

1UN1

	1	10	20
1UN1	MAAAYPWTLFLGM	VMVSG	TMGAALRKPV
PttXTH16-34	MAAAYPWTLFLGM	VMVSG	TMGAALRKPV
XTH21	MGSRRVGLTSLVIV	ASLVS	AAMCGVPRRPV
XTH51	MGSRRVGLTSLVVV	ASLVS	AAMCGVPRRPV
XTH22	MGYYSMWSVCCVIL	WGFVS	VGICGTPRRPM
XTH52	MGYYSLWSVCCVIL	WGFVS	VGICGTPRRPM
XTH55	MSSLIFVFL	IILYF	IDGVLARR.SR
XTH56	MSSLIFVFL	IVLFT	DDGVLVRGGNS
XTH18	MVRMEAKASSS	LGVIL	LLVVI AEA AVS
XTH47	MVRMEAKASSS	LGVIL	LLVVI AEA AVS
XTH10	MSKEVSLFLGL	VMGFV	FVGVAF A AATA
XTH39	MSKEVSLFLGL	VMGFV	FVGVAF A AATA
XTH24	MSKMSSL	LGFFV	GLVLVGVVASS
XTH54	MSKMSSL	LGFFV	GLVLVGVVASS
XTH2	MATFYPLIRNGGSLFLIL	LSWVF	LVSSLLCVLGR
XTH28	MATFYPLIRNGGSLFLIL	LSWVF	LVSSLLCVLGR
XTH17	MYMAFFKNPFLL	LSLWA	LVLSGVCVWGK
XTH46	MYMAFFKNPFLL	LSLWA	LVLSGVCVWGK
XTH25	MFLDSQIALFFLIG	IVSSI	LFHISVASVVS
XTH57	MNNFHIALFFLIG	IVSSI	LFQISVASVVS
XTH19	MAAASEKMF	LALLF	IFFMARGI IIV
XTH48	MAAASEKMF	LALLF	IFFMARGI IIV
XTH40	MLV	ALFIC	VVVLVGNIVQV
XTH3	MHIIDHSYTSLGFCFLLSLYTYLPP	IQPNQIKGTI	INMGIEVLIINI
XTH34	MHIIDHSYTSLGFCFLLSLYTYLPP	IQPNQIKGTI	INMGIEVLIINI
XTH11	MTLVTKVP	IGFSL	LLIIT IATKAA
XTH41	MTLVTKVP	IGFSL	LLIIT IATKAA
XTH6	MAAS	TL SYL	LLIPLLMVVAY
XTH29	MAAS	TL SYL	LLIPLLMVVAY
XTH35	MASSSP	LLIPL	LLVGSIMVVAY
XTH30	MASSKVVV	LVVPL	LVMSFCMVSCW
XTH4	MAAACVNNNDALIVI	VITLF	LIITLPSSSMA
XTH33	MVASCVNNNDALIVI	VITLF	LIITLPSSSMA
XTH5	MLLPYPTS	VVMVA	LFMTMMMLLC
XTH32	MLLPYPTS	VVMVA	LFMTMMMLLC
XTH31	MLLPYPTS	VVMVA	LFMTMMMLLC
XTH14	MGSTCTNHNGFYVG	IMVIG	LVVVTMVGSC
XTH38	MGSTCTNHNGFYVG	IMVIG	LVVVTMVGSC
XTH15	MGSTCTNHNGFYVG	IMVIG	LVVVTMVGSC
XTH44	MGGFN	LVVGV	VVVVTMVGTC
XTH1	MAPSWGGS	YFLFL	CMLLGFSTIAY
XTH27	MAPSWGGS	YFLFL	CMLLGFSTIAY

1UN1	α1	β1	η1	β2	η2	β3	β4	β5
	30	40	50	60	70	80		
1UN1	DVAFGRN	YVPTWAFD	HIKYFN	GGNE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
PttXTH16-34	DVAFGRN	YVPTWAFD	HIKYFN	GGNE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH21	DVAFGRN	YVPTWAFD	HIKYFN	GGNE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH51	DVAFGRN	YVPTWAFD	HIKYFN	GGSE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH22	AVPGRN	YVPTWAFD	HIKYFN	GGSE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH52	AVPGRN	YVPTWAFD	HIKYFN	GGSE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH55	EVSFDQNY	YVPTWAFD	HIKYFN	GGSE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH56	EVSFDQNY	YVPTWAFD	HIKYFN	GGSE	IQLH	LDKYTGT	GFQSKGS	YLFGHFSM
XTH18	KGSFEDNF	FIMWSED	HFSTSK	DGQI	IWYLS	LDKDTG	CGFTKQR	YRFGWFS
XTH47	KGSFEDNF	FIMWSED	HFSTSK	DGQI	IWYLS	LDKDTG	CGFTKQR	YRFGWFS
XTH10	KFEELF	QPSWALD	HFH	EGDL	LKLDNY	SGAGF	VSKSKY	MFPGKVT
XTH39	KFEELF	QPSWALD	HFH	EGDL	LKLDNY	SGAGF	VSKSKY	MFPGKVT
XTH24	KFEELF	QPSWALD	HFH	EGDL	LKLDNY	SGAGF	VSKSKY	MFPGKVT
XTH54	KFEELF	QPSWALD	HFH	EGDL	LKLDNY	SGAGF	VSKSKY	MFPGKVT
XTH2	PATFEQD	FRTWSESH	IRHTD	QGR	IQLMLDRS	SGCGF	ASKVKY	MFGRVSM
XTH28	PATFEQD	FRTWSESH	IRHTD	QGR	IQLMLDRS	SGCGF	ASKVKY	MFGRVSM
XTH17	PVTFEQD	FRTWSESH	IRHTD	QGR	IQLMLDRS	SGCGF	ASKVKY	MFGRVSM
XTH46	PVTFEQD	FRTWSESH	IRHTD	QGR	IQLMLDRS	SGCGF	ASKVKY	MFGRVSM
XTH25	TGNFNKD	FYVLWSP	HVNTSA	DGHT	RTLKLDQ	SGAGF	ASNQMF	FLFGQID
XTH57	TGNFNKD	FYVLWSP	HVNTSA	DGHT	RTLKLDQ	SGAGF	ASNQMF	FLFGQID
XTH19	DANFGKSMY	LTWGTQ	HASIQG	ED	LQVLHQT	SGSAAQ	TKIP	FLFGS
XTH48	DANFGKSMY	LTWGTQ	HASIQG	ED	LQVLHQT	SGSAAQ	TKIP	FLFGS
XTH40	DGNF	SKSMY	LTWGTQ	HASIQG	ED	LQVLHQT	SGSAAQ	TKIP
XTH3	AGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH34	AGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH11	AGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH41	AGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH6	AGNLDQE	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH29	AGNLDQE	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH35	GAKLDQE	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH30	GAKLDQE	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH4	GSNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH33	GSNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH5	GGDLHKNID	ITWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH32	GGDLHKNID	ITWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH31	SQFLDQE	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH14	EGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH38	EGNFNQD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH15	SANFYDD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH44	SANFYDD	FETWGNDR	RAKVLN	NGQL	LTLSDKA	SGSGF	RSRNE	YLFGKID
XTH1	GGNFTD	FLLFGDD	RVKISD	GGQS	MSLMDKY	SGSGV	ATKDO	FLFGRF
XTH27	GGNFTD	FLLFGDD	RVKISD	GGQS	MSLMDKY	SGSGV	ATKDO	FLFGRF

$\eta 4$ $\eta 5$ $\beta 14$ $\eta 6$ $\eta 7$
 $\underline{\underline{22}}$ $\underline{\underline{222}}$ $\underline{\underline{220}}$ $\underline{\underline{240}}$ $\underline{\underline{250}}$
 1UN1 $\underline{\underline{210}}$ $\underline{\underline{220}}$ $\underline{\underline{230}}$ $\underline{\underline{240}}$ $\underline{\underline{250}}$
 1UN1 GGLLEKTDWSKAPFIAASYRSFHIDGCEASVEA.....KFCATQG..ARWWDQKEFQ
 PttXTH16-34 GGLLEKTDWSKAPFIAASYRSFHIDGCEASVEA.....KFCATQG..ARWWDQKEFQ
 XTH21 GGLLEKTDWSKAPFIAASYKGFHIDGCEASVEA.....KFCSTQG..KRWWDQQEFR
 XTH51 GGLLEKTDWSKAPFIAASYKGFHIDGCEASVEA.....KFCSTQG..KRWWDQQEFR
 XTH22 GGLLEKTDWSKAPFIAASYKGFHIDGCEASVEA.....KFCSTQG..KRWWDQQEFR
 XTH52 GGLLEKTDWSKAPFIAASYKGFHIDGCEASVEA.....KFCSTQG..KRWWDQQEFR
 XTH55 GGRRTKINWNSAPFKAYFQGFVDVKGCEVLQDS.....SDIQHCASHKYQWNTPSFW
 XTH56 GGRRTKINWNSAPFKAYFQGFVDVKGCEVLQDS.....SDIQHCSDSKYQWNTPSFW
 XTH18 GGLLEKTNWKLAPFVSSYKDFSVDDGQWKDP.....YPACVSTTTDNWWDQYSAW
 XTH47 GGLLEKTNWKLAPFVSSYKDFSVDDGQWKDP.....YPACVSTTTDNWWDQYSAW
 XTH10 GGRVKTNWSHAPFIAATYKAFEINGCECPVSSSTS...VENLKRCSSE.KKYWWDDEPNLG
 XTH39 GGRVKTNWSHAPFIAATYKAFEINACECPVSSSTS...VENLKRCSSE.KKYWWDDEPNLG
 XTH24 GGRVKTDWSHAPFVATYKDFITIDACECPVGVSSSSVAPENAKRCSSEDDKYYWDEPTMS
 XTH54 GGRVKTDWSHAPFVATYKDFITIDACECPVGVSSSSVAPENAKRCSSEDDKYYWDEPTMS
 XTH2 GGLLEKIDWSKAPFNAYYKDFDIEGCSVPGPA.....SCASNPSNWWEGAAAYQ
 XTH28 GGLLEKIDWSKAPFNAYYKDFDIEGCSVPGPA.....SCASNPSNWWEGAAAYQ
 XTH17 GGLLEKIDWRKAPFYAYYKDFDIEGQPLGPT.....SCASNASNWWEGAAAYQ
 XTH46 GGLLEKIDWRKAPFYAYYKDFDIEGQPLGPT.....SCASNASNWWEGAAAYQ
 XTH25 GGQDKIDWTKGGPIASFRNYYNIDACVWKGNP.....RFCRVASHVNWNWLNNSF
 XTH57 GGQDKIDWTKGGPIASFRNYYNIDACVWKGNP.....RFCRVASHVNWNWLNNSF
 XTH19 GGLVKTNWNTNAPFIARLNRFARARACKWNGPISIN.....NCASNVPNSNWTSPYIK
 XTH48 GGLVKTNWNTNAPFIARLNRFARARACKWNGPISIN.....NCASNVPNSNWTSPYIK
 XTH40 GGLVKTDWRGAPFIAFHFRARARACKWNGAVSIN.....HCASNVPANWWSPLYK
 XTH3 GGLVKTDWTQAPFTAASYKGFNAQAQCVWSSSSGSSCSKQ.....GQSWFTQ
 XTH34 GGLVKTDWTQAPFTAASYKGFNAQAQCVWSSSSGSSCSKQ.....GQSWFTQ
 XTH11 GGLVKTDWAHAPFTAAYRNFNAPP.....AQSWMGQ
 XTH41 GGLVKTDWAHAPFTAAYRNFNAPP.....AQSWMGQ
 XTH6 GGLVKTDWTKAPFTAAYRNFNADACIWSNGASSCGSGSG...SSS.....TSSSWLSQ
 XTH29 GGLVKTDWTNAPFTAAYRNFNADACIWSNGASSCGSGSG...SSS.....TSSSWLSQ
 XTH35 GGLVKTDWTKAPFTAAYRNFNADACIWSNGASSCGSGSG...LGSSTT...SSSWLSQ
 XTH30 GGLVKTDWSKAPFTAAYRNFNANNACIWKNGRSSCKS.....SSSWLSQ
 XTH4 GGLVKTDWSQAPFTAAYRNFNANNACIWSNGVSSCNLSSSN...SSSN.....NNSWLSQ
 XTH33 GGLVKTDWSQAPFTAAYRNFNANNACIWSNGVSSCNLSS.N...SSDN.....NNSWLSQ
 XTH5 SGLIKTNWSAAPFIAYFKNFVFNACVESTPPSITSSCTHP...NKKSNHNSVGEKWITQ
 XTH32 GGVIKTNWSAAPFIAYFKNFVFNACVESTPPSIKSSCTHL...NKKNNHNSVGEKWITQ
 XTH31
 XTH14 GGLVKTDWAKAPFTAAYRNFRAATQLSSASLRPNTRSSSEWE...TS.....
 XTH38 GGLVKTDWAKAPFTAAYRNFRAATQLSSASLRPNTRSSSEWE...TS.....
 XTH15 GGLVKTDWSKAPFTAAYRNFKATAFSATSAFSDVATSEIQ...NSGK.....DS
 XTH44 GGLVKTDWSKAPFTAAYRNFKATAFSATSAFSNVVTSEIQ...GSGE.....DS
 XTH1 WGVVKIDLSQAPFIARFKNYNGTACVPPKGIADCKG.....FGASMKR
 XTH27 WGVVKIDLSQAPFIARFKNYNGTACVPPKGIADCKG.....FGASMKK

$\alpha 2$ $\beta 15$ $\eta 8$ $\alpha 3$
 $\underline{\underline{00000000000000}}$ $\underline{\underline{000}}$
 $\underline{\underline{260}}$ $\underline{\underline{270}}$ $\underline{\underline{280}}$ $\underline{\underline{290}}$
 1UN1 $\underline{\underline{260}}$ $\underline{\underline{270}}$ $\underline{\underline{280}}$ $\underline{\underline{290}}$
 1UN1 DLDADFQYRRLSWVVRQKYTIYNYCTDRSRYP SMPPECKRDRDI.....
 PttXTH16-34 DLDADFQYRRLSWVVRQKYTIYNYCTDRSRYP SMPPECKRDRDI.....
 XTH21 DLDALQWRRLRWVVRQKFTIYNYCNDRRYPTLPPECSRDRDI.....
 XTH51 DLDALQWRRLRWVVRQKFTIYNYCNDRRYPTLPPECSRDRDI.....
 XTH22 DLDYQWRRLRWVRRRFTIYNYCSDRTRYQPMPPECRRTNGDY.....
 XTH52 DLDYQWRRLRWVRRRFTIYNYCSDRTRYQPMPPECRRTNGDY.....
 XTH55 QLDPVRQRQYENVKTRYMIYDYCTDRKRNFTPPELCOQ.....
 XTH56 QLDPVRQRQYEDVKTRYMIYDYCTDRKRNFTPPELCOQ.....
 XTH18 HLSDDQKKDYAVWRNRLVIYDYCNDSERYPTLPEECSLSPWD.....
 XTH47 HLSDDQKKDYAVWRNRLVIYDYCNDSERYPTLPEECSLSPWD.....
 XTH10 VLSLHQSHQLMWRRAKHMVYDYCADTARFFVMPAECVHSHHKLVLKN.....
 XTH39 VLSLHQSHQLMWRRAKHMVYDYCADTARFFVMPAECVHSHHKLVLKN.....
 XTH24 ELNVHQSHQLMWRANHMVYDYCTDTARFFVTPAECVHHR.....
 XTH54 ELNVHQSHQLMWRANHMVYDYCTDTARFFVTPAECVHHR.....
 XTH2 ELSAIQARRYRWRINHVYDYCQDKSRFFHFALMFVGKKPNMEEHKRI.....
 XTH28 ELSAIQARRYRWRINHVYDYCQDKSRFFVTPPECLAGI.....
 XTH17 ALTPQARLYRWRINHIYDYCQDKRFFLGPPECLS.....
 XTH46 ALTPQARLYRWRINHIYDYCQDKRFFLGPPECLS.....
 XTH25 TLTSPORRWFKWRKYHMIYDYCQDNERFQNNLPQEWSLPKY.....
 XTH57 TLTSPORRWFKWRKYHMIYDYCQDNERFQNNLPQEWSLPKY.....
 XTH19 QLSYAQMGLYWRNRYMIYDYCKDTKRFNGQSSDFVI.....
 XTH48 QLSYAQMGLYWRNRYMIYDYCKDTKRFNGQVPPECFKTF.....
 XTH40 QLSYSEKGLYWRNRYMIYDYCADSKRFNGQLPPECSKTQL.....
 XTH3 SLDSGTQARIQWVQKNYMIYNYCTDTKRFQGLPECTLA.....
 XTH34 SLDSGTQARIQWVQKNYMIYNYCTDTKRFQGLPECTLA.....
 XTH11 SLDSGTGLARIHVVQKNYMIYNYCTDLKRFQGPPECSLA.....
 XTH41 SLDSGTGLARIHVVQKNYMIYNYCTDLKRFQGPPECSLA.....
 XTH6 ELDTTAQERLRWVQKNYMIYNYCTDAKRFQGPPECRTS.....
 XTH29 ELDTTAQERLRWVQKNYMIYNYCTDAKRFQGPPECRTS.....
 XTH35 ELDTTAQERLRWVQKNYMIYNYCTDAKRFQGPPECRTS.....
 XTH30 ELDSGLQRLRWVQKNYMIYNYCTDKKRFGRFPIECNRS.....
 XTH4 QLDSNGQRKLRWVQKNYMIYNYCSDINRFFQGLPLECTLRIT.....
 XTH33 QLDSNGQRKLRWVQKNYMIYNYCSDINRFFQGLPLECTLRIT.....
 XTH5 GLKPSVVDKLNWVHKNFIVYNYCSDLKRFFQGLPLECIPVQKEKLLDQEFDITWGDGRA
 XTH32 ELKPSVVDKLNWVHKNFIVYNYCSDLKRFFQGLPLECKIN.....
 XTH31
 XTH14 DIDAI GRRRLRWVQKYFMIYNYCNDFKRFFQGLPAECRSRF.....
 XTH38 DIDAVGRRRLRWVQKYFMIYNYCNDFKRFFQGLPAECRSRF.....
 XTH15 VLDAYGRRRLRWVQKYFVVYNYCNDLKRFFEGIPAECSHGRF.....
 XTH44 VLDAYGRRRLRWVQKYFVVYNYCNDPKRFFQGIPEACSHGRF.....
 XTH1 GLDNENKKKLRQVNSKWVVYHYCRDLRXYAHLGPFECRRDNMAHSDNNQ.....
 XTH27 GLDNENKKKLRQVNSKWVVYHYCRDLRXYAHLGPFECRRDNMAHSDNNQ.....

1UN1

1UN1
PttXTH16-34
XTH21
XTH51
XTH22
XTH52
XTH55
XTH56
XTH18
XTH47
XTH10
XTH39
XTH24
XTH54
XTH2
XTH28
XTH17
XTH46
XTH25
XTH57
XTH19
XTH48
XTH40
XTH3
XTH34
XTH11
XTH41
XTH6
XTH29
XTH35
XTH30
XTH4
XTH33
XTH5 KMLNNGELLTSLDKASC SGFQSKNEFLFGKIDMQLKLVPGNSLSSKGSNWDEIDFEFLG
XTH32
XTH31
XTH14
XTH38
XTH15
XTH44
XTH1
XTH27

1UN1

1UN1
PttXTH16-34
XTH21
XTH51
XTH22
XTH52
XTH55
XTH56
XTH18
XTH47
XTH10
XTH39
XTH24
XTH54
XTH2
XTH28
XTH17
XTH46
XTH25
XTH57
XTH19
XTH48
XTH40
XTH3
XTH34
XTH11
XTH41
XTH6
XTH29
XTH35
XTH30
XTH4
XTH33
XTH5 NVSGEPYILHTNVFSNGKGNTEQQFYLFWDPSADFHHTYSILWNPQRIMFSVDS SPIREFK
XTH32
XTH31
XTH14
XTH38
XTH15
XTH44
XTH1
XTH27

1UN1

```
1UN1
PttXTH16-34 .....
XTH21 .....
XTH51 .....
XTH22 .....
XTH52 .....
XTH55 .....
XTH56 .....
XTH18 .....
XTH47 .....
XTH10 .....
XTH39 .....
XTH24 .....
XTH54 .....
XTH2 .....
XTH28 .....
XTH17 .....
XTH46 .....
XTH25 .....
XTH57 .....
XTH19 .....
XTH48 .....
XTH40 .....
XTH3 .....
XTH34 .....
XTH11 .....
XTH41 .....
XTH6 .....
XTH29 .....
XTH35 .....
XTH30 .....
XTH4 .....
XTH33 .....
XTH5 NMNQTEFHQSRSQ
XTH32 .....
XTH31 .....
XTH14 .....
XTH38 .....
XTH15 .....
XTH44 .....
XTH1 .....
XTH27 .....
```

Supplementary Files 5 The multiple alignment of amino acid sequences among 58 AhXTHs in peanut and 1UN1

Amino acid sequences from 58 AhXTHs in peanut were aligned using PttXET16-34 (1UN1) as a referent sequence by MEGA X, and their secondary structures were predicted using ESPript. The conserved residues were shown in blue frames.