVMATMAEETKNPGR
DVPLGLISSMSAITLVYCAMSLALVGMQRYSDIDANAAYSVAFAAAGMKWARYIVALGALKGMTSGLLVGALGQA
RYTTQIARTHMIIPPYFALVHPRTGTPIYATIAVTLGAACVALFSSLDVLAASVSSISTLFI FALVAALLVRRYV
AGTTSPAQARTFLAFLALIVLSSIGMSVYYSSGYAARWPGYVVFALWAAGTAGLALFAKQQRAPKVVYGAFLMPW
LPAMSVATNLFMLGSLGSLAYMRFGICTAAMLVYYVLFVGHATYDMVHAEGQTTSAADAATDGEVQRKIMPV

>Sb-CAT9.1 (Sb04g033040)

MTQEPTSLRSIWARTRPRTRPKSRRHQLPISSDAMEEAHGRPSSTAGRPFSLGCAAALRRKPLGAHGSAAAAA
TGEGLVRQLGVLELVLLGIGASIGAGIFVVTGTWARDAGPGVTISFVLGAAACVLNLCYAEELASRFPVAVGGAY
LYTYAAFNEITAFVFTQLMVDYHIGAASIARSLASYFIQFLELIPFLKGQIPSWIGHGEEFFGGVISINILAPI
LLIILTAILCRGVKESAVNTFMTTLKIIIVIVVVVAGVFEVDVSNWSPFMPNGFKSVVTGATVVVFFAYVGFDAV
ANSAEEAKRPQRDLPIGILGSLACVLLYVAVCLVITGMVPTYLLGEDAPLAEFAAKGLKFITVLIISIGAVAGL
TTTTLLVGLYVQSRLYLGLGRDGLLPSVFAKVHPTRHTPLQSQIIVGCVAAVMAGLFNVSMLSHILSVGTLTGYSV
VSACVVTLRWNDKGTSSRSLGSMISWQEGVLCLVIVALCGFIVGICYRFNYAIAFMVFAFVIAVAASAFALQFRQV
YVDPPGFSCPGVPLLPISVFFNMVLFQALHEEAWYRFVILSLIALGVYAGYQYNAVPSSENSTIGYHGIPTE
AP

>Sb-CAT9.2 (Sb04g033020)

MEEANDHRSSSTAGRPFSLGFCAAALRRKPLGAHGSAAATGEGLVRQLGAVELVLLGIGASIGAGIFVVTGTVAR
DAGPGVTISFVVAAGAACVLNLCYAEELASRFPVAVGGAYLYTYAALNEITAFVFTQLMVDYHISAASARSLAS
YFIQFLELIPFLKGQIPSWIGHGEEFFGGVISINILAPIILLIILTAILCCGVKESAVNTFMTTLKIIIVIVVVV
AGVFEVDVSNWSPFMPNGFKSVVTGATVVVFFAYVGFDAVANSAAEAKRPQRDLPIGILGSLACVLLYVAVCLVI
TGMVPTYLLGEDAPLAEFAAKGLKFVTVLISIGAVAGLTTTTLLIGLYVQSRLYLGLGRDGLLPSVFAKVHPTRH
TPLQSQIIVGCLAAVLAGLFNVSMLSHILSVGTLTGYSVVSACVITLRWNDKGTSSRSLGSMISWQEGVLCLVIV
ALCGFIVGLCYRFNYAIAFMVFAFVIAVAASAFALQFRQVYVDPPGFSCPGVPLLPISVFFNMVLFQALHEEAWY
RFVILGLIALGFYAGYQYNALPSSSEHSTIGYHGIPSEAP

>SbCAT10 (Sb06g024120)

MALRDVLLSIAQTPHRLRRRALVTWTPAQELNEVRDRSGPRMKRRLEWYDLVGLGVGMLGAGVFTTGRVARDT
AGPAVFSYVIAGVSALLSSFCYAEFSVRVPVAGGAFSYLRVTFGEFVGGFFGANILMEYVLSNAAVARSFTDYL
ASTFGVTEHNAWRIVVDGIADGNALDVPVAVGLILLITVCLCYSTKESMLNMVLTVFHLLFFAFIIAAGLWNGS
ARNLVRPHGLAPYGVAGVLDGAAIVYFSYIGYDSACTMAEIREPSRALPVGIAAGSVLVVSAALYCLMSVALCVM
PYTEVTMHAYAGGVARSRPVARSISEAAPFSSAFREKVGWRWASSVVGAGASIGIVASLLVAMLGQARYLCVI
ARARLVPLWFAKVHPSTGTPMNATIFLALALFTELQIVFEMISIGTLLVYFYLVANALIYHRYVKIGTNRPLHVLL
FLLLLTSSLGFLSRKIDEWCRWGMALFGAISIAITTIHFCTARQDITGPPLEWSVPLMPWPAASVFLNVFLI
TTLKVRSFQRFGIWLSLVIIVFYVCYGVHSTYSAEENEIVNAMIHGANLDIS

>Vv-CAT1.1 (GSVIVP00028403001)

MGVEPSEGVRRCSCSKDDFLPEESFKTWGNYGRALAEIPARLKDRLLTRSLDTEMNEIKARSAHEMCKTLTW
WDLMWFGIGAVIGAGIFVLTGIQARDVAGPAVVLSYVVSGISAMLSVFCYTEFAVEIPVAGGSFAYLRVELGDFM
AFIAAGNILLEEVIGGAAVARSWTSYFATLCNHNKPEDFRIIAHSLKEDYNQLDPIAVGVITIIICLLAVFSTKSS
RFNYIASIFHVIVILFII IAGLCKADTSNYTPFAPNGVRGIFKSSAVLFFAYIGFDVAVSTMAEETKNPGRDIP
LVGSMISITTLAYCLLAVTLCLMQKYTDIDKDAPFSVAFEAVGWNWAKYIVAAGALKGMTTVLLVSAVGQARYLTH
IARTHMMPPWLAHVNSRTGTPVNATIVMLVATAIIAFFTDLGILSNLLSISTLFI FMLVAVGLLVRRYVSNPKL
WGVPLVPWLPSASIAINIFLLGSDIKASFERFGIWTAVLMVYVYFFFLHASDYDTAKESAKVTHETTQYKKVEEGA
VTPSVDSSTGVNASNASTNP

>Vv-CAT1.2 (GSVIVP00028405001)

MGNTSEGGGVARKRCGWTKEDFLPEESFQSWGTYVKALGNTTARLKDRLTRSLDEVELHAVRDRSKNEMCKTL
NWDLLWFGIGAVMGSGIFVLTGEEANEYAGPAVVLSYFISGVSAILSVLCYTEFAVELPVAGGSFAYLRVELGD
FVAYVAAGNILFEYVAVAGAVARSWTSYFATLCNHDPNDFRFYASSLAEGYNRLDPIAVAVSIVVCVLASLSMKG
SSRFNSIASIVHMMVIAFMLVAGLTKADSANFKDFAPFGLRGILKASSMLFFAYVGFDTTTLGEEIKKPARDIP
IGLIGMSLSVMIVYCLLAATLVLMQPYAQIDVDAPYSVAFSAVGMDWAKYIVAFGALKGMTTVLLANIIGQARYF
THIGRTHMAPPFLATINKKTGTPVNATVFM TIANSVIAFFTSLDVLNLLSISTLFI FSLVALALLVRRYVQGRK
PKIWGAPIVPWLPSASIAINVFILGSMDSFARFAVWTGILLVYVYLFVGLHASDYDAKIVAYRV

>Vv-CAT2 (GSVIVP00003854001)

MGVGGDFDSQKRGRGFKGLMRRKLVDSARKEVDGGHKLAKELSVTHLIAIGVGSTIGAGVYILVGTVAREHSGP
ALTISFLIAGIAAALS AFCYAE LSSRCP SAGSAYHYSYICVGESVAVLIGWALILEYTVGGSAVARGISP NLALL
FGGGDLPAFIARQYIPALDIVVDPCAAILVFI VTTGLLCVGIKESTVAQAI VTTGNVCAMMFVVIAGGYLGFKTGW
AGYELPTGYFFPGVDGMLAGSATVFFAYIGFDSVASTAEVKNPQRDLPLGIGAALSISCI LYMLVSVVIVGLVP
YYSMDPDTPISTAFASHGMKWAAYIITIGAVTALCSTLMGSLLPQPRILMAMARDGLLPSFFSDLNRRRTQVPVKA
TIVTGIGAATLAFFMDVSQLAGMVS VGTLLAFTMVACSVLILRYVPPDEVPLTPSHQESIDTVSLQHSSSNQKID
EENSKVCAGPSNEITRPLIAKEGASADPVVVKNVLDRIYIDENMRRKIAGWTIMLTCVGVVLLTSAASYVNLPS
FPRYMFCGIGGALLLSGLIVLTCIDQDDARHNFHSGGFICPFVPLLPACILINVYLLVNLGSATWTRVSIWLG
IGVLVYGFYGRHSSLQNAVYVPAADVDEIYGSSSDCLA

>Vv-CAT4 (GSVIVP00003852001)

MGALVNMQKGGGDGCRRAF SRGLTSLIRKPVDSVHTRSETRGLARRLSLVDLIAIGVGSTIGAGVYILVGTVAR
ENTGPALTI SFLVAGIAAALS AFCYAE LACRCPSAGSAYHYSYICVGEI AWLIGWALILEYTI GGS AVARGISP
NLALFFGGEDKLP AFLVRYTISWLGIVVDPCAAILVFI VTTGLLCVGIKESTLAQTIVTVVNVCMVFI I IAGGYL
GFKTGWVGYELQGGYFFPGANGMLSGSAIVFFSYIGFDSVSTAEVKNPQKDLPLGIGLALAI CCILYMLVSVV
IVGLVPFYELNADTPISSAFSSYGMKWAAYT VTTGAVTALVATLMGSILPQPRILMAMARDGLLPSFFSDINKHT
HVPVKSTILTGI FAATLAFFMDVSQLAGMVS VGTLLAFTTVAISVLI LRYVPPPEEVPLVSSSQEPLDSVTSQFHH
DTQDIGTETSKNLLGSCEDDRQPLLGEESLIGYPLNKKELAQDVQNEQKRRKIAAWSITLLCIGVLVLTSAASA
EKFWSI PRFMLCGVGIALLLCLGLTVLTCIEQDDARHSFGHTGGFVCPFPVFLPAACILINTYLLINLGAGTWIRV
SVWL VVGALIYVYGRTHSSLVDADAAHEPRTQAEI SATSSEDVA

>Vv-CAT5 (GSVIVP00030103001)

MGSMGEVGD EIQPRGYWRWSKQDFLPEESFKNWASYSALSQTCFRFKDRLTSRSEDAIEIGEMRKQSENDMKRC
LTWWDLTWFGFGSVIGAGIFVLTGQEAHDHAGPAIVLSYVASGVSALLSVFCYTEFAVEIPVAGGSFAYLR IELG
DFAAFITAGNILLESIVGSAGVARAWTSYFTLLNRPTNSLR IHTNLTKGYNLLDPIAVAVLAI AATLAMISTRK
TSVFNWIASAINTVVILFVI IAGFANADPSNLTPFLPYGAKGIFQAAAIVYFAYGGFDNIATMAEETKNPSRDIP
LGLLGSMSIITVIYCLMALALSMMQDYRDIDRQAAYSLAFQSVGMKWAKYLVALGALKGMTTVLLVVALGQARYV
THIARAHMIPPWFALVHPKTGTPINATLLIVISSALIAFFS LVDLASLLSVSTLFFVMMMAVALLVRRYVVTGV
TPRINLLKLVIFLLIIVASSMGTSAYWGLNPNGWVGYAITIPLWVLGTAGISVFLPQQRTPKVWGVPLVPWLPSL
SIATNLFLMGSLESKAFIRFGVCTVLMVYVYFFFLHATYDVAHQQKPESLKFNDGDMGKTGP

>Vv-CAT6 (GSVIVP00010722001)

MAEEISNPSKSLPVGIMGSVFIVSGLYCLMSFALCMMLPYNQIPEKASFAIAFQRMGWKASNIVGAGASLGIVA
SLLVAMLGQARYLCVIGRARLVPLWLAKVHPSTGTPLNATLFLGAF TASIALFTELEIVVDMVNLC TLLVFLVA
NALIYRRYVITVNNPPFHTLLFLSLLSCSSIAFSLSWKLLQWGLPLFGGIMI IITACFHYFAPYPNQPSKWSVP
FMPWPAAMSIFLNVFLMTTLKLLSLQRFGVWSCLIIILFYVLYGVHSTYRAEEMGMDAGGVNPNSSAQQTCLDIQL
L

>Vv-CAT7 (GSVIVP00013821001)

MDTHGSSSFSSFTAYARALAQTPSRLARRACSVSTSFEEMSRVRARSGSDMQRNLRWFDLVGFGLGGMVAGVVFV
TTGRASRLYAGPAVVLVSYAIAGICALLSAFICYTEFAVDMPVAGGAFSYLRVTFGEFAAFLTGANLVM DYVLSNAA
VARSFAYLGTAI GFPTTKWRFTVSGLPKGFNEIDLVA VAVVLIITLIICYSTRESSVVMVLTAMHILFIAFVI
VVGFWRGDWKNFTEPADPRRHQGGFFPFGASGVFNGAAMVYLSYIGYDAVSTLAEVVRNPVKDIPIGVSGSVMLV
TILYCLMAASMSKLLPYDAIDPEAPFSAAFRQSNQNGWKVSNVIGAGASFGILTSMLVAMLGQARYMVCVIGRSKV
VPSWFARVHHKTCTPVNASAFGLIFTAAIAVFTDLNVLNLSVIGTLFVFMVANAVIYRRYVSVGATNPWP TLS
FLVSFSLTSII FTLIWHFAAPGHPKEVMLGACTVVAVAILQMFHCMVPQVRKPEHWGVPLMPWIPSI SIFLNIFL
LGS LDRPSYVRFYFSALAVLVVLYSVHASFDAQEDGYI IQKNAEIPKDSEASVDAITMV

>Vv-CAT8.1 (GSVIVP00030275001)

MSIRTHILTRYLTHFLPNFFPEESFQNLASYKTALSHTCFRLKDRLLNRSSVANEMLLFQSEENAMKKCLTWWDL
VWMSFGSVVSGIFVITGQETRYDAGPAIILSYAVSGFSALLSVLCYTEFAVEIPVAGGSFSYLRVELGDFVAFI
AAGNILLEAIVGAAGLARSWSSYFASMINTD TDFLRIRVSYFADGFNLLDPIAAVVLLIADGIAMSGTRRTSILN
WISSVLSFMVILFII VIGFIRGKTSNLVPPFPYGARGVFRAAAVVYWSYTGFDMVATMAEETKNPTRDIP LGLVG
SMSMITVVYCLMALVLSMMQKYNEVDANAAYSVVFEEKIGMTWAKYLVSICALKGMTTSM LIGGLGQARYMTQIAR
AHMIPPWFALVHPRTGTPINATLLMAIPGATIALFSSLDVLS SIFSFSTLLIFMLVAVALLVRRYVVKDTTAKRD
LVKFLACLIVII GSSIGIAVLWNSNTTEWVGAVGAFWLWFLGTLGMGLLPKQRVTNVWGVPLVPWLP SLSIGMNL
FLIGSLGYQAF LRFFICSAVMLIYYFLVGLHATYDMARQNQQA

>Vv-CAT8.2 (GSVIVP00009349001)

MASLPGKFAVEIPVAGGSFSYLRVELGDFVAFLVAGNILLEAIVGAAGLARSWSSYFASMINTNADFLRIRVSHL
ANGFNLLDPIAAGVLLIADGIAMCGTRGTSILNWISSVISFMVILFII IIRFIRGKTSNLVPPFPYGARGVFRAA
AVVYWSYTGFDMVATMAEETKNPTRDIP LGSVGSMTMITVVYCLMALVLSMMEKNNELDVNAA YAVVFERLGMKR
AKYLVSICALKGMTTSL LIGGLGQARYMTQIARAHMIPPWFALVHPRTGTPINATLLVAI PSATIALFSSLDVLS
SIFSFCTLLIFSLIVVALLVRRYVVKDTTVKRD LVKFLACL FVII GSSIGIAVLWNPNTGWIGYAVAAFIWFLR
TLGMALLPKQRVANVWGVPLVPWLP SLSVAMNLFVGLSLGYQAF LR FVICSAVMLIYYLF IGLHATYDVAQSQEY
VY

>Vv-CAT9 (GSVIVP00019109001)

MSPRGNSNMLPVYKRRRTENIQAGSVMGEGKPTAYLPSSSSSSSYISRFCSSALRKTTLASSPSDSSIRTLSGD
ALVRRRLGLFDLILIGVGASIGAGIFVVTGT VARDAGPGVTISFILAGASCVLNALCYAELASRFP AVVGGAYLYT
YTAFNELTAFLVFAQLMLDYHIGAASIARSLASYVVAVLELFPFFKENIPSWIGHGGEEFLGGALSINILAPILL
VLLTII LCRGVGESSAVNCFMTVTKVIVLVFV IIVGAFKVDVSNWSPFAPNGFEAILTGATVVFFAYVGFDAVAN
SAEESKR PQRDLP IAIMGSLLVCVVLYIGVCLVITGMVPYKLLGEDAPLAEAF TSKGLKYVSILISIGAVAGLTT
TLLVGLYVQSRLYLGLGRDGLLP S L FARVHPKAHTPVHSQI WVGIVASILAGLFNIHALSHILSVGSLTGYSVVA
ACVVTLRWNDKTASQVSTRWTSTWQEGVIYLI I IAGCGFSAGLFYRVGASFFCLLVA AVI AVLASIALYSRQVYM
NPPGFSCPGVPIVAVCIFFNIFLFAQLHYEAWRVFVILSLISIGIYAFYGYHADPLSSNETI IYHRAPIEEGQ