

Table S1. Sequences and Accession Numbers of Representative Papain-like Cysteine Proteases (PLCPs).

| Name | Species | Sequence | Number |
|------|----------------------------------|--|--------------------|
| CTB1 | <i>Arabidops is thaliana</i> | MADSCCIRLHLLASVFLLLFSSFNLQGIAAENLSKQKLTSLILQNEIVKE VNENPNAGWKAAFNDRFANATVAEFKRLLGVIQTPKTAYLGVPPIVRH DLSLKLKPEFDARTAWSHCTSIRRILVG YILNNVLLWSTITLWFWLLG HCGSCWAFGAVESLSDRFCIKYNLNVSLSANDVIACCGLLCGFGCN GGFPMGAWLYFKYHGVVTQECDPYFDNTGCSHPGCEPTYPTPKCE RKCVRNQLWGESKHYGVGAYRINPDPQDIMA EVYKNGPVEVAFTV YEDFAHYKSGVYKYITGTKIGGHAVKLIGWGTSDDGEDYWLLANQW NRSWGDDGYFKIRRG TNECGIEQSVVAGLPSEKNVFKGITTSDDLLV SSV* | NP_563647 |
| CTB2 | <i>Arabidops is thaliana</i> | MADNCIRLLHSASVFFCLGLLISSFNLLQGIAAENLSKQKLT SWILQNE IVKEVNENPNAGWKASFNDRFANATVAEFKRLLGVKPTPKTEFLGVPI VSHDISLKLKPEFDARTAWSQCTSIGRILDQGHCGSCWAFGAVESLS DRFCIKYNMNVSLSVNDLLACCGFLCGQGCNGGYPIAAWRYFKHHG VVTEECDPYFDNTGCSHPGCEPAYPTPKCARKCVSGNQLWRESKH YGV SAYKVRSH PDDIMA EVYKNGPVEVAFTVYEDFAHYKSGVYKHIT GTNIGGHAVKLIGWGTSDDGEDYWLLANQWNRSWGDDGYFKIRRG TNECGIEHGVVAGLP SDRNVVKGITTSDDLLVSSF* | XP_002889395 |
| CTB3 | <i>Arabidops is thaliana</i> | MAVYNTKLCLASVFLLLGLLLAFDLKGIEAESLTKQKLDSKILQDEIVKK VNENPNAGWKAAINDRFSNATVAEFKRLLGVKPTPKKHFLGVPIVSH DPSLKLKPAFDARTAWPQCTSIGNILDQGHCGSCWAFGAVESLSDR FCIQFGMNISLSVNDLLACCGFRCDGCDGGYPIAAWQYFSYSGVV TEECDPYFDNTGCSHPGCEPAYPTPKCSRKCVSDNKLWSESKHYSV STYTVKSNPQDIMA EVYKNGPVEVSFTVYEDFAHYKSGVYKHITGSN IGGHAVKLIGWGTSSSEGEDYWL MANQWNRGWGDDGYFMIRRGTN ECGIEDEPVAGLPSSKNVFRVDTGSNDLPVASV* | XP_023637179 .1 |

| | | | |
|-------|----------------------------------|---|--------------|
| CEP1 | <i>Arabidops is thaliana</i> | MKRFIVLALCMLMVLETTKGLDFHNKDVESENSLWELYERWRSHHT VARSLEEKAKRFNVFKHNVKHIHETNKKDKSYKLKLNKFGDMTSEEF RRTYAGSNIKHHRMFQGEKKATKSFMYANVNTLPTSVDWRKNGAVT PVKNQQQCGSCWAFSTVVAVEGINQIRTKKLTSLSEQELVDCDTNQN QGCNGGLMDLAFEFIKEKGGLTSELVYPYKASDETCDTNKENAPVVS IDGHEDVPKNSEDDLKAVANQPVSAIDAGGSDFQFYSEGVFTGR CGTELNHGVAVVGYGTTIDGTKYWIVKNSWGEEWGEKGYIRMQRGI RHKEGLCGIAMEASYPLKNSNTNPSRLSLDSLKDEL* | XP_002864049 |
| XCP2 | <i>Arabidops is thaliana</i> | MALSSPSRILCFALALSAASLSLSFASSHDYSIVGYSPEDLESHDKLIE LFENWISNFEKAYETVEEKFLRFEVFKDNLKHIDETNKKGKSYWLGL NEFADLSHEEFKKMYLGLKTDIVRRDEERSYAEFAYRDVEAVPKSVD WRKKGAVAEVKNQGGSCGSCWAFSTVAAVEGINKIVTGNLTTLSEQEL IDCDTTYNNGCNGGLMDYAFEYIVKNGGLRKEEDYPYSMEEGTCEM QKDESETVTINGHQDVPTNDEKSLLKALAHQPLSVAIDASGREFQFY SGGVFDGRCGVDLDHGVAAGVYGSSKGS DYIIVKNSWGPKWGEKG YIRLKRNTGKPEGLCGINKMASFPTKTK* | NP_564126 |
| XBCP3 | <i>Arabidops is thaliana</i> | MSMSSSSFISLTFFFLLLVS SSSSSDDISELFDDWCQKHGKTYGSEE ERQQRIQIFKDNHDFVTQHNLITNATYSLSLNAFADLTHHEFKASRLG LSVSAPSVIMASKGQSLGGSVKVPDSVDWRKKGAVTNVKDQGSCG ACWSFSATGAMEGINQIVTGD L ISLSEQELIDCDKSYNAGCNGGLMD YAFEFVIKNHGIDTEKDYPYQERDGTCKKDKLKQKVVTIDSYAGVKS NDEKALMEAVAAQPVSVGICGSERAFQLYSRGIFSGPCSTSLDHAVLI VGYGSQNGVDYWIVKNSWGKSWGMDGFMHMQRNTENS DGVC GI NMLASYPIKTHPNPPPPSPPGPTKCNLFTYCSSGETCCCARELFGLC FSWKCCIEIASVCCCKDGRHCCPHDYPVCDTTRSLCLKKTGNFTAIP FWKKNSSKQLGRFEEWVM* | AAK71314 |
| RD21A | <i>Arabidops is thaliana</i> | MGFLKPTMAILFLAMVAVSSAVDMSIISYDEKHGVSTTGGRSEAEVM SIYEAWLVKHGKAQSQNSLVEKDRRFEIFKDNLRFVDEHNEKNLSYR LGLTRFADLTNDEYRSKYLGA KMEKKGERRTSLRYEARVGDELPE SI DWRKKGAVAEVKDQGGCGSCWAFSTIGAVEGINQIVTGD LITLSEQE LVDCDTSYNEGCNGGLMDYAFEFIKNGGIDTDKDYPYKGV DGTCDQ IRKNAKVVTIDS YEDVPTYSEESLKKAVAHQPISIAIEAGGRAFQLYDS GIFDGSCGTQLDHGVVAVGYGTENGKDYWIVRNSWGKSWGESGYL RMARNIASSSGKCGIAIEPSYPIKNGENPPNPGPSPSPPIKPPTQCDS YYTCPESNTCCCLFEYGYKCYFAWGCCPLEAATCCDDNYSCCPHEY | XP_020866872 |

PVCDLDQGTCLLSKNSPFSVKALKRKRPATPFWSQGRKNIA*

| | | | |
|-------|----------------------------------|--|-----------|
| THI1 | <i>Arabidops is thaliana</i> | MLNVLRNSNLTAVLICFVLIASKLCSVDSSVYDPHKTLKQRFEKWLK THSKLYGGRDEWMLRFGIYQSNVQLIDYINSLHLPFKLTDNRFADMT NSEFKAHFLGLNTSSLRLHKKQRPVCDPAGNVPDAVDWRTQGAVTP IRNQGKCGGCWAFSAVAAIEGINKIKTGNLVSLSEQQLIDCDVGTYNK GCSGGLMETAFEFIKTNGGLATETDYPYTGIEGTCDQEKSKNKVVTI QGYQKVAQNEASLQIAAAQPPVSVGIDAGGFIFQLYSSGVFTNYCGT NLNHGVTVVGYGVEGDQKYWIVKNSWGTGWGEEGYIRMERGVSE DTGKCGIAMMASYPLQ* | NP_563764 |
| SAG12 | <i>Arabidops is thaliana</i> | MALKHMQIFLFVAIFSSFCFSITLSRPLDNELIMQKRHIEWMTKHGRV YADVKEENNRYVVFKNNVERIEHLNSIPAGRTFKLAVNQFADLTNDEF CSMYTGFKGVSAISSQSQTMSPFYQNVSSGALPVSVDWRRKKGA VTPIKNQGSCGCCWAFSAVAAIEGATQIKKGKLISSLSEQQLVDCDND FGCEGGLMDTAFEHIKATGGLTTESDYPYKGEDATCNSKKTNPKATS ITGYEDVPVNDEQALMKAVAHQPVSVGIEGGGDFDFQFYSSGVFTGE CTTYLDHAVTAIGYGESTNGSKYWIKNNSWGTGWGESGYMRIQKDV KDKQGLCGLAMKASYPTI* | AAC49135 |
| RD19A | <i>Arabidops is thaliana</i> | MDRLKLYFSVFVLSFFIVSVSSSDVNDGDDLVRQVVGGAEPQVLTSE DHFSLFKRKFGKVYASNEEHDRFSVFKANLRRARRHQKLDPSATH GVTQFSDLTRSEFRKKHLGVRSGFKLPKDANKAPILPTENLPEDFDW RDHGAVTPVKNQGSCGSCWSFSATGALEGANFLATGKLVSLSEQQL VDCDHECDPEEADSCDSGCNGGLMNSAFEYTLKTGGLMKEEDYPY TGKDGKTCKLDKSKIVASVSNFSVISIDEEQIAANLVKNGPLAVAINAG YMQTYIGGVSCPYICTRRLNHGVLLVGGAAGYAPARFKEKPYWIIK NSWGETWGENGFYKICKGRNICGVDSMVSTVAATVSTTAH* | AAM65162 |

| | | | |
|-------|-------------------------------------|--|--------------|
| AALP | <i>Arabidops is thaliana</i> | MSAKTILSSVVLVVLVAASAAANIGFDESNPIRMVSDGLREVEESVSQI LGQSRHVL SFARFTHRYGKKYQNV EEMKLRFSIFKENLDLIRSTNKK GLSYKLG VNFADLTWQEFQRTKLGA AQNCSATLK GSHKVTEAALP ETKDWREDGIVSPVKDQGGCGSCWTFSTTGALEAAYHQA FGGKISL SEQQLVDCAGAFNNYGCNGGLPSQAF EYIKSNGGLDTEKAYPYTGK DETCKFSAENVGVQVLNSVNITLGA EDELKHAVGLVRPVSI AFEVIHS FRLYKSGVYTD SHCGSTPMDVNHAVLAVGYGVEDGV PYWLIKNSW GADWGD KGYFKMEMGKNMCGIATCASYPVVA* | NP_568921 |
| 9.1 | <i>Populus trichocarp a</i> | MLCGQQATAEEPVSKLKLNSRILQDSIVQKVNENPKAGWEATMNPQ FSNYSVGEFKYLLGVKQTPRKELRGVPLLRHPKSMKLP IEFDARTAW PHCSTIGRILDQGHCGSCWAFGAVESLDRFCIHYGMNLSLSVNDLL ACCGWMCGAGCDGGSPIDAWRYFVQSGVVTEECDPYFDDIGCSHP GCEPGFPTPKCERKCADKNKLW AESKHFSVNAYRIDSDPHSMAEV SSNGPV EVAFTVYEDFAHYKSGVYKHITGDAMGGH AVKLIGWGTSE DGEDYWLLANQWNRGWGDDGYFKIKRGTNECGIEGAVVAGLPSTR NLVREVAGIDGHEHATA* | XP_006375410 |
| 9.2 | <i>Populus trichocarp a</i> | METSLCFSTLLLLLIGAIFTFQSQVIAVEPVSDLKLNSRILQDSILKKVN GNPKAGWKATMNHHSNYTVAQFKYLLGVKPTPK EELRGIPVISHPK SLRLPEEFDARTAWPQCSTIGKILDQGHCGSCWAFGAVESLDRFCI HYGMNISLSVNDLLACCGFLCGSGCNGGYPISAWRYFVHHGVVTEE CDPYFDDIGCSHPGCEPGYPTPKCARKCVNKNQLW KSKHYGVKP YRIDSDPESIMAEIYKNGPV EVAFTVYEDFAHYKSGVYKHITG GMMG GHAVKLIGWGTSEDGEAYWLLANQWNRGWGDDGYFKIRRG TNEC GIEGDVVAGLPSTRNLVREVVSDAREDASA* | XP_002301457 |
| PtCP5 | <i>Populus trichocarp a</i> | MASPLYHGTLFLLVAALFTFHSQVIAVEPVSNLKLNSRILQDSIVQKVN ENPNAGWEATMNPQFSNYSVGEFKYLLGVKPTPKELRGVPLVRHP KSMKLPKEFDARTAWSHCSTIGRILDQGHCGSCWAFGAVESLDRF CIHYGMNLSLSVNDLLACCGWMCGDGDGGYPIDAWRYFVQSGVV TEECDPYFDDIGCSHPGCEPGFPTPKCERKCADKNKLW AESKHFSV NAYRIDSDPHSMAEVSMNGPV EVAFTVYEDFAHYKSGVYKHITGDV MGGHAVKLIGWGTSDDGEDYWLLANQWNRGWGDDGYFKIRRG TN ECGIEEDVVAGLPSTRNLVREIAKIDAHEHASA* | |
