

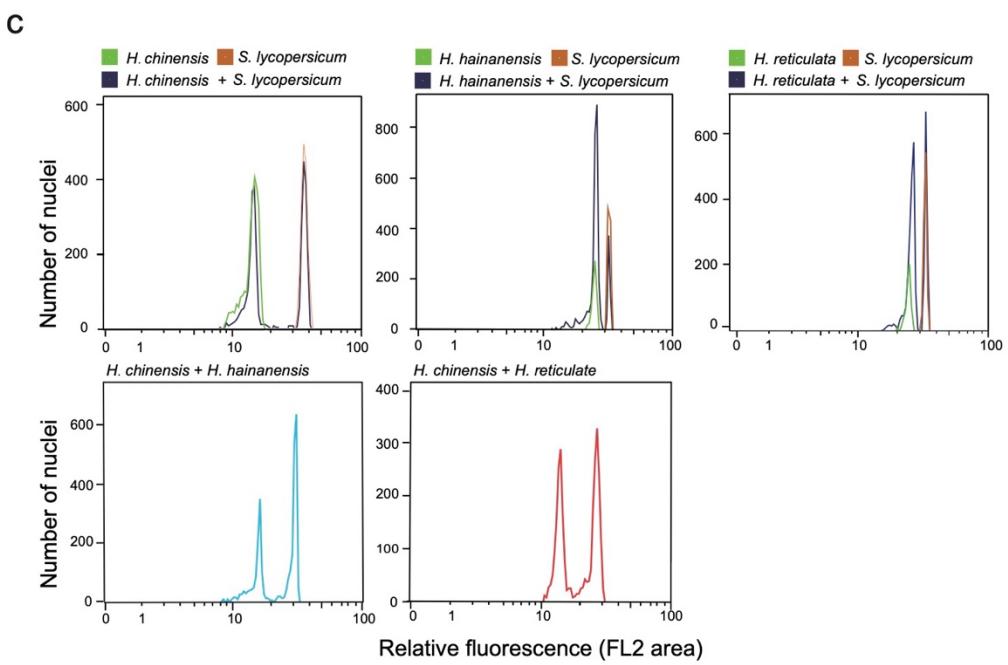
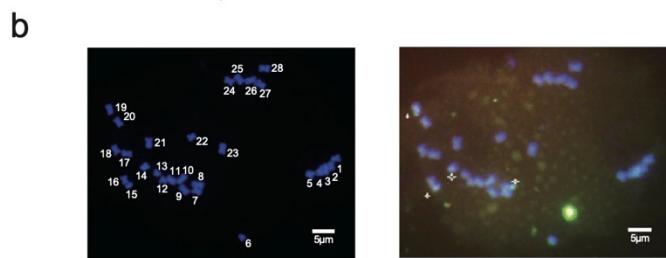
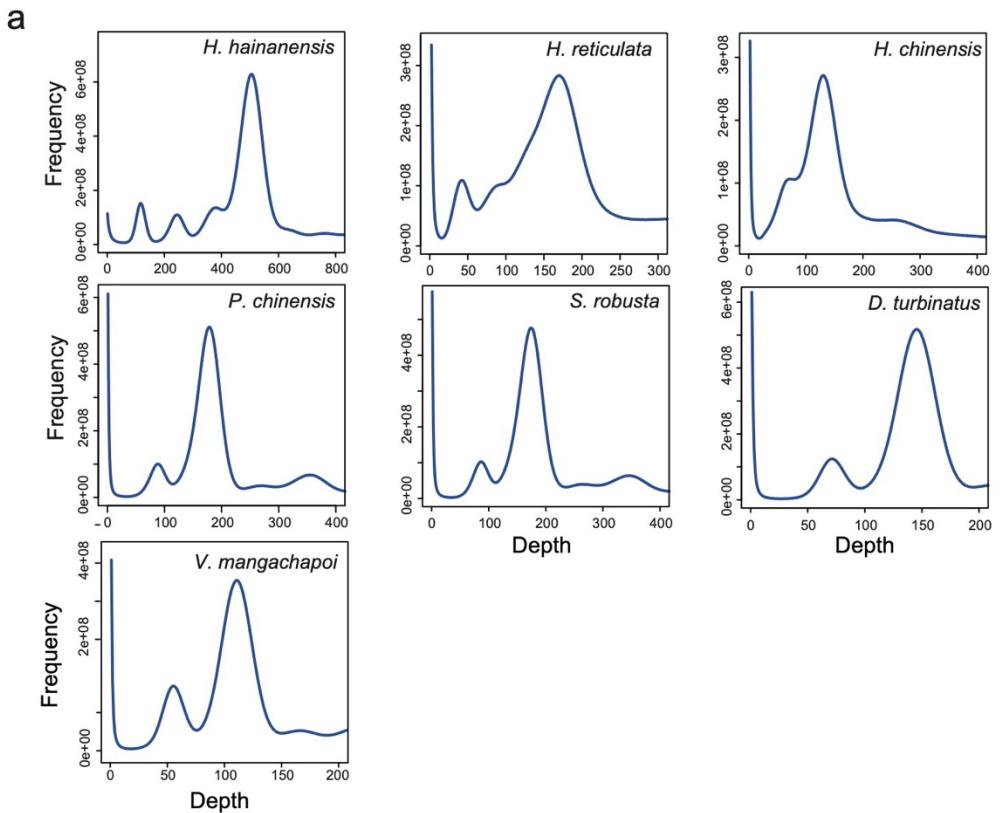
Supplemental information

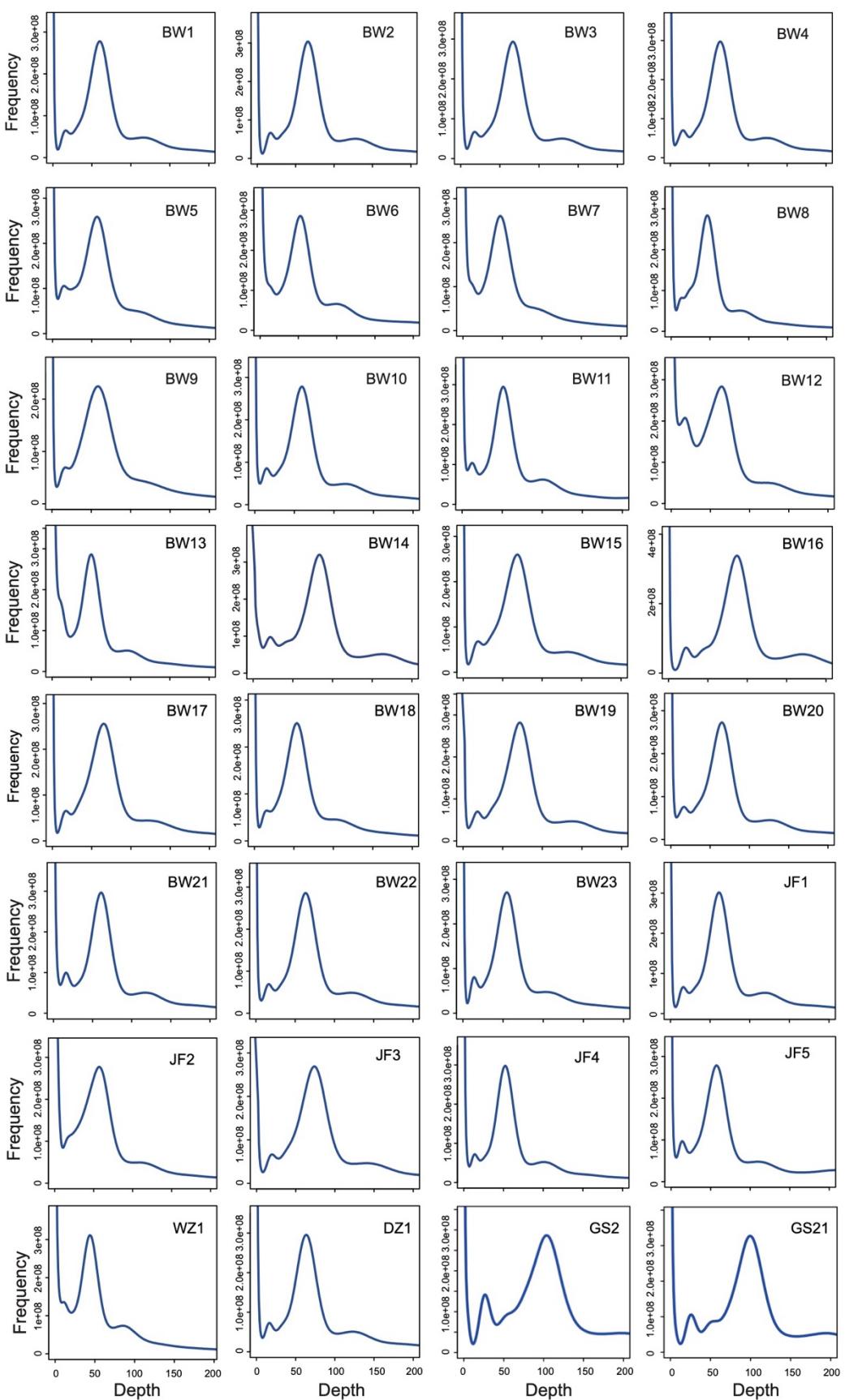
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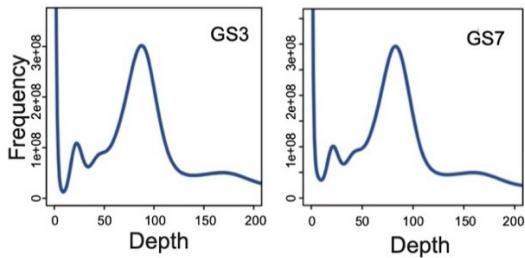
Dipterocarpoidae genomics reveal their demography and adaptations to Asian rainforests

Author list:

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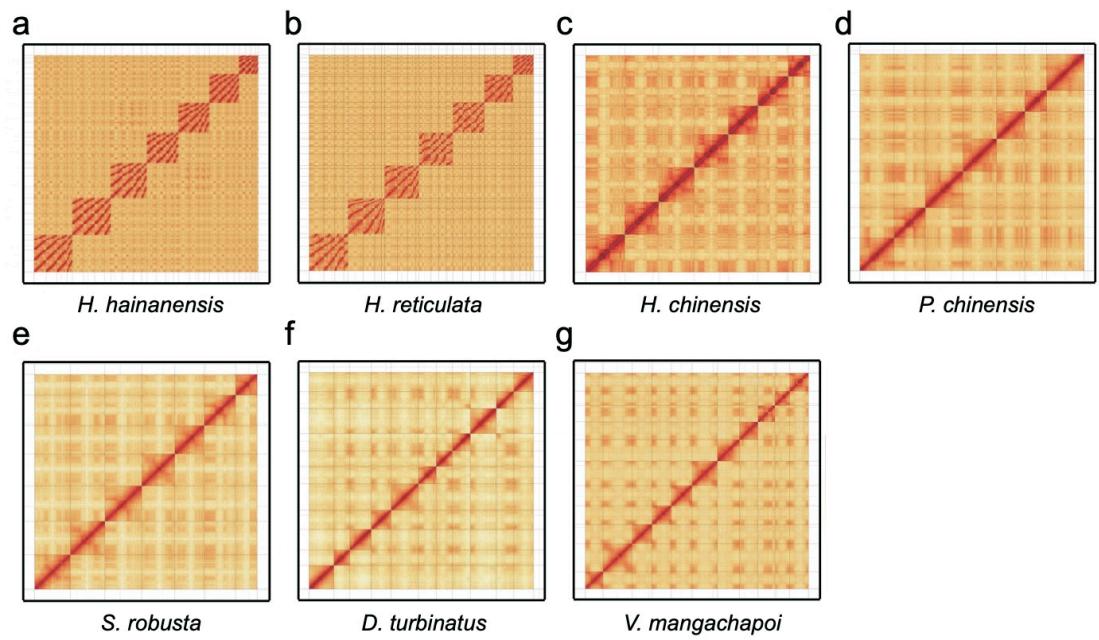


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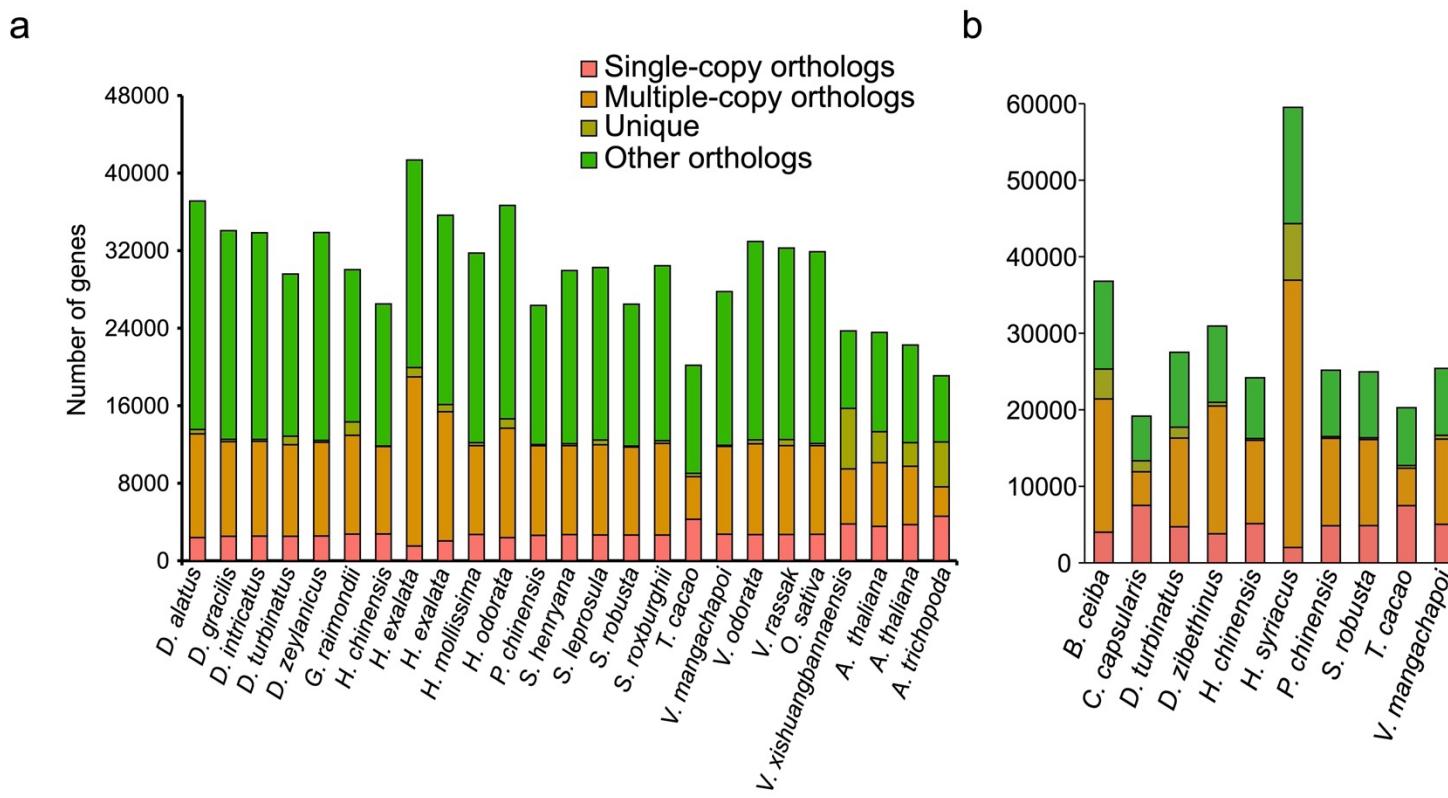


Supplementary Figure 1. *k*-mer distributions of the 7 Dipterocarpoideae genomes (a), the results of karyotype analysis of *H. hainanensis* using fluorescence *in situ* hybridization (b), the results of flow cytometry (c), and *k*-mer distributions of all sampled trees of *H. hainanensis* ($n=30$) and the selected four *H. reticulata* trees (d).

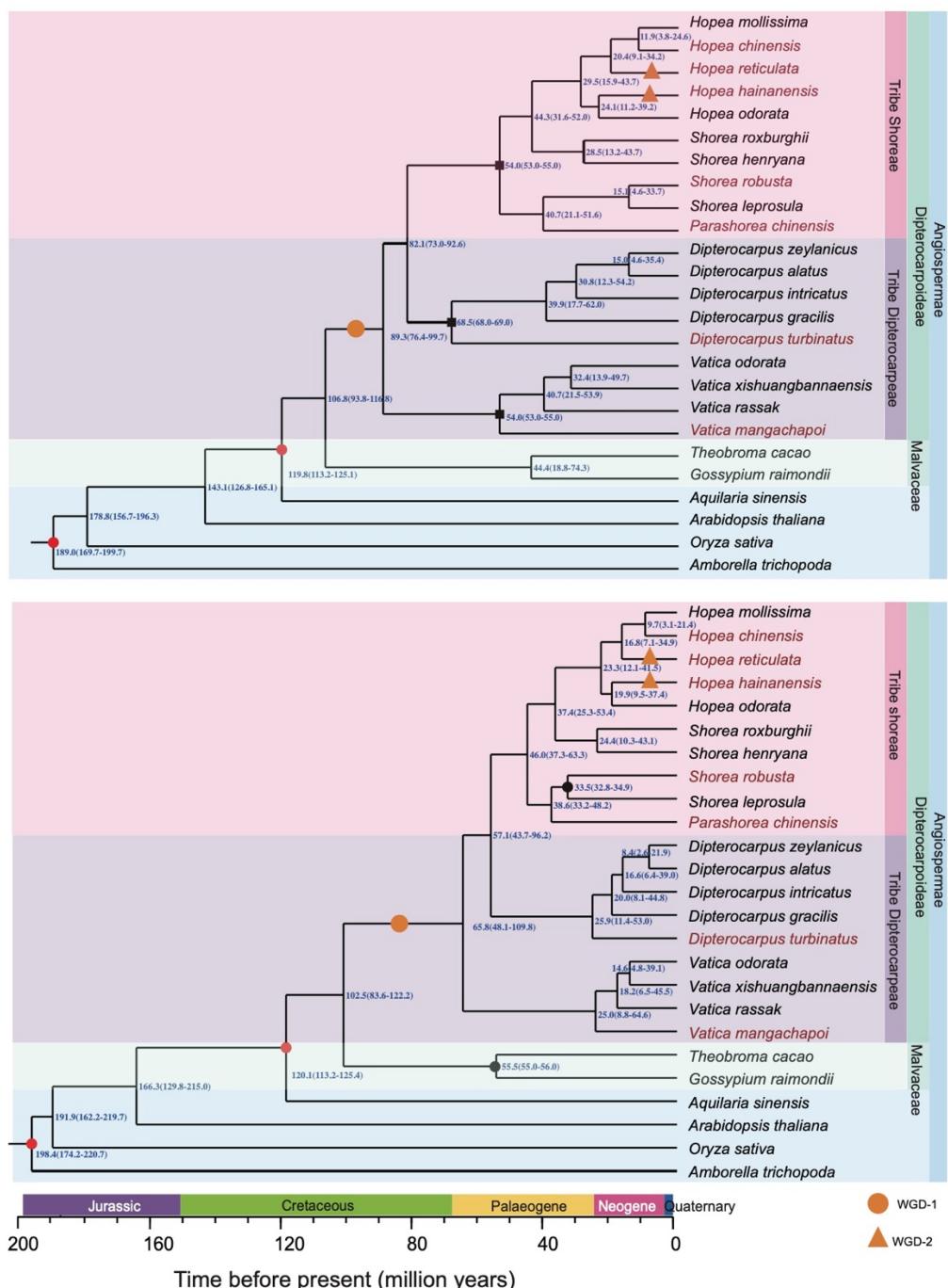
In the *k*-mer analysis, the ploidy of a species is assessed via the ratio of the depth of the leftmost peak to that of the rightmost peak, and the results suggest that *H. hainanensis* and *H. reticulata* are tetraploid species and the other species are diploids. The details of Illumina sequencing data used for the *k*-mer analysis are shown in Supplementary Tables 2 and 16. The chromosome number of *H. hainanensis* was identified as 28, which was four times as the basic chromosome number in genus *Hopea* ($n=7$)¹. The green fluorescence signal (highlighted by crosses in Supplementary Fig. 1b) were detected in all the four chromosomes using *in situ* hybridization with the probe of 18SrDNA (this experiment was performed for one time), further confirming that there are four copies of basic chromosomes in *H. hainanensis*, i.e., autotetraploidy. When estimating the genome size for *H. Chinesis*, *H. hainanensis* and *H. reticulata*, we used the genome of *Solanum lycopersicum* ($2C = 2.12$) as the reference for flow cytometry experiments. When estimating genome size, we ran individual sample for each of the three *Hopea* species (*H. Chinesis*, *H. hainanensis* and *H. reticulata*) and *S. lycopersicum* separately, and ran samples combining each *Hopea* species with *S. lycopersicum* (Supplementary Fig 1c (the upper panel) and Supplementary Table 1). *H. Chinesis* was chosen as the reference diploid species for the estimation of ploidy of *H. hainanensis* and *H. reticulata*. Each treatment of flow cytometry experiments were repeated for three times with similar results.



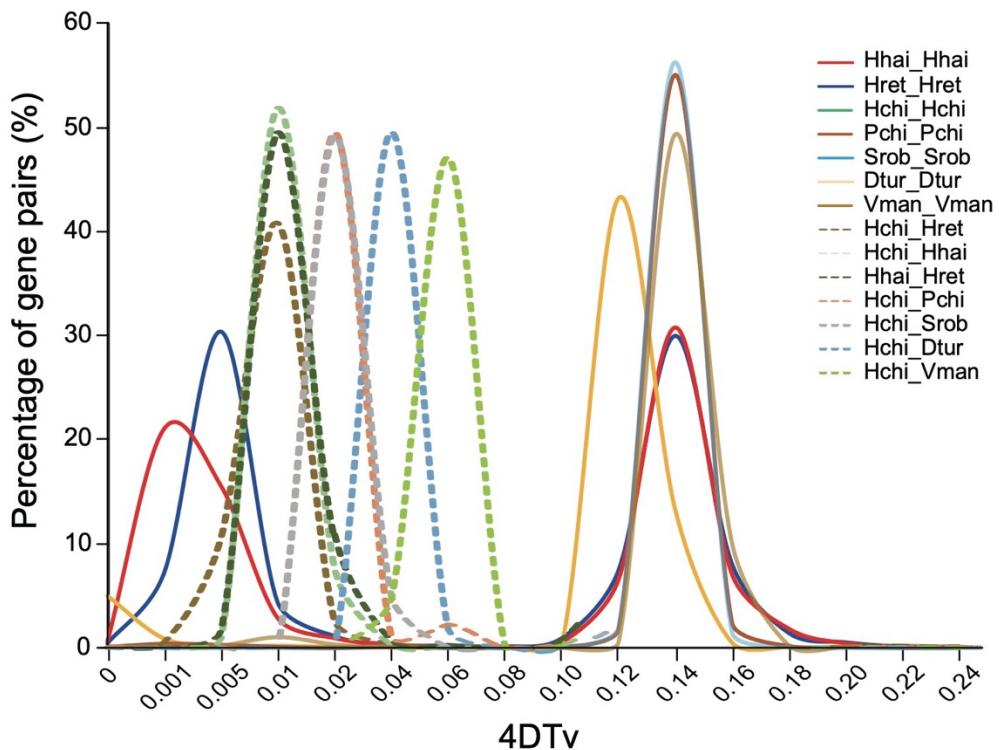
Supplementary Figure 2. Heat maps of interaction intensity between the pseudo-chromosomes clustered by Hi-C reads for the 7 Dipterocarpoideae species.



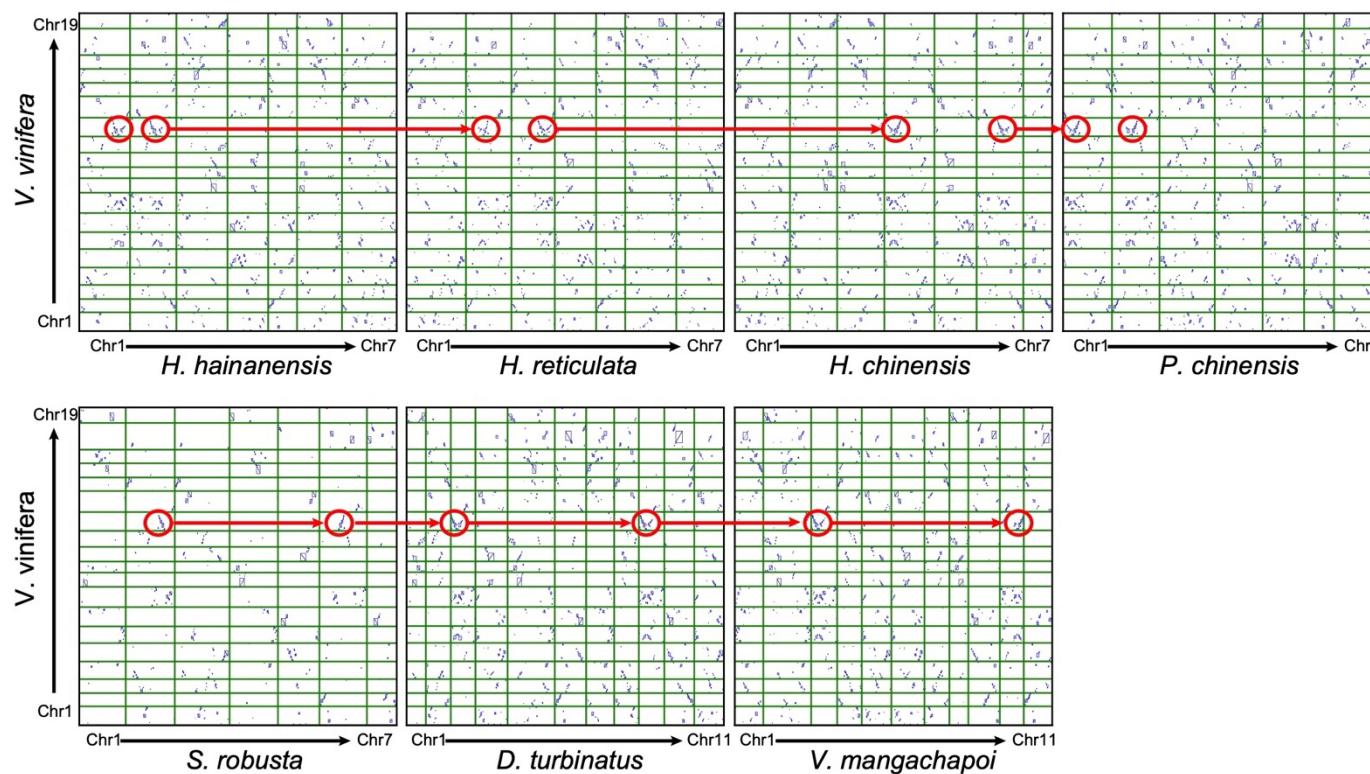
Supplementary Figure 3. Results of gene family clustering based on the genomes of our focal 7 Dipterocarpoideae species, other 12 Dipterocarpoideae species and four species from other plant taxa (a) and those of the 5 diploid Dipterocarpoideae species and 5 temperate tree species (b). Full names of each species and the references reported the assembled genomes are listed in Supplementary Table 9. Source data are provided as a Source Data file.

a

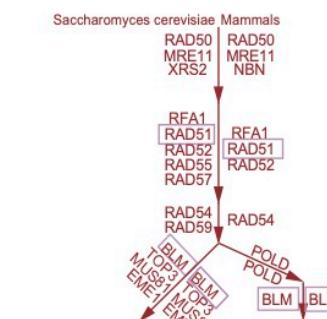
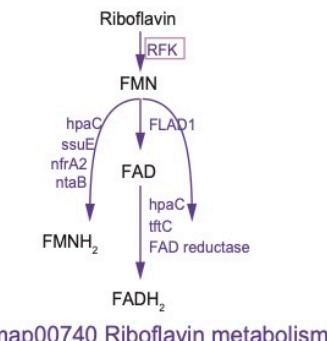
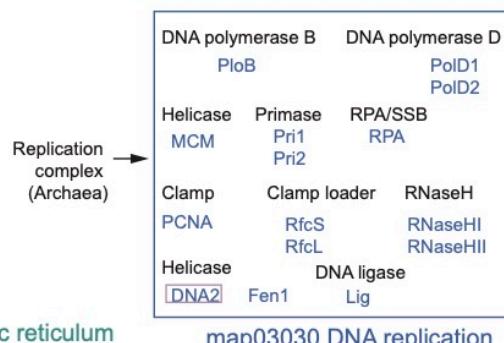
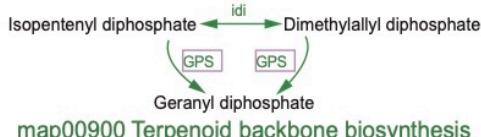
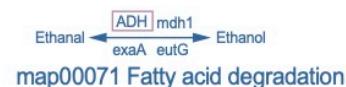
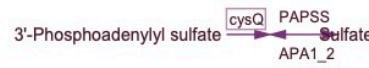
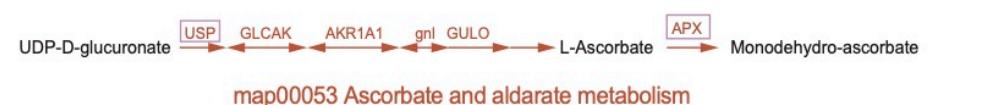
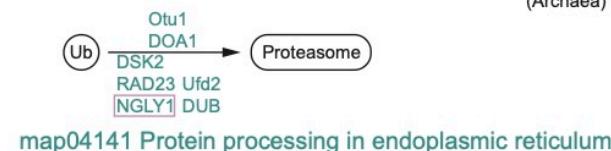
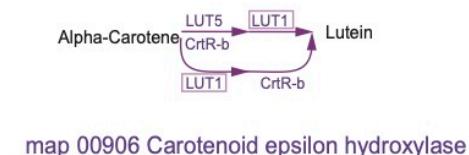
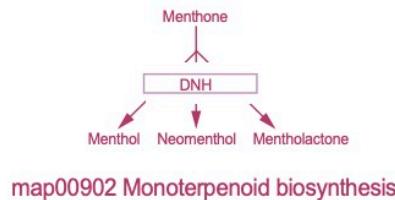
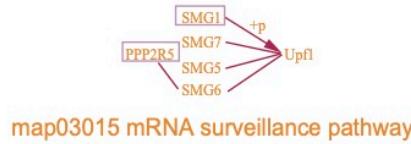
b



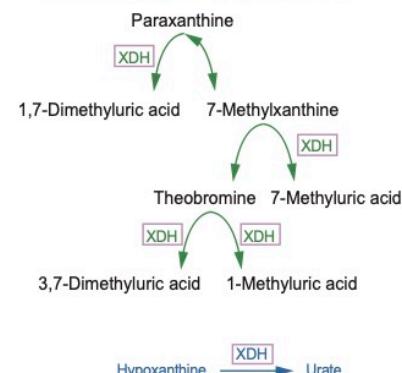
Supplementary Figure 4. Results of phylogenomic analysis using calibrations from Bell et al.² and Vega et al.³ (red dots), Bansal et al.⁴ (black squares) and Ng et al.⁵ (black dots) (a), and the distribution of transversion rate of four-fold degenerate sites (4DTv) for homologous genes within each genome and between two genomes (b). The genomes assembled in this study are highlighted by red. Abbreviations of species are shown in Supplementary Table 2.



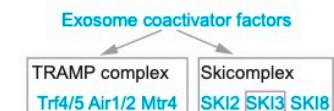
Supplementary Figure 5. Comparison of the homologous regions between the genome of each focal Dipterocarpoideae species and the genome of *Vitis vinifera*. Results show that most homologous regions detected in the genome of *Vitis vinifera* are doubled in the genomes of our focal species.



map00232 Caffeine metabolism



map00230 Purine metabolism

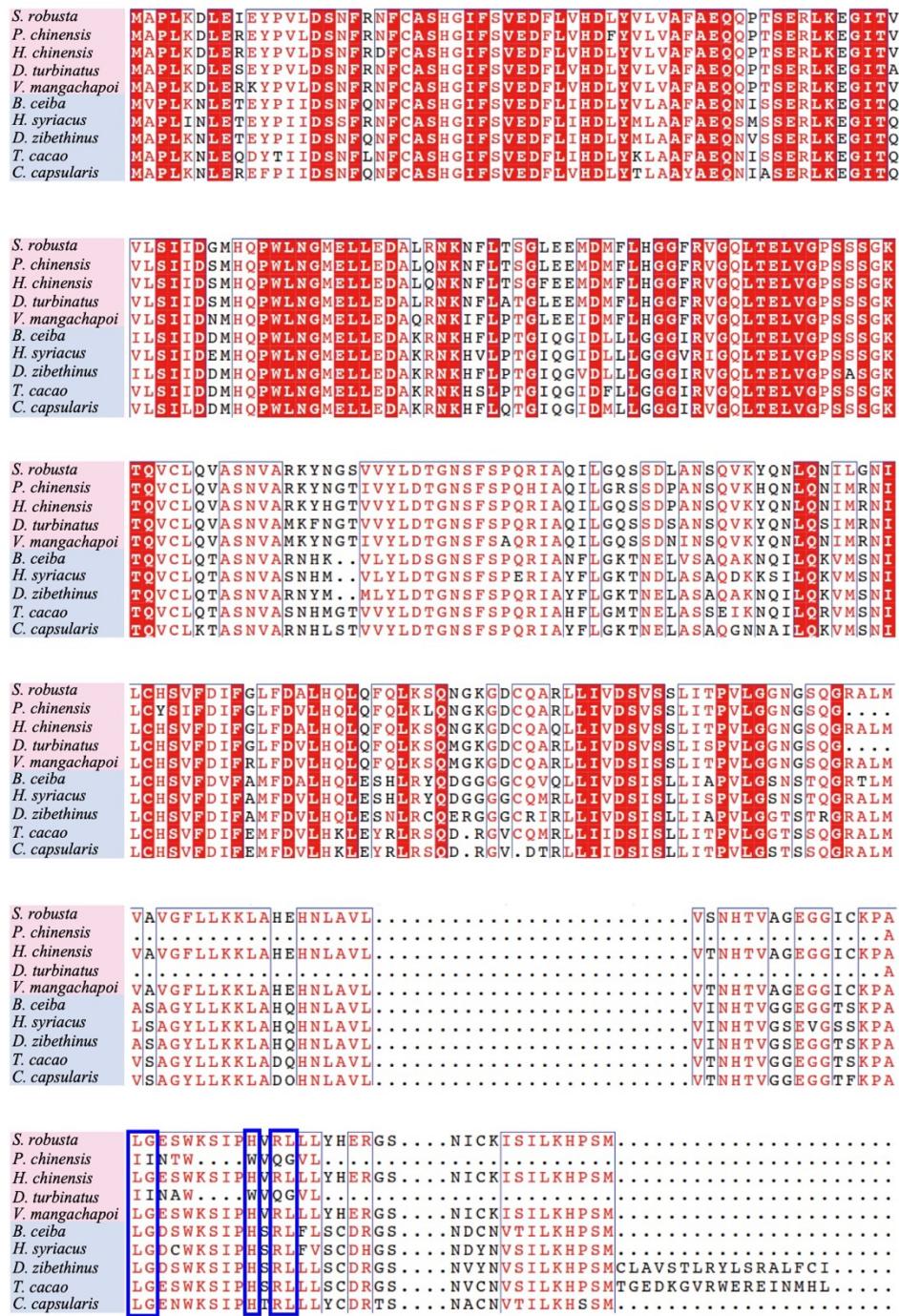


map03018 RNA degradation

Positively selected genes detected in comparing with temperate trees

Supplementary Figure 6. Positively selected genes (16) involved in the KEGG pathways relevant to plants' response to environmental stresses. Purple frames are used to highlight the positively selected genes supported by the comparison with the genomes of five temperate tree species. The function of each gene is shown in Supplementary Data 2.

a RAD51D



RAD51D

The image shows a sequence alignment of the RAD51D gene across nine plant species. The species listed on the left are *S. robusta*, *P. chinensis*, *H. chinensis*, *D. turbinatus*, *V. mangachapoi*, *B. ceiba*, *H. syriacus*, *D. zibethinus*, *T. cacao*, and *C. capsularis*. The sequence is shown as a grid of dots, where each dot represents a position in the sequence. Colored boxes highlight specific amino acid residues at positions 253, 254, 255, and 256. In *S. robusta*, the sequence is ASGKAASFVI. In *P. chinensis*, it is ASGKAASRFVI. In *H. chinensis*, it is ASGKAASRFVI. In *D. turbinatus*, it is ASGKAARFMIPPDSR. In *V. mangachapoi*, it is ASGKAASFVI. In *B. ceiba*, it is ASGKAASFVI. In *H. syriacus*, it is ASGKAARFLI. In *D. zibethinus*, the sequence is YLCPFYIRLLGRLQGLLFRTCPYRFAGDEKNIEKMELFHE. In *T. cacao*, the sequence is DTTATAIEWALAEELINNPAVLEKARQVMEMKVVGN. In *C. capsularis*, the sequence is ASGKAARFVI.

Species	Sequence
<i>S. robusta</i>	ASGKAASFVI
<i>P. chinensis</i>	ASGKAASRFVI
<i>H. chinensis</i>	ASGKAASRFVI
<i>D. turbinatus</i>	ASGKAARFMIPPDSR
<i>V. mangachapoi</i>	ASGKAASFVI
<i>B. ceiba</i>	ASGKAASFVI
<i>H. syriacus</i>	ASGKAARFLI
<i>D. zibethinus</i>	YLCPFYIRLLGRLQGLLFRTCPYRFAGDEKNIEKMELFHE
<i>T. cacao</i>	DTTATAIEWALAEELINNPAVLEKARQVMEMKVVGN
<i>C. capsularis</i>	ASGKAARFVI

SMC5

<i>S. robusta</i>	L P E F F E H P K D E L G R L I N G Q I R E L R V Q S N E K R L Q K S E M E K L L Y Q R Q L N L R Q C I D R L K D M E N T N
<i>P. chinensis</i>	L P E F F E H P K E E L G R L N G Q I R E L R V Q S N E K R L Q K S E M E K L L Y Q R Q S N L R Q C I D R L K D M E N T N
<i>H. chinensis</i>	L P E F F E H P K D E L G R L I N G Q I R E L R V Q S N E K R L Q K S E M E K L L Y Q R Q L N L R Q C I D R L K D M E N T N
<i>D. turbinatus</i>	L P K F E Q P K D E L G R L I N G Q I R E L R V Q S N E K R L Q K S E M E K L L Y Q R Q L N L K Q C V D R L K D M E N T N
<i>V. mangachapoi</i>	L P E F P P K D E I G R L N G Q I R E L R V Q S N E K R L Q K S E M E K L L Y Q R Q L N L K Q C V D R L K D M E N T N
<i>B. ceiba</i>	L P A Y E P P K A E I E R L K S Q I L E L T S S A H Q L M Q Q K E K E K S L G Q M K A A L R N C V D S L K D M E N T K
<i>H. syriacus</i>	L P V Y E P P K E E I E R L K I Q I V E L T S S A Q Q M M Q Q K E K E K S L G Q M K T D L R N C V D S L K D M E N T K
<i>D. zibethinus</i>	L P T Y E P P K E E I E R L K S Q I V E L T S S A H Q K M Q Q K E K E K S L G Q M K T A L R N C V D S L K D M E N T N
<i>T. cacao</i>	L P A Y E P P K E E I D K L S Q I V E L T S S A R Q K M Q Q K E K E K S L G Q M K T A L R N C M D S L R D M E N T N
<i>C. capsularis</i>	L R S Y K P K E E I E S L I S Q I A E K T S S A R E K K R Q K E M K E K H L G Q L K S A L R N C V N S L T D L E N K N

<i>S. robusta</i>	N K R L H A L K N S G A E S I V Q A Y Q W L Q Q H R N L L N K E V F G P V I L L E V N V S D Q M H A N Y L E G H V P F X I
<i>P. chinensis</i>	N K R L H A L K N S G A E S I V Q A Y Q W L Q Q H R N L L N K E V V G P V I L L E V N V S D H M H A N Y L E G H V P F Y I
<i>H. chinensis</i>	N K R L H A L K N S G A E S I V Q A Y Q W L Q Q H R N L L N K E V V G P V I L L E V N V S D Q M H A N Y L E G H V P F Y I
<i>D. turbinatus</i>	N K R L H A L K N S G V E S I V Q A Y Q W L Q Q H R N L L N K E V V G P V I L L E V N V S D Q M H A N Y L E G H V P F Y I
<i>V. mangachapoi</i>	N K R L N A L K N S G A E S I I Q A Y Q W L Q Q H R N L L N N E V Y G P V I L L E V N V S D Q M H A N Y L E G H V P F Y I
<i>B. ceiba</i>	T K L L H A L K S G A E K I F D A Y Q W L Q Q H R D E L N K D V Y G P V I L L E V N V S N E V H A N F L E G H V A H Y I
<i>H. syriacus</i>	S K C L H A L K C G A D K I F E A Y Q W L Q E Q N R D K L N K E V V G P V I L L E V N V S N E V H A N F L E G H V A H Y I
<i>D. zibethinus</i>	N K L L H A L Q K S G A E K I V D A Y R W L Q Q H R D E L N K D V Y G P V I L L E V N V S N K V H A N F L E G H V A H Y I
<i>T. cacao</i>	T K D L R A L R N S G A E K I F D A Y E W V Q L H R H E L N K E V V G P V I L L E V N V A D Q V H A N F L E G H V A H Y I
<i>C. capsularis</i>	T K L L H A L K N T G A E R I F D A Y O W L O O H R H E L N K E V F G P V I L L E V N V S D K L H A N F L E G H V A H Y I

<i>S. robusta</i>	W K S F I T Q D D G D R D F V A K N L K P F E V P V L N Y V R D G N G Q K S R P E V S . E E M R V L G I Y T R L D Q V F
<i>P. chinensis</i>	W K S F I T Q D D G D R D F V A K N L K P F E V P V L N Y V R D G N G L K S R P E V S . E E M R V L G I Y T R L D Q V F
<i>H. chinensis</i>	W K S F I T Q D D A D R D F V V K N L K P F E V P V L N Y V R D G N G L K S R P E I S . E E M R V L G I Y T R L D Q V F
<i>D. turbinatus</i>	W K S F I T Q D D E D R D F V A K N L K P F E V P V L N Y V R D G N G L K S R P E V S . E E M R V L G I Y T R L D Q V F
<i>V. mangachapoi</i>	W K S F I T Q D D G D R D F V A K N L K P F E V P V L N Y V R D G N G L K S R P E A S . E E M R V L G I Y T R L D Q V F
<i>B. ceiba</i>	W R S F I T Q D A G D R D F L V R N L Q S F D V P I L N Y V R D E S G R K A P F E I S K Q Q M R E F G I Y S R L D Q V F
<i>H. syriacus</i>	W R S F I T Q D S S D R D F L V K N L Q P F D V P I L N T R E S G R K A P F E I S K Q M H E L G I Y S R L D Q V F
<i>D. zibethinus</i>	W R S F I T Q D S G D R D F L V K N L Q P F D V P I L N Y V R D E S G R K A P F E I S N Q M R E L G I Y S R L D Q V F
<i>T. cacao</i>	W K S F I T Q D S S D R D F L V K N L Q S F D V P I L N Y V R D E S G R K A P F E I S K Q M H E L G I Y S R L D Q V F
<i>C. capsularis</i>	W K S F I T Q D S S D R D F L V K N L E S F D V P I L N Y V G G O S D R K E P F E I S N O M R E L G I Y S R L D Q V F

<i>S. robusta</i>	D A F D V V K E V L T S Q F G L D N S Y I G T K E T D K K A D D V K E . L G I S D L W T P E N H Y R W
<i>P. chinensis</i>	D A F D V V K E A L T S Q F G L E N S Y I G T K E T D K K A D D V K E . L G I S D L W T P E N H Y R W
<i>H. chinensis</i>	D A F D V V K E V L T S Q F G L E N S Y I G T K E T D K K A D D V K E . L G I S D L W T P E N H Y R W
<i>D. turbinatus</i>	D A F D V V K E V L T S Q F G L E N S Y I G T K E T D Q K K A D D V K E . L G I P D L W T P E N H Y R W
<i>V. mangachapoi</i>	D A F D V V K E V L T S Q F G L E N S Y I G T K E T D Q K A D H V K K . M G I P D L W T P E N H Y R W
<i>B. ceiba</i>	D A P T A V K E V L T S Q F G L E H S Y I G S D K T D K K A D D T A R R L G I L D F W T P Q N H Y H W
<i>H. syriacus</i>	D A P T A V K E V L T S Q F G L E H S Y I G S D K T D K K A D D T A R R L G I L D F W T P Q N H Y H W
<i>D. zibethinus</i>	D A P T A V K E V L T S Q F G L E H S H I G S D K T D K K A D D V A K K L G I L D F W T P Q N H Y H W
<i>T. cacao</i>	D A P T A V K E V L T S Q F G L E H S Y I G S D K T D R K A D D V A K . L G I L D F W T P Q N H Y H W
<i>C. capsularis</i>	D A P T A V K E V L T S Q C S L D R S Y I G S G N T D O N A D Y I A N . L G I F D F W T P O N H Y H W

<i>S. robusta</i>	V C S R Y . D N H V S A R V E A V D R S R L L F G G L D G G E I E K L R S R T S E L E K S I T D I Q Q E L K S L Q T E Q
<i>P. chinensis</i>	V C S R Y . D N H V S A R V E A V D R S R L L F G G L D G G E I E K L R S R T S E L E K S I T D I Q Q E L K S L Q T E Q
<i>H. chinensis</i>	V R S R Y . D N H V S A R V E A V D R S R L L F G G L D G G E I E K L R F R T S E L E K S I T D I Q Q E L K S L Q T E Q
<i>D. turbinatus</i>	V C S R Y . D K H V S A R V E A V D R S R L L F G G L D G G E I E K L R S R R S E L E K S I A D I Q Q E L K S L Q N E Q
<i>V. mangachapoi</i>	V C S R Y . D N H V S A R V E A V D R S R L L F G G L D G G E I E K L R S R K S E L E K S I A D I Q Q E L K S L Q T E Q
<i>B. ceiba</i>	S V S R Y G D N E M S A R V E P V H D S R L L H G L D S G E I E K L R S R N E L E N S V A D E D G I K S L Q I Q Q
<i>H. syriacus</i>	S V S R Y G D N E M S A Q V E P V H D S R L L C G L L D S G E I E K L R S R N E L E K S V A D V E E G I K S L Q I Q Q
<i>D. zibethinus</i>	S V S R Y G D N E K S A Q V E P V R D S R L L C G L L D S G E I E K L R S R K N E L E N S V A D M E E G I K S L Q I Q Q
<i>T. cacao</i>	S V S R Y . D N H I S G T V E S V R D S R L L C G L D T G E I E K L R S R K N E L E N S V A D M E E G I K S L Q I Q Q
<i>C. capsularis</i>	S V S R Y D N N A I S A T V E P V G D S R L L S G L D L G E T E T L K S R K I E L E N S V A D A E R G I K L L Q S E O

<i>S. robusta</i>	R I L E D E A A Q L Q K Q Q E E I V N T V R N E K R K R Q E L E N R I E Q R K R K V E S L E K E D D L D T V M A K L V D
<i>P. chinensis</i>	R I L E D E A A Q L Q K Q Q E E I V N T V R N E K R K R Q E L E N R I E Q R K R K V E S L E K E D D L D T V M A K L V D
<i>H. chinensis</i>	R I L E D E A A K L Q K Q Q E E I V N T V R N E K R K R Q E L E N R I E Q R K R K V E S L E K E D D L D T V M A K L V D
<i>D. turbinatus</i>	R I L E D E A A Q L Q K R Q E E I V N T V R N E K R K R Q E M E N R I E Q R K R K L E S L E K E D D L D T V M T K L I D
<i>V. mangachapoi</i>	R I L E D E A A Q L Q K Q E E I V N T V R N E K R K R Q E L E N R I E Q R K R K L E S L E K E D D L D T V M A K L I D
<i>B. ceiba</i>	R V A E D E A A K L Q K Q R E E M V N T G R E M K K R K E L E S C V E Q R K R K L V S L E K G D V E T A M A K L I D
<i>H. syriacus</i>	R L V E D E A A K L Q K Q R E E M V D T A R R E M K K R K E L E S C V E Q R K R K L S L E K A G D M E I A V V K L I D
<i>D. zibethinus</i>	R L F E D E A A K L Q K Q R E E M V E T G R R E M K K R K E M E S C V E Q R K R K L V S L E K G D L E T A V A K L I D
<i>T. cacao</i>	R L L E D E A A K L H K Q R E E M I N I G K R E K Q K R E M E S C V E Q R K R K L A S L E E G V D L E T A V A K L I D
<i>C. capsularis</i>	R Q L E D E S A K I E K R E D M V L T S R R M I Q K Q K N M E N Y A Q L K S T L . S L E E S D D L E T A V A K L I D

SMC5

<i>S. robusta</i>	QVARHNNTNRFEDMIKIKDLLVDAVSLKWNLAEKKNLVSIEYDAKVRELEANFKHQEKFHQ
<i>P. chinensis</i>	QVARHNNSNRFEDMIKIKDLLVDAVSLKWNLAEKNLASIEYDAKIRELEANLKQQEKFHQ
<i>H. chinensis</i>	QVARHNNTNRYEDMIKIKDLLVDAVSLKWNLAEKNLASIEYDAKIRELEANLKHQEKFHQ
<i>D. turbinatus</i>	QVARHNTSQFEDVIKIKDLLVDAVSLKWNLAEKNLASIEYDAKIRELQANLKHQEKFHQ
<i>V. mangachapoi</i>	QVARHNNTNRFEDVIKIKDLLVDAVSLKWNLAEKNLASIEYDAKIRELQANLKHQEKFHQ
<i>B. ceiba</i>	QATRSNVVERFKHAIKIKDLLVEAVSCKWSFAEKHMVSIEYDAKIRDSEANLKEHEKFHQ
<i>H. syriacus</i>	QATRSNIEERLKHAALKDLLVEAVSCKWSFAEKHMVSIEYDAKIRDMEVNLEHEKFHQ
<i>D. zibethinus</i>	QATRSNVRFKHAIKIKDLLVEAVSCKWSFAEKHMVSIEYDAKIRDMEVNLEHEKFAYQ
<i>T. cacao</i>	QATRSNVQRFKHAIKIKDLLVEAVSCKWSFAEKHMVSIEYDAKIRDMEVNLTQHEKFHQ
<i>C. capsularis</i>	RAKRSNIEERFINHAIKIKDLLVEAVWAKWSFAEKHMSFIENDAKIRELEVNLTAHKKVASK

<i>S. robusta</i>	ALQQFEYCKKEVEDCRQOLYAAKTSAESIAVITPELEKAFLLEMPPTTIEELEAAIEDNISQ
<i>P. chinensis</i>	ALQQFEYCKKEVEDCREQOLSAAKTSAESIAVITPELEKAFLLEMPPTTIEELEAAIEDNISQ
<i>H. chinensis</i>	ALQQLEYCKKEVEDCRQOLSAAKRSAESIAVITPELEKAFLLEMPPTTIEELEAAIEDNISQ
<i>D. turbinatus</i>	ALQQLEYCKKEVEDCRQOLSAAKRSAESIAVITPELEKAFLLEMPPTTIEELEAAIEDNISQ
<i>V. mangachapoi</i>	ALQQFELYCKKEVEDCRQOLSAAKRSAESIAVITPELEKAFLLEMPPTTIEELEAAIEDNISQ
<i>B. ceiba</i>	ASLDLQICEKNVEDHSQOLLAAKFHAESIAIATIPELEKLFLLEMPPTTIEELEAAIQDNISQ
<i>H. syriacus</i>	ASMNLEICQQEVKDYRQOLSAAKRTAESIATITPELQKLFLEMPPTTIEELEAAIQDNISQ
<i>D. zibethinus</i>	ASLNQFCENDVKGQYSQOLESAAKERAESIAIITPELEKLFLLEMPPTTIEELEAAIQDNISQ
<i>T. cacao</i>	ASLHLEYCKKDVEDCHQOLSAAKFHAETIAIITPELAKLFLLEMPPTTIEELEAAIQDNISQ
<i>C. capsularis</i>	ASLDLQKCKEDVEDYLOOLSAAKKHAESIAIITPELAKLFRKMPTTIEELEAAIQDNISQ

<i>S. robusta</i>	ANSILFLNN.QNILQOEYEHQRQHIEDISTKLEADDKKELERCLAEINALKESWLFTTLRNLV
<i>P. chinensis</i>	ANSILFLN.QNILQOEYEHQRQHIEDISTKLEADDKKELERCLAEINALKESWLFTTLRNLV
<i>H. chinensis</i>	ANSILFLN.QNILQOEYEHQRQHIEDVSTKLEADDKKELERCWAELNALKESWLFTTLRNLV
<i>D. turbinatus</i>	ANSILFLN.QNILQOEYEHQRQHIEDVSTKLEADDKKELERCLTEMNALKESWLFTTLRNLV
<i>V. mangachapoi</i>	ANSILFLN.QNILQOEYEHQRQHIEDISTKLEADDKKELERCLAEELNALKESWLFTTLRNLV
<i>B. ceiba</i>	ANSIVFLN.RNILQOEYEDRRHQIEAISAKLDDADNKELQRCLAEIDALKGNWLPTTLRNLV
<i>H. syriacus</i>	ANSIVFLN.RNILQOEYEDRRHQIEAISAKLDDADNKELQRCLAEIDALKGNWLPTTLRNLV
<i>D. zibethinus</i>	ANSIVFLN.RNILQOEYEDDRQHQIEAISAKLDDADNKELQRCLAEIDALKGNWLPTTLRNIVN
<i>T. cacao</i>	ANSIVFLN.RNILQOEYEDDRQCIETISAKLEADDNKELQCLADIIDALKGNWLPTTLRNIVN
<i>C. capsularis</i>	ANSIFCLNGNNNILLQEYEDRRHQIEFTLSKLEADNNKLOKCLEEIIDALKGTWLPTTLRNIVN

<i>S. robusta</i>	QINETFSHKQEMAVAGEVLLD.
<i>P. chinensis</i>	QINETFSRKQEMAVAGEVLLD.
<i>H. chinensis</i>	QINETFSHKQEMAVAGEVLLLGITM.
<i>D. turbinatus</i>	QINETFSRKQEMAVAGEVLLD.
<i>V. mangachapoi</i>	QINETFSRKQEMAVAGEVLLD.
<i>B. ceiba</i>	QINETFSRNQEMAVAGEVSLD.
<i>H. syriacus</i>	QINETFSRNQEMAVAGEVSLD.
<i>D. zibethinus</i>	QINETFSRNQEMAVAGEVSLD.
<i>T. cacao</i>	QINETFSRNQEMAIAGEVSLD.
<i>C. capsularis</i>	QINETFSRNFKEMAVAGEVSLD.

<i>S. robusta</i>	.....EHGTDQFGILIKVKFR
<i>P. chinensis</i>	.....EHGTDQFDQFGILIKVKFR
<i>H. chinensis</i>	.....NMELIFDQFGILIKVKFR
<i>D. turbinatus</i>	.....EHGTDQFDQFGILIKVKFR
<i>V. mangachapoi</i>	.....ERGSDFDQFGILIKVKFR
<i>B. ceiba</i>	.....EHDTDFDQFGILIKVKFR
<i>H. syriacus</i>	.....EHONDQFGILIKVKFR
<i>D. zibethinus</i>	.....EHDMDFDQFGVLVKVKFR
<i>T. cacao</i>	.....EHDTDFDQFGILIKVKFR
<i>C. capsularis</i>	.....EHADDFDQFGIFIKVVKFR

<i>S. robusta</i>	.....QS GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>P. chinensis</i>	.....QS GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>H. chinensis</i>	.....QS GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>D. turbinatus</i>	.....QS GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>V. mangachapoi</i>	.....QS GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>B. ceiba</i>	.....QA GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>H. syriacus</i>	.....QA GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>D. zibethinus</i>	.....QA GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>T. cacao</i>	.....QT GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG
<i>C. capsularis</i>	.....QA GQLQVLSAHHQSGGERSVSTILYLVSLQDLTNCPFRVVDEINQG

SMC5

<i>S. robusta</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWIEQASKVW
<i>P. chinensis</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EQASKVW
<i>H. chinensis</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EQASKVW
<i>D. turbinatus</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EQASKVW
<i>V. mangachapoi</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EQASKVW
<i>B. ceiba</i>	MDLINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWIETPSKVW
<i>H. syriacus</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EGPSKVW
<i>D. zibethinus</i>	MDPINERKMFQQLVRAATQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI ETPSKVW
<i>T. cacao</i>	MDPINERKMFQQLVRAATQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI EAPS KVW
<i>C. capsularis</i>	MDPINERKMFQQLVRAASQPNTPQCFLTPKILLPNLEYSEACSILNIMNGPWI QT PSKVW

<i>S. robusta</i>	SFGESWGIVGGGL..AI....
<i>P. chinensis</i>	SFGESWGIVAGL..AR....
<i>H. chinensis</i>	SFGESWGIVAGL..AR....
<i>D. turbinatus</i>	SFGESWGIVAGL..AR....
<i>V. mangachapoi</i>	SFGESWGIVAGL..AR....
<i>B. ceiba</i>	SSGECWGTIAGL..VERSRC
<i>H. syriacus</i>	GNGDCWSLIAGLEETRRQRC
<i>D. zibethinus</i>	SSGECWATIAGL..VKQNRC
<i>T. cacao</i>	SSGECWGTIAGL..VDESRC
<i>C. capsularis</i>	SKGERWSTIAGL..VEESRC

C LUT1

<i>S. robusta</i>	MRSSSLIS.	SFSFPTA P PRR <i>SAT</i>.	....S LHS.....L	SVKSSVE KT E.TTKTQ..
<i>P. chinensis</i>	MQSSSLIS.	SFSFPTA P PRH <i>SAT</i>.	....S LHS.....L	SIKSSVE KT E.TTNKKPQ..
<i>H. chinensis</i>	MQSSSLIS.	SFSFPTA P PPR <i>RFSAT</i>.	....S LHS.....L	SIKSSVE KT E.NTKPQ..
<i>D. turbinatus</i>	MQSSSLIS.	SFSFPTA P PPR <i>SAT</i> S.	....LHS.....L	SVKSSVD KI K...PQ..
<i>V. mangachapoi</i>	MQSFSIS.	SFSFPAAPPP <i>RSVT</i> S.	....LRS.....L	SIKSSVE KI S.TTKSQ..
<i>B. pendula</i>	MQSCLTESS.	SFLVSIPIP <i>KPINS</i> S.	....PLQPS.	F SVKSSVD KT E.TSKPKHL
<i>O. rehderiana</i>	MQSCLTESS.	SFLVSIPIP <i>KPINS</i> S.	....PLQPS.	F SIKSSID KT E.TTKPK..
<i>Q. robur</i>	MQSCTLG.	SLSFLSLSPQRPPN.	....IPLQS.	F SVKSYIG KI E.TAKRK..
<i>F. sylvatica</i>	MRCVAFS.	SITFPSPLP <i>RRLTIN</i>.	....IPLQS.	F SVKSSIE KT E.TTKPK..
<i>F. excelsior</i>	MRCVTLIS.	SLSFFSLP <i>PQRATIN</i>.	....IPLQS.	F SIKSSIE KT E.STKPK..
<i>S. robusta</i>	PTNASPR K PA	SWVSPNWLTSLSRSL .	TVGRGDDSGIPIASAE	LLGGALFLPLF	
<i>P. chinensis</i>	PTNASPR K PA	SWVSPNWLTSLSRSL .	TIGRGDDSGIPIASAE	LLGGALFLPLF	
<i>H. chinensis</i>	PTNATPR K PA	SWVSPNWLTSLSRSL .	TVGRGDDSGIPIASAE	LLGGALFLPLF	
<i>D. turbinatus</i>	PTNATTR K PA	SWVSPNWLTSLSRSL .	TVGRGDDSGIPIASAKL	LLGGALFLPLF	
<i>V. mangachapoi</i>	PTNATTB K PA	SWVSPNWLTSLSRSL .	TIGRGDDSGIPIASAQ	LLGGALFLPLF	
<i>B. pendula</i>	ATSATPSK K AT	SWVSPNWLTSLSKSL .	TIGSNDDSGIPIASAO	LEDVS	
<i>O. rehderiana</i>	APAPSKTT	SWVSPNWLTSLSKSL .	TFGANDDSGIPIVANAO	LEDVS	
<i>Q. robur</i>	PTIPS	SWVSPNWLTSLSKSL .	TIGFNDDSGIPIASAO	LEDVS	
<i>F. sylvatica</i>	PTSPSKST	SWVSPNWLTSLSKSL .	TIGSNDDSRIPIASAO	LEDVS	
<i>F. excelsior</i>	PA...SPSNST	SWVSPNWLTSLSKSL .	TIGSNDDSGIPIASAO	LEDVS	
<i>S. robusta</i>	FLQHLNFEELLPD	QNISM TTGATIHTTNGLFMKLS	QRQSNLTFAS	S TSR.....	
<i>P. chinensis</i>	FLQHLNFEELLPD	QNISM TTGATIHTTNGLFMKLS	QRQSNLAFAS	S SILR.....	
<i>H. chinensis</i>	FLQHLNFEELVPD	QNISM TTGATIHTTNGLFMKLS	QRQSNLAFAS	S TSR.....	
<i>D. turbinatus</i>	FLQHLKFEELVPD	QNISM TTGATIHTTNGLFMKLS	QRQSNLAFAS	S TSR.....	
<i>V. mangachapoi</i>	FLQHLNFEELVPD	QNISM TTGATIHTTNGLFMKLS	QRQSNLAFAS	S TSR.....	
<i>B. pendula</i>	FLQRNLNFELVPN	QNISM TTGATIHTTDGLYMKL	ERRPDIS..	SPTSK.....	
<i>O. rehderiana</i>	FLQRNLNFELVPD	QNIR FVHEA.....	.....	OPTPK.....
<i>Q. robur</i>	FLQRNLNFELVPN	QNISM TTGATIHTTDGLYMKL	CERKPNFAFSS	STTSK.....	
<i>F. sylvatica</i>	FLQRNLNFELVPD	QD ISMTTGATIHTNGMYMKL	ERRSKFDI	SPTSSK.....	
<i>F. excelsior</i>	FLQHLNFEELVPN	QNISM TTGATIHTNGLYMKL	ERKSNFDNS	SPTPSK.....	
<i>S. robusta</i>	GSLW.	.....	TVRRRAVVP	VLKRYLSVMVDRVFCKCA
<i>P. chinensis</i>	GSLW.	.....	TVRRRAVVP	SLHKRYSVMVDRVFCKCAD
<i>H. chinensis</i>	GSLW.	.....	TVRRRAVVP	SLHKRYSVMVDRVFCKCAD
<i>D. turbinatus</i>	GSLW.	.....	TVRRRAVVP	SLHKRYSVMVDRVFCKCAD
<i>V. mangachapoi</i>	GSLW.	.....	TVRRRAVVP	SLHKRYSVMVDRVFCKCA
<i>B. pendula</i>	GSLW.	.....	TVRRRAVVP	SLHKKYL SVMVDRVFCKCA
<i>O. rehderiana</i>	GSLW.	.....	TVRRRAVVP	SLHKKYL SVMVDRVFCKCA
<i>Q. robur</i>	GSLW.	.....	TVRRRAVVP	SLHKKYL SVMVDRVFCKCA
<i>F. sylvatica</i>	GSLW.	.....	TVRRRAVVP	SLHKKYL SVMVDRVFCKCA
<i>F. excelsior</i>	GIVFRIETPCRLIAGPISFVKLVRRR	AVVPSLHKKYL SVMVDRVFCKCA	ERLVEKQL	ONLOP F	
<i>S. robusta</i>	ALNCNAVNLEEKFSQLTL	DVGIGLA	LFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY	
<i>P. chinensis</i>	ALNCNAVNMEENFSQLTL	DVGIGLA	LFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY	
<i>H. chinensis</i>	ALNCNAVNMEEKFSQLTL	DVGIGLA	LFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY	
<i>D. turbinatus</i>	ALNCNAVNMEEKFSQLTL	DVGIGLA	LFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY	
<i>V. mangachapoi</i>	ALNCNAVNMEEKFSQLTL	DVGIGLA	LFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY	
<i>B. pendula</i>	ALDC	TAVNMEEKFSQLTL	DVGIGLA	IFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY
<i>O. rehderiana</i>	ALDC	TAVNMEEKFSQLTL	DVGIGLA	IFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY
<i>Q. robur</i>	ALDC	TAVNMEEKFSQLTL	DVGIGLA	IFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY
<i>F. sylvatica</i>	AFDC	TAVNMEEKFSQLTL	DVGIGLA	VFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY
<i>F. excelsior</i>	ALDCMPVNMEA	KFSQLTL	DVGIGLA	VFNYNFD	SLTADSPVIDAVYTALKAEELRSTDILPY
<i>S. robusta</i>	WKIKPLCKII	I	PRQIKAEKAVTI	IRT	TVEELIKQCKAIVDS
<i>P. chinensis</i>	WKIKPLCKII	I	PRQIKAEKAVTI	IRT	TVEELIKQCKAIVDS
<i>H. chinensis</i>	WKIKPLCKII	I	PRQIKAEKAVTI	IRT	TVEELIKQCKAIVDS
<i>D. turbinatus</i>	WKIKPLCKII	I	PRQIKAEKAVTI	IRT	TVEELIKQCKAIVDS
<i>V. mangachapoi</i>	WKIKPLCKII	I	PRQIKAEKAVTI	IRT	TVEELIKQCKAIVDS
<i>B. pendula</i>	WKAVPLCKII	I	PRQIKAEKAVTV	IRR	TVEELIKC
<i>O. rehderiana</i>	..	I	GVPLCKMV	PRQIKAEKAVTV	IRR
<i>Q. robur</i>	WKIRTKCKIV	I	PRQIKAEKAVTV	IRR	TVEELIKC
<i>F. sylvatica</i>	WKIRALCKV	I	PRQIKAEKAVTV	IRR	TVEELIKC
<i>F. excelsior</i>	WKISALCKIV	I	PRQIKAEKAVAV	IRK	TVEELIKC

LUT1

<i>S. robusta</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D STS LLRA QEEVDRVLOG
<i>P. chinensis</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D STS LLRA QEEVDRVLOG
<i>H. chinensis</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D STS LLRV QEEVDRVLOG
<i>D. turbinatus</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D STS LLRA QEEVDRVLOG
<i>V. mangachapoi</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D STS LLRA QEEVDRVLOG
<i>B. pendula</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D SAS LLKA QEEVDRVLEG
<i>O. rehderiana</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D PSS LPKA QEEVDTVLEG
<i>Q. robur</i>	FLLASR E VSS I QLRDDL LSMLVAGHETTGSVLTWT FYLLSK D SSS LLKA QEEVDRVLEG
<i>F. sylvatica</i>	FLLASR E VSS I MQLRDDL LSMLVAGHETTGSVLTWT FYLLSK D SST LLKA REEVDRVLKG
<i>F. excelsior</i>	FLLASR E VSS I MQLRDDL LSMLVAGHETTGSVLTWT FYLLSK D PSS LLKA QEEVDRVLOG

<i>S. robusta</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNTF A S STS R
<i>P. chinensis</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S SIL R
<i>H. chinensis</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S STS R
<i>D. turbinatus</i>	FLQH LN KFEL VPD QN ISMTTGATIHTTNGLFM KF S QR QSNLAF A S STS R
<i>V. mangachapoi</i>	FLQH LN FEL VPD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S STS R
<i>B. pendula</i>	FLQRLN F EL VP <i>N</i> QN ISMTTGATIHTTD GLYM KL ER RP <i>D</i> IS . . . SPTSK
<i>O. rehderiana</i>	FLQRFN F EL VP <i>N</i> QN ISMTTGATIHTTD GLYM KL ER KPNFAF <i>S</i> STTSK
<i>Q. robur</i>	FLQRLN F EL VP <i>D</i> QD ISMTTGATIHTTNG GYM KL ER RSKF <i>D</i> IS SPTSSK
<i>F. sylvatica</i>	FLQH LN FEL VP <i>N</i> QN ISMTTGATIHTTNG GYM KL ER KSNFD <i>DNS</i> SPTPSK
<i>F. excelsior</i>	FLQH LN FEL VP <i>N</i> QN ISMTTGATIHTTNG GYM KL ER KSNFD <i>DNS</i> SPTPSK

<i>S. robusta</i>	EHSA Q VW ERA NEF V PER F DLE G PI P NES NTD FR I PP S GGP R KC V GDQ F AM L EAI V VALAI
<i>P. chinensis</i>	EHSA Q VW ERA NEF V PER F DLE G PI P NES NTD FR I PP S GGP R KC V GDQ F AM L EAI V VALAI
<i>H. chinensis</i>	EHSA Q VW ERA NEF V PER F DLE G PI P M NES NTD FR I PP S GGP R KC V GDQ F AM L EAI V VALAI
<i>D. turbinatus</i>	EHSA Q VW ERA DEF V PER F DLD P I P NES NTD FR I PP S GGP R KC V GDQ F AM L EAI V VALAI
<i>V. mangachapoi</i>	EHSA Q VW ERA DEF V PER F DLE G PI P NES NTD FR I PP S GGP R KC V GDQ F AM L EAI V VALAI
<i>B. pendula</i>	EHSS Q VW ERA EEF V PER F DLE S P I P NET NTD Y RF I PP S GGP R KC V GDQ F ALLE A I V LAI
<i>O. rehderiana</i>	EHSS Q VW ERA EEF V PER F DLE S P I P NET NTD Y RF I PP S GGP R KC V GDQ F ALLE A I V VALAI
<i>Q. robur</i>	EHSS Q VW ERA EEF V PER F DLE S P I P NET NTD Y RF I PP S GGP R KC V GDQ F ALLE A I V VALAI
<i>F. sylvatica</i>	EHSS Q VW ERA EEF V PER F DLE S P I P NET NTD Y RF I PP S GGP R KC V GDQ F ALLE A I V VALAI
<i>F. excelsior</i>	EHSS Q VW DR EEF V PER F DLE S A I P NET NTD Y RF I PP S GGP R KC V GDQ F ALLE A I V VALAV

<i>S. robusta</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNTF A S STS R
<i>P. chinensis</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S SIL R
<i>H. chinensis</i>	FLQH LN FELL PD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S STS R
<i>D. turbinatus</i>	FLQH LN KFEL VPD QN ISMTTGATIHTTNGLFM KF S QR QSNLAF A S STS R
<i>V. mangachapoi</i>	FLQH LN FEL VPD QN ISMTTGATIHTTNGLFM KL S QR QSNLAF A S STS R
<i>B. pendula</i>	FLQRLN F EL VP <i>N</i> QN ISMTTGATIHTTD GLYM KL ER RP <i>D</i> IS . . . SPTSK
<i>O. rehderiana</i>	FLQRFN F EL VP <i>N</i> QN ISMTTGATIHTTD GLYM KL ER KPNFAF <i>S</i> STTSK
<i>Q. robur</i>	FLQRLN F EL VP <i>D</i> QD ISMTTGATIHTTNG GYM KL ER RSKF <i>D</i> IS SPTSSK
<i>F. sylvatica</i>	FLQH LN FEL VP <i>N</i> QN ISMTTGATIHTTNG GYM KL ER KSNFD <i>DNS</i> SPTPSK
<i>F. excelsior</i>	FLQH LN FEL VP <i>N</i> QN ISMTTGATIHTTNG GYM KL ER KSNFD <i>DNS</i> SPTPSK

d DNA2

S. robusta S V D S K N S P Q N T P L E N L V A E D G N A E L S P E I S K S V P L K R F N F S P G M L I K
P. chinensis S V D S K N S P Q N T S L E N L V A E D G N A E L S P E I S K S V P L K R F N F S P G M L I K
H. chinensis S V D S K N S P Q N T A L E N L V S E D G N A E L S P E I S K S V P L K R F N F S P G M L I K
D. turbinatus S V D S K N S P Q N T P L E N L V A E D D N A E L S P E I S K S V P L K R F N F S P G M L I K
V. mangachapoi S V D S K N T I Q N T P L E N L V A D D G N A E L S P E I S K S A S L R R F N F S P G M L I K
B. pendula L G S Q G N D P N S A S Q N T P T R N I A A M G V S V L I K
O. rehderiana Q K E A V S Q N T P E E N V V L V G V N A A D E N L S E V S P E V S K S V S L K R F K F S P G M L I K
Q. robur S R D I K R Q T K E P N V P S Q N T P P E N L V M I G V N D A . E N L S E V S P E I S K S V S L K R F K F S P G M L I K
F. sylvatica K N G G N L R E S E L N N Q S Q N T P Y E N I L P V D N D D V . E N Q L E V S P E A C K S L S V K R F K F S P G M L I K
F. excelsior

S. robusta Q S Q D D G G D E V T W K I S P I N E R L Q A V S K Q I P E G V H P
P. chinensis Q S Q D D G G D E V T W K I S P I N E R L Q A V S K Q I P E . V I K V L A D S S R R N S F S I R N C S Q N K G V H P
H. chinensis Q S Q D D G G D E V T W K I S P I N E R L Q A V S K Q I P E G V H P
D. turbinatus Q S Q D D G G D E V T W K I S P I N E R L Q A V S K Q I P E G V H P
V. mangachapoi Q S Q D D G G D E V T W K I S P I N E R L Q A V S K Q I P E G V H P
B. pendula Q S Q D D G G D E V T W K I S P V N E K L Q A V S K R I P E . M M R V L A D S S R R N A L H L R Q C S Q N K
O. rehderiana Q S Q D D G G D E V T W K I S P V N E K L Q A V S K R I P E . M M K A L A D S S R L N A L H L R Q C S Q N K I
Q. robur Q S Q D D A G D E V T W K I S P V N E R L Q A V S K R V P E . K M M R V L A D S S R L N S L R M K Q C S Q K K A L Q A P I
F. sylvatica Q S Q D D G G D E V T W K I S P V N E R L Q A A P I
F. excelsior Q S Q D D G G D E V T W R I S P V N E R L H S M S K H F P G . M I K V L A D S S R L N S M N F Q Q C S Q K K . . . V L A

S. robusta C P G A A G K A D K P L S L S P K T S K K S S V A P S R V G L K R V N P Y Q D E N E I N G G N L D V N A S L A S Q
P. chinensis C P G A A G K A D K P L S L S P K T S K K S S V A P S R V G L K R V N P Y Q D E N E I N G G N L V V N A S L A S Q
H. chinensis C P G A A G K A D K P L S S S S P T T S K K S S V A P S R V G L K R V N P Y Q D E T I V I N G G N L D V N A S L A S Q
D. turbinatus C T G A T G K A D K P L S L S P K T F K K S S V A P S R V G L K R V N P Y Q D E T E I N G S Y L D A N A S L A S Q
V. mangachapoi C P G A A G K A D K P L S L S P K T S K K S S V A P S R V G L K R V N P Y Q D E T E I N G S N L D V N A S L A S Q
B. pendula A S G K V E M W L S S P T K K A A E K S L V S T N K V G L K R V N P D R D M D L Y G N E S E L N S T G V A S R
O. rehderiana S P G T A G K V E K W L S S P S K K A D E K S L V S T N K V G L K R V N P D R D M D L Y G N E S E L T S T G V A S R
Q. robur S P G K A G K V E M W L S S P T R K K A A E R S L V S M N R V G V K R V N L D Q E M D L C G N G S E L T S T G V A S G
F. sylvatica S P G K A G K V E T W L S S P T Q K K A A E R S L V S T N R V G L T R V N P D Q D M N L C G D E S E L T S S G V A S R
F. excelsior S P G E S G N L E K W L S S P P L K A D E K S L I C S D R V T L R N V N S D H D V F H G T N G T T S K K N S D V F N S

S. robusta Q S P F R T P P S L S Y C H D K F A T G S A C G G P S D Q L G L R Q H K K A L L E L L D Q V E D A I S T E D S V S N D L
P. chinensis R S P F R T P P S L S Y C H D K F A T G S A C G G P S D Q L G L R Q H K K A L L D L L D Q V E D A I S T E D A V S N D L
H. chinensis Q S P F R T P P S L S Y C H D N F A T G S A C G G P S D Q L G L R Q H K K A L L E L L D Q V E D A I S T E D S V S N D L
D. turbinatus Q S P F R T P P S L S Y C D D K F V A N G S A C G G P S D Q L G L R Q H K K A L L E L L D Q V E D A I S T E D S V S N D L
V. mangachapoi P S P F R T P P S L S Y C H D K F A N S S A C G G P S D Q L G L R Q H K K A L L E L L D Q V E D A I S T E D S V S N D L
B. pendula Q S P F R T P P S L S Y C N D K I G N G V A C N G A S D Q L G L R Q H K K A L L E L L D Q V E D V I S V E D S L S S D M
O. rehderiana Q S P F R T P P S L S Y C H D K I A D G V A C N G A S D Q L G L R Q H K K A L L E L L D Q V E D V I S V E D S I S N D T
Q. robur Q S P F R T P P S L S Y C H D .
F. sylvatica Q S P F R T P P S L S Y C P D .
F. excelsior Q S P F N T P P S L S F C H D K A A D G F D S S G V P D E Q G S R Q H K K A L I E I L D Q V E N V I S V E E S V C K D E

S. robusta E S C S S K V Q A E N S D E M S V K T D P T A K A V P M N L S E K T V G A S S D G Y F L V L E V S E K R R P P E S S G A
P. chinensis E S C S S K V Q A E N S D E M S V K T D P T V K A V P M N L S E K T I G A S F D G Y F L V L E V S E K R R P P E S S G A
H. chinensis E S C S S K V Q A E N S D E M S V K T D P T V K A V P M N L S E K T I I G A S S D G Y F L V L E V S E K C K P P E S S G A
D. turbinatus E S C S S K V Q A E N S D E M S V K T D P T V K A V P M N L S E K T I V G A S S D G Y F L V L E V S E K H R P P E S S G A
V. mangachapoi D S C S S K V Q A E S F D E M S V K T D P T V K E V P T N P S E K V V G A P F D G H F L V L E V S E K C R P P E S S G A
B. pendula E A Y S F K S H D R N D E M P V K V D P A V E R V A V D Q E V N G A S S N C N F L V L E V S E R C G P A D S S G T
O. rehderiana E T Y S S K S H D R N D E M P V K V D P A V E R V A M L P E V T G A S S N C N F L V L E V S E R C R P A D S S G T
Q. robur E A Y S S K I H N R N G D G M T V E V D P T V E R V A .
F. sylvatica E V Y S S K V H N R N G D G M P V K V D P A V E G V A M D L P E D A I G D S S N C T F L V L E V S E K R R P A D S S G N
F. excelsior E T F L K A E R C P E A D L A V N Q L T I N S N E N I N S K A S N C Y F L V L E V S E K H G S A G S S E P

S. robusta C A L Y K V L R L I T N E O S G E E H A V V L W E E W C Y S V I A P G D T V N V I G E F D D E G K C D I D H E K N F L I V
P. chinensis C A L Y K V L R L I N E O S G E E R A V V L W E E W Y Y S V I A P G D T V N V I G E F D D Q G K C D I D H E N N F L I V
H. chinensis R A L Y K V L R L I N E O S G E E R A V V L W E E W Y Y S V I A P G D T V N V I G E F D N Q G K C D I D R E K N F V I V
D. turbinatus R A L Y K V L R L I N E O S G E E R A V V L W E E W Y Y S V I A P G D T V N I I G E F D D Q G K C D I D H E K N F L I V
V. mangachapoi R A L Y K V L R L I N E O S G E E R A V V L W E E W Y Y S V I A P G D T V N A I G E F D D L G K C D I D H E K N F L I V
B. pendula Q R T Y K V L R L L N E H S G E E R A V V L W E E W F Y S V V A P G D T V N I I G E F D D Q G K C D I D R D S N F I I V
O. rehderiana Q C P Y K V L R L L N E H S G E E R A V V L W E E W F Y S V V A P G D T V N V I I G E F D D Q G K C D I D R D S N F I I V
Q. robur Q C P Y K V L R L L N E C S G E E Q A V V L W E E W F Y S V V A P G D T V N V I I G E F D D Q G K C D V D R D N N F I I V
F. sylvatica Q C P Y K V L R L L N E R S G E E R A V V L W E E W F Y S V V A P G D T V N V I I G E F D D Q G K C D V D R D N N F I I V
F. excelsior H F P F K V L R L L N E Q S G E E R A V Q L W D E W F F S V V A P G D T V H I I G E F D G H G K C D V N R E N N F L I V

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<i>S. robusta</i>	H P D I L I S G T R V A A S F N C P R R T	V I D E R L T S S E Y S T A A L I	T G T L L H E I F Q A G L L K E I P S L N F L
<i>P. chinensis</i>	H P D I L I S G T R V A A S F N C P R R T	V I D E R L T S S E Y S T A A L I	G T L L H E I F Q A G L L K E I P S I N F L
<i>H. chinensis</i>	Y P D I L I S G T R V A A S F N C P R R T	V I D E R L T S S E Y S T A A L I	G T L L H E I F Q A G L L K D I P S I N F L
<i>D. turbinatus</i>	H P D I L I S G T R V A A S F N C P R R T	V I D E R L T S S E H S T A A L I	G T L L H E I F Q A G L L K E I P N I N F L
<i>V. mangachapoi</i>	H P D I L I S G T R V A A S F N C P R R T	V I D E R L T S S E H S T A A L I	G T L L H E I F Q A G L L K E I P S I N F L
<i>B. pendula</i>	H P D I L I L S G T R V A G S F S C P R R T	V I D E R L K S S E Y S T A A L I	G T L L H Q I F Q A G L M K E V P T I O F L
<i>O. rehderiana</i>	H P D I L I L S G T R V A G S F S C P R R T	V I D E R L K S S E Y S T A A L I	G T L L H Q I F Q A G L M K E I P T I K F L
<i>Q. robur</i>	H P D V L V S G T R V A G S F S C P R R T	V I D E R V K C S E Y S T A A L I	G T L L H O I F Q A G L M K E I P T I K F L
<i>F. sylvatica</i>	H P D I L V S G T R V A G S F S C P R R A	V I D E R I K C S E Y S T A A L I	G T L L H O I F Q A G L M K E I P T I K F L
<i>F. excelsior</i>	H P D I L V S G T R M	V I D E R . R N Q Q E A A A L M G T L L H O	I F Q A G L I K E S P T K E F L

<i>S. robusta</i>	E E Y A R L V L Q K N L E S L Y A C G V K E N D M Y K T L I	E A I P K I L N W I F L F K D S Q N S K A P T I D F G S D N
<i>P. chinensis</i>	E E Y A R L V L Q K N L E S L Y A C G A N E D D M Y K T L I	E A I P K I L N W I F L F K D S Q N S E A P T I D F G S D N
<i>H. chinensis</i>	E E Y A R L V L Q K N L E S L Y A C G V N E N D M Y K T L I	E A I P K I L N W I S L F K D S Q N S K T P T I D F G S D N
<i>D. turbinatus</i>	E E Y A R L V L Q K N L E S L Y A C G V N E N D M Y K T L I	E A I P K I L N W I F L F K D S Q N S K A P T I D F G S D N
<i>V. mangachapoi</i>	E E Y A R L V L Q K N L E S L Y A C G V N E N D M Y K T L I	E A I P K I L N W I F L F K D S Q N S K A P T I D F G S D N
<i>B. pendula</i>	E E Y A R V V L V Q K N I E S L Y A C G V N E N D M Q K T L I	E A V P K M L N W I I T F K D S Q
<i>O. rehderiana</i>	E E Y A R V V L V Q K N I E S L Y A C G V N E N D M Q K T L I	E A V P K M L N W I I T F K D S Q F S K A P S V D F G S D
<i>Q. robur</i>	E E Y A R V V L V Q K S I E S L Y A C G V N E N D M Q K T L I	E A V P K I L N W I I T F K D S Q D S K A P S V D F G S D E
<i>F. sylvatica</i>	E E Y A R V . . . . .	. . . . .
<i>F. excelsior</i>	E E Y A R I V L Q K N L E N L Y A C G V D E I D T Q K T L F	A A I P K I L N W I S S F R D S Q D F K S P S I D F K C D E

<i>S. robusta</i>	G L K K L N I S E V I D I E E M A W A P K Y G L K G M I D A S V R V Q V E S S G N E A Y E K I L P L E F K T G K A P N G
<i>P. chinensis</i>	G V K K L N I S E V I D I E E M A W A P K Y G L K G M I D A S V R V Q V E S S G N E A Y E K I L P L E F K T G K A P N G
<i>H. chinensis</i>	G L K K F N I S E V I D I E E M A W A P K Y G L K G M I D A S V R V Q V E S S G N E A Y E K I L P L E F K T G K A P N G
<i>D. turbinatus</i>	G L K K V K I S E V I D I E E M A W A P K Y G L K G M I D A S V R V Q V E S A S G N K A Y E K I L P L E F K T G K A P N G
<i>V. mangachapoi</i>	G L K K V N I S E V I D I E E M A W A P K Y G L K G M I D A S V R V Q V E S S G N E A Y E K I L P L E F K T G K A P N G
<i>B. pendula</i>	. . . . . V I D I E E M A W A P K Y G L K G M I D A S V R
<i>O. rehderiana</i>	G L K K V N I L S E V I D I E E M A W A P K Y G L K G M I D A S V R V S I T S N K N Q A N E K I M P L E F K T G K V S N G
<i>Q. robur</i>	G L K K V I D I E E M A W A P K Y G L K G M I D A S V R V A N V I S N K N E A H E K I M P L E F K T G K A S N G
<i>F. sylvatica</i>	. . . . . V I D I E E M A W A P K Y G L K G M I D A S V R V N V K S N K N E A Q Q K I M P L E F K T G K
<i>F. excelsior</i>	G L K K I K I N E V I D I E E M A W A P K Y G L K G M I D A S V Q R I E S T L H E A H E M I M P L E F K T G K A T S G

<i>S. robusta</i>	Q . A M E H C A Q V I L Y T L L M S E R Y L K P I D S G L I Y Y L Q S D H
<i>P. chinensis</i>	Q S V S E H C A Q V I L Y T L L M S E R Y L K P I D S G L I Y Y L Q S D H
<i>H. chinensis</i>	Q . A M E H C A Q V I L Y T L L M S E R Y L K P I D S G L I Y Y L Q S D H
<i>D. turbinatus</i>	Q . A M E H C A Q V I L Y T L L M S E R Y L K P I D S G L I Y Y L Q S D H
<i>V. mangachapoi</i>	Q S V E H C A Q V I L Y T L L M S E R Y L K P I D S G L I Y Y L Q S D H
<i>B. pendula</i>	. . . . . S M E H C A Q V I F Y T L L M S E R Y K M H I D R G L I Y Y L Q S D H
<i>O. rehderiana</i>	Q S S M E H C A Q V I F Y T L L M S E R Y K M H I D R G L I Y Y L Q S D H
<i>Q. robur</i>	Q A S L W Y K F I D S G L I Y Y L Q S G Q T Q G I V V R R S D L V G L I M R R N E L A N
<i>F. sylvatica</i>	. S S M E H S A Q V I L Y T I L M S E R Y K M N I D S G L I Y Y L Q S G Q T Q G I K V R R S D L V G L I M R R N E L A N
<i>F. excelsior</i>	Q T T M E H S A Q V M L Y A L L M S E R Y M K N I E C G L L I Y Y L H T D Q T Q G I S V R R S D L V G L I M R R N E L A N

<i>S. robusta</i>	D I V K A S T T Q Q L P P M L R V P S M C K G C R H L D V C T I Y H K A L G G D A E T S G L G A M Y D S L V H H I S N S
<i>P. chinensis</i>	D I V K A S T T Q Q L P P M L R V P S M C K G C R H L D V C T I Y H K A L G G D T E T S G L G D M Y D S L V H H I S N S
<i>H. chinensis</i>	D I V V K A S T T Q Q L P P M L R V P S M C K G C R H L D V C T I Y H K A L G G D T E T S G L G D M Y D S L V H H I S N S
<i>D. turbinatus</i>	D I V K A S T T Q Q L P P M L R V P T M C K G C R H L D V C T I Y H K A L G G D T E T S G L G D M Y D S L V H H I S N S
<i>V. mangachapoi</i>	D M V K A S T S Q Q L P P M L R V P S M C K G C R H L D V C T I Y H K A L G G D A E T S G L G D M Y D S L V H H I S N S
<i>B. pendula</i>	D I L K A S T M Q Q L P P M A R S L S M C K G C R H L D V C T I Y H K A L G G D T E T S G L G D M Y D S L V H H I S N S
<i>O. rehderiana</i>	D I L K A S T V Q Q L P P M Q I Q S L N M C K G C R H L D V C T I Y H K A L G G D T E T S G L G D V F D A H T S H I T V P
<i>Q. robur</i>	D I L K A S T I Q Q L P P M A I Q A H G G S T E S S G L G D V F E S H T N H I T V S
<i>F. sylvatica</i>	D I L K A S T T Q Q L P P M T R S P S M C K G C R H L D V C T I Y H K A H G G S T E S S G L G D V F D S H T N Q D T P A
<i>F. excelsior</i>	D L L K A L T A Q Q L P P M L Q S P N M C K G C R H L D V C S V Y H K A S G G T I E G S G L G D V F D S L I S H I T T A

<i>S. robusta</i>	H C S F L R H W D R L I D L E A K E M Q L V K R E I W H S H T V K R D R S S S C F C S I A L . . . D E L P E R K S Q D S
<i>P. chinensis</i>	H C S F L R H W D R L I D L E A K E M Q L V K R E I W H S H T V K R D R S S S C F C S I A L . . . D E L P E Q K S Q D G
<i>H. chinensis</i>	Q S S F L R H W D H L I D L E A K E M Q L V K R E I W H S H T V K R D R S S S C F C S I A L . . . D E L P E W K S Q D G
<i>D. turbinatus</i>	H C S F L R H W D H L I D L E A K E M Q L V K R E I W H S H T V K R D R S S S C F C S I A L . . . D E L P Q R K S Q D G
<i>V. mangachapoi</i>	Q C S F L R H W D H L I D L E A K E V Q L V K R E I W H S H T V K R D Q S S S C L C S I A L . . . D E L P E Q K S Q D G
<i>B. pendula</i>	H C T F L R H W D R L I D L E A R E I E L V K K I W R S H S L K H D N S T S F L L S S V L D A S D E L P H Q S L Q E
<i>O. rehderiana</i>	H C T F L R H W D R L I D L E A R E I E L V K K I W R S H S L K H D N S T S F L S S L V L D A S D E L P H Q K S H K E
<i>Q. robur</i>	H S I F L R H W D Q L I D L E A K E I E L V K K I W R S H S S K S D D S R G C L S S I V L D A S D K L P H Q K S L K E
<i>F. sylvatica</i>	H C M F L R H W D R L I D L E A K E T E L V K K I W R S H S L K N D . S T S C L S S I V L D A S D E L P H Q K S L K D
<i>F. excelsior</i>	H T D F L K R W E R L V D L E A K A L E V V K K E N W C S Q S L R N N P S P I S L S S L V L D A S D E P L H K N F C K S

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<i>S. robusta</i>	NRF IYR FV R Q R S P D S N V E G S A I D P V T A A F S L T N D L G S T L K S G D Y V M L S T E S G C N P I A S G V
<i>P. chinensis</i>	NRF IYH FV R Q R S P D G N V E G S A I D P L T A A S S I L T N D L G S T L K S G D Y V M L S T E S G R N P I A S G V
<i>H. chinensis</i>	NRF IYR FV R Q R S P D G N V E G S A I D P L T A T S S L T N D L G S T L K S G D Y V M L S T E S G R N P I A S G V
<i>D. turbinatus</i>	NRF IYR FV C Q R L P D G N V E G S A I D P L T A A S S I L T K D L G S T L K S G D Y V M L S T E S G H N P I A S G V
<i>V. mangachapoi</i>	NRF IYR FV C Q R L S D G S V E T V A S S I L T N D L G S T L K S G D Y V M L S T E S G H N P I A S G V
<i>B. pendula</i>	NRF IYR FV Y R D L L S V N V K A S D G D S S T V D T S P T S D M D C T L K S G D Y V I L S T E S G H L T I A S G V
<i>O. rehderiana</i>	NRF IYR FV Y R D L S F N M K A S D G D S S T V D T S P T S D M D C T L K S G D Y V I L S T E S G H L T I A S G V
<i>Q. robur</i>	NRF IYR FV H R D L S S I N V K A L G G D P L S V A S S L K S D M D C T L R S G D Y V I L S T E S C H Q T I A S G V
<i>F. sylvatica</i>	NRF IYR FV H R D L L S V N V K A S G G D P L S V A S S P T N D M D C T L R S G D Y V I L S T E S G H Q T I A S G V
<i>F. excelsior</i>	NKF VYR FV H R D F P L S G T E E L N R D S L N S S S . . . L D C A L R M G D Y V I L S I E P G C H R V A N G V

<i>S. robusta</i>	I T D I S P I H V S V S F S K R L R L P R S N A S S E A E D F I R E V W R I D K D E N M T S F S V M R F N L V Q L F L Q
<i>P. chinensis</i>	I T D I S P I H V S V S F S K R L R L P R S N A S S E A E D F F R E V W R I D K D E N M T S F S V M R F N L V Q L F L Q
<i>H. chinensis</i>	I T D I S P I H V S V S F S K R L R L P R S N A S S E A E D F E R E V W R I D K D E N M T S F S V M R F N L V Q L F L Q
<i>D. turbinatus</i>	I T D I S P I H V S V S F S K R L R L P R S N A S S E A E D F E R E V W R I D K D E N M T S F S V M R F N L V Q L F L Q
<i>V. mangachapoi</i>	I T D I S P I H V S V S F S K R L R L P R S N A S S E E N L P Q E V W R I D K D E N M T S F S V M R F N L V Q L F L Q
<i>B. pendula</i>	I K E I S R F H I S V S F S K R L R L P R G S N P S S E A H D L E R E V W R I D K D E F L T S F A V M R F N L I Q L F L R
<i>O. rehderiana</i>	I T E I S R F H F V F S K R L R L P R G S N P S S E A O N L E R E V W R I D K D E F L T S F A V M R F N L V Q L F L Q
<i>Q. robur</i>	I T E I S R S H V S V S F S K R L R L P R S N P S L E T O D L E G E V W R I D K D E F L T S F A V M R F N L V Q L F L Q
<i>F. sylvatica</i>	I T E I S R S H V S V S F S K R L R L P R I N S S S E A O D L E G E V W R I D K D E F L T S F A V M R F N L V Q L F L Q
<i>F. excelsior</i>	I V D V G N S H V S V S F T K R L R L P G S S R K S A T O D L H Q O S W R I D K D E V M S S F A I M R F N L V Q V F L Q

<i>S. robusta</i>	N A E G S H L R K M I V D L E A P R F D K E C V S S Q D P A I S Y L R S E K S L N D D Q R R A I L K I L A A K D Y A L I
<i>P. chinensis</i>	N A E S S H L R K M I V D L E A P R F D K E C V S S Q D P A I S Y L R S E K S L N D D Q R R A I L K I L A A K D Y A L I
<i>H. chinensis</i>	N A E S S H L R K M I V D L E A P R F D K E C A S S Q D P A I S Y L R S E K S L N D D Q R R A I L K I L A A K D Y A L I
<i>D. turbinatus</i>	N A E S S H L R K M I V D L E A P R F D K E C A S S Q D P A I S Y L R S E K G L N D D Q R R A I L K I L A A K D Y A L I
<i>V. mangachapoi</i>	N A E S S H L R K M I V D L E S P R F D K E C I S S Q D P A I S Y L R S E K S L N D D Q R R A I L K I L A A K D Y A L I
<i>B. pendula</i>	S V Q S T Q L R K I I V D L E A P K F D S G C I F S S Q D P A I S Y A V V W S E K N L N D D Q R R A I L K I L T A K D Y A L I
<i>O. rehderiana</i>	S V Q S T H L R K I I V D L E A P K F D S G C I F S S Q D P A I S Y V V W S E K N L N D D Q R R A I L K I L T A K D Y A L I
<i>Q. robur</i>	S S Q S T H L R K M I V D L E A P K F D S G C I F S S Q D P A I S Y V V W S E K N L N D D Q R R A I L K I L T A K D Y T L I
<i>F. sylvatica</i>	S V Q S T H L R K M I V D L E A P K F D S G C I F S S Q D P A I S Y V V W S E K N L N D D Q R R A I L K I L T A K D Y A L I
<i>F. excelsior</i>	N E R S S H L R K M I V D L E M P R F D S G C I F S S Q D P A I S Y V V W S E K S L N D D Q R R A I L K I L T A K N Y A L I

<i>S. robusta</i>	L G M P G T G K T T T M V H A V I A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q D I D F V R I G R H E A V H
<i>P. chinensis</i>	L G M P G T G K T T T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q D I D F V R I G R H E A V H
<i>H. chinensis</i>	L G M P G T G K T T T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q D I D F V R I G R H E A V H
<i>D. turbinatus</i>	L G M P G T G K T T T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q D I D F V R I G R H E A V H
<i>V. mangachapoi</i>	L G M P G T G K T T T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q D I D F V R I G R H E A V H
<i>B. pendula</i>	L G M P G T G K T S T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q G I D F V R I G R H E A V H
<i>O. rehderiana</i>	L G M P G T G K T S T M V H A V M A L L M R G A S I L L T S Y T N S A V D N L L I K L K A Q G I D F V R I G R H E A V H
<i>Q. robur</i>	L G M P G T G K T S T M V H A V K A L L R G A S I L L T S Y T N S A I D N L L I K L K A Q G I D F V R I G R Y E A V H
<i>F. sylvatica</i>	L G M P G T G K T S T M V H A V K A L L R G A S I L L T S Y T N S A V D N L L I K L K A Q G I D F V R I G R H E A V H
<i>F. excelsior</i>	L G M P G T G K T S T M V H A V K A L L M R G A S I L L T S Y T N S A V D N L L I K L K A Q G I D F V R I G R D E A V H

<i>S. robusta</i>	E E V R G H C L S A M N I H S V N D I K I R L S Q V K V V A V T C L G I T S P L L S G K R F D V C I M D E A G Q T T L P
<i>P. chinensis</i>	E E V R G H C F S A M N V H S V N D I K I R L S Q V K V V A V T C L G I T S P L L S G K R F D V C I M D E A G Q T T L P
<i>H. chinensis</i>	E E V R G H C F S A M N V H S V N D I K I R L S Q V K V V A V T C L G I T S P L L S G K R F D V C I M D E A G Q T T L P
<i>D. turbinatus</i>	E E V R G H C F S A M N V H S V N D I K I R L S Q V K V V A V T C L G I T S P L L S G K R F D V C I M D E A G Q T T L P
<i>V. mangachapoi</i>	E E V R G H C F S A M N V H S V N D I K I R L S Q V K V V A V T C L G I T S P L L S G K R F D V C I M D E A G Q T T L P
<i>B. pendula</i>	E E V R G Y C F S A M N I Q S V K D I K L R L D Q V K V V A V T C L G I T S P L L S A S K R F D V C I M D E A G Q T T L P
<i>O. rehderiana</i>	E E V Q G H C F S A M N V I Q S V K D I K L R L D Q V K V V A V T C L G I T S P L L A N K R F D V C I M D E A G Q T T L P
<i>Q. robur</i>	E E V Q G H C F S A M N V O Q S V E D V K I R L E Q V K V V A V T C L G I T S P L L T N K R F D V C I M D E A G Q T T L P
<i>F. sylvatica</i>	E E V R G H C F S A M D I Q S V E D V K I R L E Q V K V V A V T C L G I T S P L L A N K E F D V C I M D E A G Q T T L P
<i>F. excelsior</i>	T E V E G N C I S A M K M E S T Q E I K I K L D Q I K V V A V T C L G I N N P L L T N K R F D V C I M D E A G Q T T L P

<i>S. robusta</i>	V S L G P L M F A S M F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S P L Q S Q Y R M
<i>P. chinensis</i>	V S L G P L M F A S M F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S P L Q N Q Y R M
<i>H. chinensis</i>	V S L G P L L F A S M F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S P L Q S Q Y R M
<i>D. turbinatus</i>	V S L G P L M F A S M F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S P L Q S Q Y R M
<i>V. mangachapoi</i>	V S L G P L M F A S I F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S P L Q N Q Y R M
<i>B. pendula</i>	V S L G P L M F A S T F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S A L Q S Q Y R M
<i>O. rehderiana</i>	V S L G P L M F A S T F V L V G D H Y Q L P P L V Q S T E A R E S G M G I S L F C R L S E A H P Q A I S A L Q S Q Y R M
<i>Q. robur</i>	V S L G P L M F A S T F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S A L Q S Q Y R M
<i>F. sylvatica</i>	V S L G P L M F A S T F V L V G D H Y Q L P P L V Q S T E A R E N G M G I S L F C R L S E A H P Q A I S A L Q S Q Y R M
<i>F. excelsior</i>	V S L G P L M L A S K F V L V G D H Y Q L P P L V Q S P E A K E N G M A V S L F C R L S E A H P Q A I A A L E S Q Y R M

DNA2

<i>S. robusta</i>	CQD	IMELSNALIYGDRLCGSSEIASAKL	SLSR	RLDSCSSWL	QT	VLNPSKT	VIFI	INTDM L	
<i>P. chinensis</i>	CQD	IMELSNALIYGDRLCGSSEIASAKL	SLSR	RLDSCSSWL	QT	VLNP I	KTVIFI	INTDM LL	
<i>H. chinensis</i>	CQD	IMELSNALIYGDRLCGSSEIASAKL	SLSR	RLDSCSSWL	QT	VLNP I	KTVIFI	INTDM LP	
<i>D. turbinatus</i>	CQD	IMELSNALIYGDRLCGSSEIASAKL	NLSR	RLDSCSSWL	QT	ALNP S	KTVIFI	DTDM LP	
<i>V. mangachapoi</i>	CQD	IMELSNALIYGDRLCGSSEIASAKL	SLSR	RLDSCSSWL	QT	TIFFY	SDM LP
<i>B. pendula</i>	CQG	IMELSNALIYGDRLRCGSSEVANAKL	OFSSL	KSCSLWL	KE	VLNP T	KPVIFI	DTD LLP	
<i>O. rehderiana</i>	CQD	IMELSNALIYGDRLRCGSPEVANAKL	KFLS	CLKSCSLWL	KE	VLNP A	KPVVIFI	DTD MLP	
<i>Q. robur</i>	CQG	IMELSNALIYGDRLRCGSSEIASAKL	NLSL	SCSSWL	KE	VLNP T	KPVVIFI	DTD MLP	
<i>F. sylvatica</i>	CQG	IMELSNALIYGDRLRCGSSEIASAKL	NLSL	SCSSWL	RE	VLNP T	KPVVIFI	DTD MLP	
<i>F. excelsior</i>	CAA	IMELSNALIYGNRLRCGSSEIEAKI	KYTKA	SAPSWL	EQ	VLNP KQP	VIFI	ND LLP	

<i>S. robusta</i>	A	F	E	T	KD	QKTVNNQMEAHI	IIAEITEA	LVNN GIE	GKD	DIGIITPYNSQANLIRH.	VCEASVEI
<i>P. chinensis</i>	A	F	E	T	KD	QKTVNNQMEAHI	IIAMTEA	LVNN GIE	GKD	DIGIITPYNSQANLIRH.	VCEASVEI
<i>H. chinensis</i>	A	F	E	A	KD	QKTVNNQMEAHI	IIAEITEA	LVNN GIE	SKD	DIGIITPYNSQANLIRH.	VYEASVEI
<i>D. turbinatus</i>	A	F	E	T	KD	QKTVNNQMEAHI	IIAEITEA	LVNN GIE	GKD	DIGIITPYNSQANLIRH.	VCESSVEI
<i>V. mangachapoi</i>	A	F	E	S	KD	QKTVNNEMEAHI	IIAEITEA	LVNN GIE	GKD	DIGIITPYNSQANLIRH.	ICEASVEI
<i>B. pendula</i>	A	F	E	A	KD	QKTLNNPTEAYIIIAEV	TEAKLVDNCIGGED	DIGIITPYNSQANLIRQAV	YRTTVEI		
<i>O. rehderiana</i>	A	F	E	A	KD	QKTRNNPIEACIIAEV	TEQLVNNGIGCED	DIGIITPYNSQANLIRHAL	YITSVEI		
<i>Q. robur</i>	A	F	E	A	KD	QKTVNNPVEAYIIIAEV	TEQLVNNGIGCED	DIGIITPYNSQANLIRHAV	YTTSVEI		
<i>F. sylvatica</i>	A	F	E	A	KD	QKAVNNPVEAYIIIAEV	TEQLVNNGIGCED	DIGIITPYNAQANLIRHAV	YTTSVEI		
<i>F. excelsior</i>	I	Y	E	K	TDRKA	VNNNPIEAYIIIAEV	TEQLLRGIR	DIGIITPYNSQAKLIQEAV	. SAPVEI		

<i>S. robusta</i>	HTIDKYQGRDKDCILVSFVRSS	SAT	TSRSCA	ASSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>P. chinensis</i>	HTIDKYQGRDKDCILVSFVRSS	SAT	TSRNC	ASSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>H. chinensis</i>	HTIDKYQGRDKDCILVSFVRSS	SAT	TSRNC	ASSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>D. turbinatus</i>	HTIDKYQGRDKDCILVSFVRSS	SAT	TSRNC	ASSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>V. mangachapoi</i>	HTIDKYQGRDKDCILVSFVRSS	SAT	TSRSC	ASSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>B. pendula</i>	HTIDKYQGRDKDCILVSFVRSS	SEN	PRDC	TSSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>O. rehderiana</i>	HTIDKYQGRDKDCILVSFVRSS	SEN	PRDC	TSSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>Q. robur</i>	HTIDKYQGRDKDCILVSFVRSS	SEN	PRNC	TSSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>F. sylvatica</i>	HTIDKYQGRDKDCILVSFVRSS	SEN	PKNYT	TSSLLGDWHRINVAL	TRAKKKLIMVGSC	KTLS
<i>F. excelsior</i>	HTIDKYQGRDKDCILVSFVRSS	Q	PGIST	TSSLLGDWHRINVAL	TRAKKKLIMVGSC	I SLS

<i>S. robusta</i>	KVP LLLKL I NKV EE QSGI IFR I SRTDFNPKME DKRC TE	...	...	...	...	...
<i>P. chinensis</i>	KVP LLLKL I NKV EE QSGI IFR I SRTDFNPKME DKRC IK	...	...	...	...	...
<i>H. chinensis</i>	KVP LLLKL I DNV EE QSGI IFR I SRTDFNPKME DKRC IK	...	...	...	...	...
<i>D. turbinatus</i>	KVP LLLKL I D KVEE Q LGIFR I SRTDFNPKME DKRC SK	...	...	...	...	...
<i>V. mangachapoi</i>	KVP LLLKL I D KVEE Q SGILR I SRTDFNPKMG DKDAPR	...	...	...	...	...
<i>B. pendula</i>	KVP LLLKL I K KVD E QSGIL S VSKKD IN YRGDE DKRC SO	...	...	...	...	...
<i>O. rehderiana</i>	KVP LLLKL I K KVD E QSGIL S VSKKD IN YRGDE DKRC SO	...	...	...	...	...
<i>Q. robur</i>	KVP LLLKL I K KVD E QSGIL S VSKKD IN YNGGDK DKRC SO	...	...	...	...	...
<i>F. sylvatica</i>	KVP LLLKL I K KVD E QSGIL S VSKKD IN YKGGDK DKRC SO	...	...	...	...	...
<i>F. excelsior</i>	KVP LLLKL I E KVEG Q SGML I FS D KDL N INA E DKRC SN	...	...	...	...	...

e cysQ

<i>S. robusta</i>	MEACLVKC	CP.	GNVL	ORALKP	.	.	.	.	LRCs	.	SSMATNS	.	GKFS	VKT	AYDAVLL
<i>P. chinensis</i>	...MTRC	CW...	.	.	.	.	.	.	.	.	.	.	.	.	TLEVPSY
<i>H. chinensis</i>	MEA	CLMKCC	CP.	GNALRR	RVLKp	.	.	.	LRCs	.	SSMAIHS	.	GKIS	VKT	AYDAVLL
<i>D. turbinatus</i>	MEA	CLVKCC	CP.	GNALRR	RVLNp	.	.	.	FRSS	.	SSMAIHS	.	GKIS	VKT	AYDAVLL
<i>V. mangachapoi</i>	MEA	CLVKCC	CP.	GNALRR	RVLKp	.	.	.	LRCs	.	CSMAINS	.	GKIS	VKT	AYDAVLL
<i>B. pendula</i>	MET	CLMRC	SHGGSTL	FRLKP	.	PLSMKLPPN	SLCC	.	SMALHT	DGGRS	VKR	RAYDALLL	.	.	.
<i>O. rehderiana</i>	MET	CLMRC	SHGGSTL	FRLKP	.	PLSMKLPN	SL...	.	SMALHT	DGGRS	IKR	RAYDALLL	.	.	.
<i>Q. robur</i>	MET	CLMKCSH	GRALR	FRLKP	.	LSLKLPN	SIHC	.	SSMAIHT	DGGRW	IKR	RAYDTLLL	.	.	.
<i>F. sylvatica</i>	MET	CLMKCSH	GSALF	FRLKP	.	P.	SLKLPN	SIRC	.	SSMAIHT	GGGSCAKR	RAYDALLL	.	.	.
<i>F. excelsior</i>	MEAC	.......	T	LF	KPLKP	SNLNFI	KSIPS	RFSNNF	SSTRI	HAG	GDRMT	KRAYDGLLL	.	.	.

<i>S. robusta</i>	DAGGTLLQ	TR	PVEETYASIC	AKYGL	KATPS	DIKKG	.	.	.	.	.	.	.	.	.
<i>P. chinensis</i>	NWQGLWKR	LTSFI	...	.	CAYGL	NATPS	DIKKG	.	.	.	.	.	.	.	.
<i>H. chinensis</i>	DARGTLLQ	LAR	PVEETYASIC	AEYGL	KATPS	DIKKG	.	.	.	.	.	.	.	.	.
<i>D. turbinatus</i>	DAGGTLLQ	LAR	PVEQTYASIC	AKYGL	KATPS	DIKKG	.	.	.	.	.	.	.	.	.
<i>V. mangachapoi</i>	DAGGTLLQ	LAS	PVEETTYASIC	AKYGL	KATPS	DIKKG	.	.	.	.	.	.	.	.	.
<i>B. pendula</i>	DAGGTLLQ	LAK	PVEETYATIC	SKYGL	SATSAE	IKQG	.	.	.	.	.	.	.	.	.
<i>O. rehderiana</i>	DAGGTLLQ	LAK	PVEETYATIC	SKYGL	SATSAE	IKQG	.	.	.	.	.	.	.	.	.
<i>Q. robur</i>	DAGGTLLQ	LAK	PVEEIYATIC	CKYGL	SATSAE	IKQG	FRRFAA	APWPEK	LRYQV	CLSATSA	.	.	.	.	.
<i>F. sylvatica</i>	DAGGTLLQ	LAK	PVEEIYATIC	CSKYGL	SATSAE	IKQG	.	.	.	.	.	.	.	.	.
<i>F. excelsior</i>	DAGGTLLQ	LAK	PVEETYL	TGQKYGL	KTTVA	DIKQG	.	.	.	.	.	.	.	.	.

<i>S. robusta</i>	...	F	KS	A	FS	APWP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	S	CANEDYFEEVYQ	
<i>P. chinensis</i>	...	F	K	RA	F	S	A	PWP	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CANDDYFEEVYQ
<i>H. chinensis</i>	...	F	RA	F	P	A	PWP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CANDDYFEEVYQ
<i>D. turbinatus</i>	...	F	RA	F	S	P	WP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CANDDYFEEVYE
<i>V. mangachapoi</i>	...	F	RA	F	S	P	WP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CANDDYFEEVYE
<i>B. pendula</i>	...	F	RA	F	A	PWP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CADDYFEEVYE	
<i>O. rehderiana</i>	...	F	RA	F	A	PWP	K	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CADDYFEEVYE	
<i>Q. robur</i>	EIKQG	F	RA	F	A	PWP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CADDYFEEVYE	
<i>F. sylvatica</i>	...	F	RA	F	A	PWP	E	KLRY	QGDGR	PF	WWKK	L	VSEAT	G	CADGDYFEEVYE	
<i>F. excelsior</i>	...	F	RA	F	S	A	PWP	E	KLRY	QGDGP	FWR	L	VSEAT	G	CDSDNYFEEVYK	

<i>S. robusta</i>	...	YYA	N	GDAW	HLPDGA	HQTIF	L	L	KDAG	GVKMAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>P. chinensis</i>	...	YYA	N	GDAW	HLPDGA	HQTIF	L	L	KDAG	GVKMAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>H. chinensis</i>	...	YYA	N	GDAW	HLPDGA	HQTIF	L	L	KDAG	GVKMAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>D. turbinatus</i>	...	YYA	N	GDAW	HLPDGA	HQTIF	L	L	KDAG	GVKMAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>V. mangachapoi</i>	...	YYA	N	GDAW	HLPDGA	HQTIF	L	L	KDAG	GVKMAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>B. pendula</i>	...	YYA	K	GDAW	RLPG	GYETI	A	L	KDAG	GVKAV	VAVSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>O. rehderiana</i>	...	YYA	K	GDAW	HLPDGA	GYETI	A	L	KDAG	GVKAV	VAVSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>Q. robur</i>	...	YYA	K	GDAW	RLPDGA	GYETI	A	L	KDAG	GVKAV	VAVSVNF	DTRLRK	LLKD	LNVI	DLFDAV	
<i>F. sylvatica</i>	...	LVLSPL	YYA	K	GDAW	HLPDGA	GYETI	A	L	KDAG	GVKIAV	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV
<i>F. excelsior</i>	...	YYA	N	GDAW	HLPDGA	GYETI	M	L	KDGS	GVKLA	VSVNF	DTRLRK	LLKD	LNVI	DLFDAV	

<i>S. robusta</i>	IISSE	V	GYEKPD	DAR	I	F	I	K	FKAAL	.	DQV	GVEA	G	R	S	VHIGDDE	KADKM	GANAVGIDCWLW
<i>P. chinensis</i>	IISSE	V	GYEKPD	DAR	I	F	I	K	FKAAL	.	DQV	GVEA	G	R	S	VHIGDDE	KADKM	GANAVGIDCWLW
<i>H. chinensis</i>	IISSE	V	GYEKPD	DAR	I	F	I	K	FKAAL	.	DQV	GVEA	G	R	S	VHIGDDE	KADKM	GANAVGIDCWLW
<i>D. turbinatus</i>	IISSE	V	GYEKPD	SRI	FKAAL	.	DQV	GVEA	G	R	S	IHIGDDE	KADKM	GANAVGIDCWLW				
<i>V. mangachapoi</i>	IISSE	V	GYEKPD	TR	I	F	I	K	FKAAL	.	DKV	GVEA	G	R	S	VHIGDDE	KADKM	GANAVGIDCWLW
<i>B. pendula</i>	IISSE	V	GYEKPD	DI	K	I	F	K	FKAAL	.	DQL	HVEA	G	K	A	VHVGDD	QADKV	GANAIGIDCWLW
<i>O. rehderiana</i>	IISSE	V	GYEKPD	DI	K	I	F	K	FKAAL	ECAIAV	DQV	HVEA	G	K	A	VHVGDD	QADKV	GANSIGIECWLW
<i>Q. robur</i>	IISSE	V	GYEKPD	DI	K	I	F	K	FKAAL	.	DKVN	VEA	C	K	A	IHVVGDD	QADKV	GANAIGIDCWLW
<i>F. sylvatica</i>	IISSE	V	GYEKPD	DI	K	I	F	K	FKAAL	.	DQI	SVDAS	C	K	A	VHVGDD	QADKV	GANAIGIDCWLW
<i>F. excelsior</i>	IISSE	I	GYEKPD	EN	I	F	I	FRAAL	.	DQI	SVDAS	C	K	A	VHVGDD	KADKA	GANAIGIDCWLW	

<i>S. robusta</i>	G	R	DVKTF	FS	DI	Q	K	R	I	F	I	L	D	A	.	.	.
<i>P. chinensis</i>	G	R	DVKTF	FS	DI	Q	K	R	I	F	I	S	D	A	.	.	.
<i>H. chinensis</i>	R	S	DVKTF	FS	DI	Q	K	R	I	F	I	S	D	A	.	.	.
<i>D. turbinatus</i>	G	R	DVKTF	FS	DI	Q	K	R	I	F	I	L	D	E	.	.	.
<i>V. mangachapoi</i>	G	R	DVKTF	FS	DI	Q	K	R	I	F	I	S	D	E	.	.	.
<i>B. pendula</i>	G	T	DI	IKTF	FS	DI	Q	S	R	I	L	I	S	E	.	.	.
<i>O. rehderiana</i>	G	I	DI	IKTF	FS	GI	GS	R	I	L	I	S	E	S	.	.	.
<i>Q. robur</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>F. sylvatica</i>	G	I	DVKTF	FS	DI	GN	R	I	L	I	S	E	P	P	.	.	.
<i>F. excelsior</i>	G	V	DVKTF	AD	I	QN	R	I	L	P	E	P	P	P	.	.	.

f BLM

<i>S. robusta</i>	ANHVQEMKDMLIAVSNELLDNA	ANLS PQQ IEKLRQDRLQLNKQI QQLERYLN . . . DAER
<i>P. chinensis</i>	ANHVQEMKDMLIAVSNELLDNA	ANLS PQQ IEKLRQDRLQLNKQI QQLERYLN . . . DAER
<i>H. chinensis</i>	ANHVQEMKDMLIAVSNELLDNA	ANLS PQQ IEKLRQDRLQLNKQI QQLERYLN . . . DAER
<i>D. turbinatus</i>	ANHVQEMKDMLIAVSNELLDNA	ANLS PQQ IEKLRQDRLQLNKQI QQLERYLN . . . DAER
<i>V. mangachapoi</i>	ANHVQEMKDMLIAVSNELLDNA	ANLS PHQ IEKLRQDRLQLNKQI QQLERYLN . . . DAER
<i>B. pendula</i>	.....	LLINKQI QQLDGYLHANSVDEER
<i>O. rehderiana</i>	AAHLQEMKDMLIVISNELLDNV	NELSLQE IETLRRDRQLNKQI QQLDGYLHRANSVDEER
<i>Q. robur</i>	TTHLQEMKDMLIVISNELLDNV	NELTSEH IEKLRQDRS QLNKQI QQLDGYLHRANSVDEER
<i>F. sylvatica</i>	ATHLQEMKDMLIVISNELLDNV	NELSLHE IEKLRQDRQLNKQI QQLDGYLHRANSVDEER
<i>F. excelsior</i>	.....	NA DNLT SDEF EKLRQER QQLNKQI RHL EKYL HSTSVNEER
<i>S. robusta</i>	QKSHFA AST. ASRTFQYETPQAT	ASWIEPSKFHTQVHLHNDS [MCRNWD] TA SASFP SFNN
<i>P. chinensis</i>	QKSHFA AST. ASRSFQYEMPQAT	ASWIEPSKFDTQVHLRNDSS [MCRNWD] TA ASVSFP SFNN
<i>H. chinensis</i>	QKSHFV AST. TSRTFQYETPQAT	ASWIEPSKFGTQVHLRNDSS [MCRNWD] TA ASVSFP SFNN
<i>D. turbinatus</i>	QKSHFA AST. ASRTFQYETPQAT	ASWIDPSKFDTQVHLHNDS [MCRNWT] TA ASVSFP SFNN
<i>V. mangachapoi</i>	KKSHFA AST. ASHTFRHETPQAT	ASRIDPSKFDTQVHLHNDS [VCWNWN] SP SVSFPS SFNN
<i>B. pendula</i>	QRSHYCI HG.	SYQLIYKNEAGGYERWNSSSVSFPS SVDR
<i>O. rehderiana</i>	QSSHYSASTAATRPFQYETPPEAATLRT.	SMRCDAHVNLHNEAGGYERWNSS TVSFSS SVDR
<i>Q. robur</i>	QKSHYSTTAATRSFQYETPQADAFKT.	PMRFEAQVNLNNELG GNERWN SFSSVDR
<i>F. sylvatica</i>	QRSHYSTTAATRSFQYETPQADAFKT.	SMRFEAQVNLNHNELG GYERWN SFSSVDR
<i>F. excelsior</i>	KMSQFSSST. . STPMTF QTPPA	VFRIDSTRLD DRFQINTE SG SFDRWGSS SFPSY STDR
<i>S. robusta</i>	FDVSSASVGREPYIPKI	[I EANNKKVFGNHSFRPNQR
<i>P. chinensis</i>	LDISSLAPVGREPYIPKI	I EVNYIEGSND QQWRSRDFSWTKLE EANNKKVFGNHSFRPNQR
<i>H. chinensis</i>	FDVSSAPVGREPYIPKI	I EVNYIEGSND QQWRSRDFSWTKLE EANNKKVFGNHSFRPNQR
<i>D. turbinatus</i>	FDVSSAPVGREPYIPKI	QQWRSRDFWTWKLE EANNKKVFGNHSFRPNQR
<i>V. mangachapoi</i>	FDVSSAPVGREPYIPKI	I EVNYIEGSKD QQWRSRDFWTWKLE EVDNKKVFGNHSFRPNQR
<i>B. pendula</i>	FGVSSGPMEREPYIPKI	KKCS SGNF PWTKMK EANNKKVFGNHSFRPNQR
<i>O. rehderiana</i>	FGVSSGPVEREPYIPKI	AEVNYIEGSND KKWS SGNF PWAKKLE EANNKKVFGNHSFRPNQR
<i>Q. robur</i>	FDVSSVPLEREPYIPKI	VEVNYIEGSND KKWS SENF PWTKLE EVNNKKVFGNHSFRPNQR
<i>F. sylvatica</i>	FDVLSGPLEREPYIPKI	VEVNYIEGSND KKWS SENF PWTKLE EANNKKVFGNHSFRPNQR
<i>F. excelsior</i>	FGVSTAPLEREPYPVKY	IEINYIEGSID KKWS GWD F PWTKLE EANNKKVFGNHSFRPNQR
<i>S. robusta</i>	EVINATMSGHDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQ . . .
<i>P. chinensis</i>	EVINATMTGHDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP
<i>H. chinensis</i>	EVINATMSGHDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP
<i>D. turbinatus</i>	EVINATMSGHDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP
<i>V. mangachapoi</i>	EVINATMSGHDVFVLMPGGKSLTYQLPALICPGVTL	EVISPLVSLIQDQIMHLLQANIP
<i>B. pendula</i>	EAINAAMSGYDVSVLMPTRGGKSLTYQLPALICPGI	TFVISPLVSLIQDQIMHLSQANIP
<i>O. rehderiana</i>	EVINATMSGCDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLSQANIP
<i>Q. robur</i>	EVINATMSGCDVFVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP
<i>F. sylvatica</i>	EVINATMSGYDVVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP
<i>F. excelsior</i>	EVINATMSGYDVVLMPGGKSLTYQLPALICPGI	ITLVISPLVSLIQDQIMHLLQANIP

9 LRPPRC

<i>S. robusta</i>	MEKAWLFFYWASKIKGFKHDQFTYTTMLDIFGEAGRISSMKYVFQOMOEKGITIDAVTYT
<i>P. chinensis</i>	MEKAWLFFYWASKIKGFKHDQFTYTTMLDIFGEAGRISSMKYVFQOMOEKGITIDAVTYT
<i>H. chinensis</i>	MEKAWLFFNWWASKIKGFKHDQFTYTTMLDIFGEAGRISSVKYVFQOMOEKGITIDAVTYT
<i>D. turbinatus</i>	MEKAWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRISSMKHVFQOMOEKGITIDAVTYT
<i>V. mangachapoi</i>	MEKAWLFFNWWASKIKGFKHDQFTYTTMLDIFGEAGRISSMKYVFQOMOEKGITIDAVTYT
<i>B. pendula</i>	MEKAWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRIPSMKHVFQOMOEKGKLIDAVTYT
<i>O. rehderiana</i>	MEKAWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRISSMNYVFELMRERKGKIDAVTYT
<i>Q. robur</i>	MEKAWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRIVASMKHVFQOMOEKGKLIDAVTYT
<i>F. sylvatica</i>	MEKSWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRIVASMKHVFQOMOEKGKLIDAVTYT
<i>F. excelsior</i>	MEKAWLFFNWWASKLKGFKHDQFTYTTMLDIFGEAGRISSMKYVFQOMOEKGKLIDAVTYT
<i>S. robusta</i>	SVMHWVSRG GDVDGAVEAWEEMREKGCEPTVVSYTA YMKILF DNKR VKEAT DLYK EMLQS
<i>P. chinensis</i>	SVMHWVSRG GDVDGAVEVWEEMREKGCEPTVVSYTA YMKILF DNKR VKEAT DLYM EMLQS
<i>H. chinensis</i>	SVMHWVSRG GDVDGAVEVWEEMREKGCEPTVVSYTA YMKILF DNKR VKEAT DLYK EMLQS
<i>D. turbinatus</i>	SVMHWVSRG GDVDGAVEVWEEMREKGCEPTVVSYTA YMKILF DNKR VKEAT DLYK EMLQS
<i>V. mangachapoi</i>	SVMHWVSRG GDVDGAVEVWKEMREKGCEPTVVSYTA YMKILF DNKR VKEAT DLYK EMLQS
<i>B. pendula</i>	SLMHWLSSS GDFDGA KVWEEMKDNGCYPTVVSYTA YMKVLFDNSRAKEATDVYREMLRS
<i>O. rehderiana</i>	SLMHWLSSS GDVDRA KVWEEMKANGCFLTVVSYTA YMKVLFDNSRAKEATDVYREMLRS
<i>Q. robur</i>	SLMHWLSSC GNVDGAIKVWEEMKGNGCFLTVVSYTA YMKLLFDNNRAKEATEVYKEMLR S
<i>F. sylvatica</i>	SLMHWLSSS GDVDGAMKVWEEMKGNGCFLTVVSYTA YMKLLFDNGRASEATDAYKEMLR S
<i>F. excelsior</i>	SLHWMSND GDVDGAVKLWEEMKLK GCRPTVVSYTA EMKILF DHKR VKEATEVYKEMLR S
<i>S. robusta</i>	GISPNCHTYT VLM EHLIGAGKYNEALDIFFN KMQEAEVK PDKAACNV LIEKCCKARETGAI
<i>P. chinensis</i>	GISPNCHTYT VLM EHLIDAGKYNEALDIFFN KMQEAGVK PDKAACNV LIEKCCKARETGAI
<i>H. chinensis</i>	GISPNCY TYTVLM EHLIDAGKYNEALDIFN RNM QEAGVK PDKAACNV LIEKCCKVRETGAI
<i>D. turbinatus</i>	GITPNGHHTYTVLM EHLIGAGKYDEALDIFN EMEAGVK PDKAACNV LIEKCCKTRATGAI
<i>V. mangachapoi</i>	GISPNCHTYT VLM EHLIGAGKYDEALDIFN EMEAGVK PDKAACNV LIEKCCKTRATGAI
<i>B. pendula</i>	GCPNCHTYT ILM EYLVGSGKYKEALEMFCKM QEAGAQ PDKAACNI LVEKY SKAGE T KAL
<i>O. rehderiana</i>	GCTPNCHTT YTLMEYLVGSGKYKEALEMFCKM QEAGT Q PDKAACNI LVEKC SMAGE T KAF
<i>Q. robur</i>	GFSPTCHTYT ILM EYLVGSGKYEAELEIFSKM QEAGIQ PDKAACNI LVEKC SKAGE TRAL
<i>F. sylvatica</i>	GCAPTCHTYT ILM EYLVGSGECNTV F LVEG VMIAACGV
<i>F. excelsior</i>	GLSPNCY TYTVLM EHLACSGKFDEALEVPN KMQEAGVK PDKATCN I LVEIC CRTGETWAM
<i>S. robusta</i>	TQ ILQYMK EHF LVLRYP IFLETLK T NAA GES DLLLRQV HPHI SPEC VSDE KEVELIR NG
<i>P. chinensis</i>	TQ ILQYMK EHF LVLRYP IFLEALK I LNAAGES DLLLRQV HPHI SV EHV SDE KEVELIR NG
<i>H. chinensis</i>	TQ ILQYMKENFLVLRYP IFLEALK I LNAAGES DLLLRQV HPHI SV EHV SDE KEVELIR NA
<i>D. turbinatus</i>	TQ ILQYMKENFLVLRYP IFFEALKSLN AAGES DLLLRQV HPHI SVER VSDE KEVELIR NA
<i>V. mangachapoi</i>	TL ILQYMKENFLVLRYP IFFEALKSLN AAGES DLLLRQV HPHI SAER VT DE KEVEPIRNA
<i>B. pendula</i>	TL ILQYMKESRLVLRYPV FEEALKALK I LNAAGES SALLMQVN PHFSTECV SEE EAGDL RATG
<i>O. rehderiana</i>	TL ILQYMKQNH LVLRYPVFLKALKALK I VGES I ALLMQVN PHFSTECV SEE EAGDL RATG
<i>Q. robur</i>	TL ILQYMKESRLVLRYPV FEEALKALK I LNAAGES DLLLRQV HPHI SAER VT DE KEVEPIRNA
<i>F. sylvatica</i>	SVWAGTVTCMSWPLRWGM DALVSSI
<i>F. excelsior</i>	MK ILQYMKENL L VLRYPVY QKA LETFK MAGES Y EILRQV NRHFVIE HFKEE KTDKF GETA
<i>S. robusta</i>	SEVTLSLERELVLL LKKQNL LAVDHLLAALGDKNKQLDP AIISTTIEANGNHCR LD GAL
<i>P. chinensis</i>	SEVTFSLERELVLL LKKQNL LAVDHLLAALGDKNKQLDP AIISTTIEANSNHCR LA GAL
<i>H. chinensis</i>	SEVNLSLERELVLL LKKQNL LAVDHLLAALGDKNKQLDP AIISTTIEANSNHCR LA GAL
<i>D. turbinatus</i>	SEVTLSLERELVLS LKKQNL LAVDHLLAALGDRNKLDP AIISTTIEANGNHCR LD GAL
<i>V. mangachapoi</i>	SEVTLSLERELVLS LKKQNL LAVDHLLAALGDRNKLDP AIISTTIEANGNHCR LD GAL
<i>B. pendula</i>	ADVPFSIDRG LLLI FLKKRN LVAIDL T GII DKNIRLD ST II SI IVEANC DR CR RS GAL
<i>O. rehderiana</i>	PDPVPFSDRG LLLI FLKKRN LVAIDL T GII DKNIRLD ST II SI IVEANC DR CR RS GAL
<i>Q. robur</i>	SDTSY GIDR G LLLI FLKKRN LVAIDL T GII DKNIRLD ST II SI IVEANC DR CR RS GAL
<i>F. sylvatica</i>	SVWAGTVTCMSWPLRWGM DALVSSI
<i>F. excelsior</i>	RVNCPNVD SGFVLNLINK QN FVAIDY LADMDKGVR LD SKI ISTTIELN STNG RWNSAL
<i>S. robusta</i>	S AFNYSV KM SII LERTAFL ALIGI LIRSN AF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>P. chinensis</i>	S AFNYSV KM SII LERTAFL SLGI LIRSN TF ISVVS IVEE MVRAGY SPGV YLGS LLI YRL
<i>H. chinensis</i>	S AFNYSV KM SII LERTAFL SLGI LIRSN TF ISVVS IVEE MVRAGY SPGV YLGS LLI YRL
<i>D. turbinatus</i>	S AFNYSV KM SII LERTAFL SLGI LIRSN TF ICVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>V. mangachapoi</i>	L AFNYSV KM SII LERTT YLA LIGI LIRSN TF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>B. pendula</i>	L AFKYSV RM GITIERNAYL S LIGI LIRSN TF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>O. rehderiana</i>	L AFKYSV RM GITIERNAYL S LIGI LIRSN TF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>Q. robur</i>	L AFKYSV RM GITIERNAYL S LIGI LIRSN TF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>F. sylvatica</i>	L AFKYSV RM GITIERNAYL S LIGI LIRSN TF ISVVS IVEE MVRAGY SLGV YLGS LLI YRL
<i>F. excelsior</i>	F AF EYGV KFG LN IDRI AYIA LIGI LIRSN TF ISK AVE IVEE MVRAGH SLGTQQSA LLI YHL

h LSD1

<i>S. robusta</i>	.....	.....	.....	.....	.....	.....	.....	.....
<i>P. chinensis</i>	.....	LLDASHRNL	RSLPRSF	SRSSSSADS	MAQI	PNLDNS	SPIN	SK	
<i>H. chinensis</i>	.....	.....	.....	ISRSSSADS	MAQI	PNLDNS	SPIN	IK	
<i>D. turbinatus</i>	.....	.....	LLQASHR	KLSGSLPRSF	SRSSSSADS	MAQI	PNLDNS	SPIN	IK
<i>V. mangachapoi</i>	.....	.....	.....	.....	.....	MAQI	PNLDNS	SPIN	IK
<i>B. pendula</i>	.....	.....	.....	.....	.....	MAQI	PNLDNA	PIN	FT
<i>O. rehderiana</i>	.....	.....	.....	.....	.....	MAQI	PNLDNA	PIN	FT
<i>Q. robur</i>	.....	.....	.....	.....	.....	MAQI	PNLDNA	PIN	LT
<i>F. sylvatica</i>	MKVRGTER	QREACKS	I G V M E V K I	K R E S Q K R E I P S L Y N T E R H F A P	.....	MAQV	PNLDNA	PIN	LT
<i>F. excelsior</i>	.....	.....	.....	.....	.....	MAQV	PNLDNA	PIN	LT

<i>S. robusta</i>	SMRDQSQRD	LLK	LKD	IRGKKCLVIEPKLGGSSLII	IQTSILKEHGVELRHLSP	EPPVQTE	.....	.....
<i>P. chinensis</i>	SIREQSQRD	LLL	K	IRGKKCLVIEPKLGGSSLII	IQTSLLKEHGVELRHLSP	ESVQTE	.....	.....
<i>H. chinensis</i>	SIREQSQRD	LLL	K	IRGKKCLVIEPKLGGSSLALI	I IQTSLLKEHGVELRHLSP	PPEPVQTE	.....	.....
<i>D. turbinatus</i>	SIREQSQRD	LLL	K	IRGKKCLVIEPKLGGSSLII	I IQTSLLKEHGVELRHLSP	PPEPVQTE	.....	.....
<i>V. mangachapoi</i>	SIREQSQRD	LLL	K	IRGKKCLVIEPKLGGSSLII	I IQTSLLKEHGVELRHLSP	DPDVQTE	.....	.....
<i>B. pendula</i>	SIREQSQRD	LLL	K	IRGKKCLVIEPKLGGSSLII	I IQTSLLKEHGVELRHLSP	ADEPIQTD	.....	.....
<i>O. rehderiana</i>	SIREQSQRD	LLL	N	IRGKKCLIIDPKLGGSSLII	I QTSSLKEHGVELRHLSP	ADEPIQTD	.....	.....
<i>Q. robur</i>	SIREQSQRD	LLL	N	IRGKKCLIIDPKLGGSSLII	I QTSSLKEHGVELRHLSP	ADEPIQTD	.....	.....
<i>F. sylvatica</i>	SIREQSQRD	LLL	N	IRGKKCLIIDPKLGGSSLII	I QTSSLKEHGVELRHLSP	ADEPIQTD	.....	.....
<i>F. excelsior</i>	TTRDOSCKEL	LTN	LN	IRGKKCLVIDPKLSGSLSLIV	QSSQLKEHGAELRHLTT	EPVETD	.....	.....

<i>S. robusta</i>	CTKVVVYLVRP	Q R D L M K	I	I S S H V H N D I S K G L O R E	E Y Y I I Y F V P R R Q V Q C E K I L E E E K V H N	L M T	.....	.....
<i>P. chinensis</i>	CTKVVVYLVRP	Q R D L M K	I	I S S H V H N D I S K G L O R E	E Y Y I I Y F V P R R Q V Q C E K I L E E E K V H N	L M T	.....	.....
<i>H. chinensis</i>	CTKVVVYLVRP	Q R D L M K	I	I S S H V H N D I S K G L O R E	E Y Y I I Y F V P R R Q V Q C E K I L E E E K I H N	L M T	.....	.....
<i>D. turbinatus</i>	CTKVVVYLVRP	Q R D L M K	I	I S S H V H N D I S K G L O R E	E Y Y I I Y F V P R R Q V Q C E K I L E E E K V H S	L M T	.....	.....
<i>V. mangachapoi</i>	CTKVVVYLVRP	Q R D L M K	I	I S S H V H N D I S K G L O R E	E Y Y I I Y F V P R R Q V Q C E K I L E E E K V H S	L M T	.....	.....
<i>B. pendula</i>	CTKVVVYLRSQ	L D L M K F I	C S N V H N D I S K G L O R E	E Y Y I I Y F V P R R S V A C E K V L E E E K V H E	A C E K V L E E E K V H E	L I T	.....	.....
<i>O. rehderiana</i>	CTKVVVYLRSQ	L D L M K F I	C S N V H N D I S K G L O R E	E Y Y I I Y F V P R R S V A C E K V L E E E N I H E	A C E K V L E E E N I H E	L I T	.....	.....
<i>Q. robur</i>	CTKVVVYLRSQ	L D L M K F I	C S N V H N D D V S K G E	Q R E Y F I Y F A P P R Q V Q C E K I L E E E K V H S	Q R E Y F I Y F A P P R Q V Q C E K I L E E E K V H S	L M T	.....	.....
<i>F. sylvatica</i>	CTKVVVYLRSQ	L D L M R F I	C S N V H N D V S K G I	Q R E Y Y V Y F V P R R T V V C E K I L E E E N V Y S	Q R E Y Y V Y F V P R R T V V C E K I L E E E N V Y S	H L M S	.....	.....
<i>F. excelsior</i>	CTKVVVYLRAQ	N L M K F I C S Q I H N D I	T K G L O R E	E Y F L Y F V P R R A V A C E K I L E D E K V H E	E Y F L Y F V P R R A V A C E K I L E D E K V H E	M L T	.....	.....

<i>S. robusta</i>	I G E Y A L Y V V I P F	D E D V	L S F E	L D A Y K E C Q V D	G D T D S L W H I A K A I H R L E .	.	.....	.....
<i>P. chinensis</i>	I G E Y P L Y V V P	P F D E D I	L S F E	L D A Y K E C Q V D	G D T D S L W H I A K A I H K L E . S	S F G I I P N V R A K	.....	.....
<i>H. chinensis</i>	I G E Y P L Y V V P F	D E D I	L S F E	L D A Y K E C Q V D	G D T D S L W H I A K A I H K L E . F	S F G I I P N V R A K	.....	.....
<i>D. turbinatus</i>	I G E Y P L Y V I P	F D E D I	L S F E	L D A Y K E C Q V D	G D T D S L W H I A K A I H K L E . S	S F G I I P N V R A K	.....	.....
<i>V. mangachapoi</i>	I G E Y P L Y A I P	L D E D V	L S F E	L D A Y K E C Q V D	G D T D S L W H I A K A I H K L E . S	S F G I I P N V R A K	.....	.....
<i>B. pendula</i>	I G E C P L Y I V P	L E E D V	L S F E	L D A Y K E C Q V D	G D T D T S L W H I A K A I H K L E . F	S F G V V P N V R A K	.....	.....
<i>O. rehderiana</i>	V G E Y P L Y V V	P L E E D V	L S F E	L D A Y K E S Q V D	G D T T S L W H I A K S I H K L E . F	S F G V V P N V R A K	.....	.....
<i>Q. robur</i>	I G E Y P L Y I V P L	D E D V	L S F E	L D A Y K E S Q V D	G D T T S L W H I A K A I H K L E F	S F G V I P N V R A K	.....	.....
<i>F. sylvatica</i>	I G E Y P L Y M V P L	D E D V	L S F E	L D A Y K G S Q V D	G D T T S L W H I A K A I H K L E . F	S F G V I P N V R A K	.....	.....
<i>F. excelsior</i>	I G E Y P L Y L I P	L D E D V	L S F E	L D A Y K E C V V N	G D T T S L W H I A K S I H K L E . F	S F G T I P N V R A K	.....	.....

<i>S. robusta</i>	.....	.....	.....	.....	.....	.....	.....	.....
<i>P. chinensis</i>	[G] K A S V L V	A D I L N R M Q	T	[E] E P V N S L D M T	V P E I N T L L I I D R E V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>H. chinensis</i>	[G] K A S V L V	A D I L N R M Q	T	[E] E P V N S L D M A	V P E I N T L L I I D R E V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>D. turbinatus</i>	[G] K A S V L V	A D I L N R M Q	T	[E] E P V N S L E M T	V P E I N T L L I I D R E V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>V. mangachapoi</i>	[G] K A S V L V	A D I L N R M Q	T	[E] E P V N S F D V	L P E I N T L L I I D R E V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>B. pendula</i>	[G] K A S V R V	A D I L N R M Q A	E E P V N S	D M V P E I N T L I I L D R E	V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>O. rehderiana</i>	[G] K A S V R V	A D I L N R M Q V	E E P V N S	D M V P E I N T L I I L D R E	V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....
<i>Q. robur</i>	[G] K A S V R V	A D I L N R M Q A	E E P V N S P D	.....	.....	V D M V T P M L S Q L T Y E G L I D E C L	.....	.....
<i>F. sylvatica</i>	[G] K A S V R V	A D I L N R M Q A	E E P V N S P D	.....	.....	V D M V T P M L S Q L T Y E G L L D E I L	.....	.....
<i>F. excelsior</i>	G K A S T R	V A D I L N R M Q A	E E P V T S	D M G I P E I N T L I I L D R E	V D M V T P M C S Q L T Y E G L L D E F L	.....	.....	.....

<i>S. robusta</i>	H I S N G A	V E L D T S	V M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q V L R Q K A T S M K Q D Y	.....	.....
<i>P. chinensis</i>	H I N N G A	V E L D T S	V M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q V L R Q K A T S M K Q D Y	.....	.....
<i>H. chinensis</i>	H I N N G S	V E L D T S	V M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q V L R Q K A T S M K Q D Y	.....	.....
<i>D. turbinatus</i>	H I N N G A	V E L D P S	V M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q V L R Q K A T S M K Q D Y	.....	.....
<i>V. mangachapoi</i>	H I N N G A	V E L D T S	V M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q V L R Q K A T S M K Q D Y	.....	.....
<i>B. pendula</i>	R I N N G S	V E L D A S	I M G V Q	Q Q E G K K M	K V P L N S S D K L F	K E I R D L N F E V V V V Q I L R Q K A T S M K Q D Y	.....	.....
<i>O. rehderiana</i>	R I N N G S	V E L D S S	I M G A Q Q D G K K I	K V P L N S S D K L F	K E I R D L N F E V V V V Q I L R Q K A T S M K Q D Y	.....	.....	.....
<i>Q. robur</i>	H V N N G S	V E L D A S	I M G L Q	Q Q E G K K I	K V P L N S S D K L F	K E I R D L N F E V V V V Q I L R Q K A T S M K Q D Y	.....	.....
<i>F. sylvatica</i>	H V N N G S	V E L D S S	V M G L Q	Q Q E G K K I	K V P L N S S D K L F	K E I R D L N F E V V V V Q I L R Q K A T S M K Q D Y	.....	.....
<i>F. excelsior</i>	G V N N G A	V E L D S S	I M G V Q	Q Q E A K K L	K V P L N S S D K L F	K E I R D M N F E V V V V Q V L R Q K A T S M K Q D Y

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<i>S. robusta</i>	TEMTTTNQTVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPSFLAKLDMEHTMVEAQS	
<i>P. chinensis</i>	TEMTTTNQTVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPSFLAKLDMEHTMVEAQS	
<i>H. chinensis</i>	TEMTTTNQTVSELKDFVK	KLNSLPEMTRHINLAQHLSSFTSKPSFLAKLDMEHTMVEAQS	
<i>D. turbinatus</i>	TEMTTTNQTVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPSFLAKLDMEHTMVEAQS	
<i>V. mangachapoi</i>	TEMTTTNQTVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPSFLAKLDMEHTMVEAQS	
<i>B. pendula</i>	TEMSTTNQTVSELKDFVR	KLNSLPEMTRHINLAQHLSTFTSKPFLGQLDMEHTIEAQS	
<i>O. rehderiana</i>	TEMTTTTQTVSELKDFVR	KLNSLPEMTRHINLAQHLSTFTSKPFLGQLDMEHTIVEAQS	
<i>Q. robur</i>	TEVTTTQTQSVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPAFLGQLDMEHTIVEAQS	
<i>F. sylvatica</i>	TEVTTTQTQSVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPAFLGQLDMEHTIVEAQS	
<i>F. excelsior</i>	TEISTTTQSVSELKDFVK	KLNSLPEMTRHINLAQHLSTFTSKPSFLGRLDMEOTLVQAQS	
<i>S. robusta</i>	YDICFEYIEEMIHKQEPLVNVLRLLLF	SVTNSGLPKKHF DYLR.....RE	
<i>P. chinensis</i>	YDICFEYIEEMIHKQESLVNVRLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>H. chinensis</i>	YDICFEYIEEMIHKQEPLVNVLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>D. turbinatus</i>	YDICFEYIEEMIHKQEPLVNVLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>V. mangachapoi</i>	YEISFEYIEEMIHKQEPLVNVLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>B. pendula</i>	YDICFEYIEEMIHKQEPLVNVLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>O. rehderiana</i>	YDICFEYIEEMIHKQEPLVNVLRLLF	SVTNSGLPKKHF DYLR.....RE	
<i>Q. robur</i>	YDICFEYIEELIHKQEPLVNVLRLLF	SITSSGLPKKFQFDYLRQDFMHIIITVNSLGRE	
<i>F. sylvatica</i>	YDI.....LNAKACL.....	FAVNWA.....RE	
<i>F. excelsior</i>	YDVCFEYIEEMIHKQEPLINVLRLLVLE	SITNSGLPKKNFDYLR.....RE	
<i>S. robusta</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWQMIEH	NALQLVVVEDTN TANPNDIAYVFSGY	
<i>P. chinensis</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWQMIEH	NALQLVVVEDTN TAK.....RE	
<i>H. chinensis</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWQMIEH	NALQLVVVEDTN TANPNDIAYVFSGY	
<i>D. turbinatus</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWQMIEH	NALQLVVVEDTN TANPNDIAYVFSGY	
<i>V. mangachapoi</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWQMIEH	NALQLVVVEDTN TANPNDIAYVFSGY	
<i>B. pendula</i>	LLHSYGFEHMATLNNLEKAGLKKQESKSNWLT	IQRALQLVVDDTD TANPNDIAYVFSGY	
<i>O. rehderiana</i>	LLHSYGFEHMATLNNLEKAGLFKKQEAKSNWLT	IQRALQLVVDDTD TANPNDIAYVFSGY	
<i>Q. robur</i>	LLHSYGFEHMATLNNLEKAGLKKQESKSNWLT	IQRALQLVVDDTD TANPNDIAYVFSGY	
<i>F. sylvatica</i>	.....ESKSNWLT	IQRALQLVVDDTD TANPNDIAYAFSGY
<i>F. excelsior</i>	LLHSYGFEHIA	TTLNNLEKAGLFRKQDSKSNWLT	IKRQLQLVVEDDT TANPNDIAYVFSGY
<i>S. robusta</i>	APLSVRIIH	HAVRSGWRPMEEAVWKLLPGPQMETKRD	G SVP SNQSFESLQGAT. IDK
<i>P. chinensis</i>	RPMEAVWRLLPGPQMETKRD	G SVP SNQSFESLQGAT. IDK
<i>H. chinensis</i>	APLSVRIIH	HAVRSGWRPMEEAVWKLLPGPQMETKRD	G SVP SNQSFESLQGAT. IDK
<i>D. turbinatus</i>	APLSVRIIH	HGVRSGWRPMEEAIWKLLPGPQMETKRD	G SVP SNQSFESLQGAT. MDK
<i>V. mangachapoi</i>	APLSVRIIH	HAVRSGWRPMEEAIWKLLPGPQMETKRD	G SVP SSQSFESLHGT. MDK
<i>B. pendula</i>	APLSIRLIQ	HAVRSGWRPIEEILKLLPGPHSETKR	GRFSSSPSSFTLQGASANMDK
<i>O. rehderiana</i>	APLSIRLIQ	HAVRSGWRPIEEILKLLPGPHSETKR	GRFSSSPSSFTLQGASANTDK
<i>Q. robur</i>	APLSIRLVQ	HAVRSGWRPIEEILKLLPGPHSETKR	GRFSSSPSSFTLQGASAN. NIDK
<i>F. sylvatica</i>	APLSIRLIQ	HAVRSGWSD.....	GRFSSSPSSFTLQGASAN. NIDK
<i>F. excelsior</i>	APLSIRLVQ	HAIRSGWRPIE EILKLLPGPHSETKK	SGFASSPSFDTIPGSLNNELEK

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<i>S. robusta</i>	M GEEQHQAP E Q.....	Q PESQVE S A E ASE Q S.....	Q KEYSWPVI
<i>P. chinensis</i>	M GEEQHQAP E H.....	Q PESQVE S TE E ASE Q S.....	Q KEYSWPVI
<i>H. chinensis</i>	M GEEQHQAP D H.....	Q PESQVE S TE E ASE Q S.....	Q KEYSWPVI
<i>D. turbinatus</i>	M GEEQHQAP E H.....	Q PESQVE S TE E ASE Q S.....	Q KEYSWPVI
<i>V. mangachapoi</i>	M GEEQHQAP E Q.....	Q PESQVE S TE E ASE Q S.....	Q KEYSWPVI
<i>B. pendula</i>	MSVTEAM G EEE.EEEEKH.....	QNSPSGVAE I TQAT.....	QEDHSWPLI
<i>O. rehderiana</i>	MSATEAM G EE.EEEEKH.....	QNSPSGVAE I TRAT.....	QEEHSSPVV
<i>Q. robur</i>	M QEEEQENHHNNNHESES K SNSPSEVAE I TEPTKDQEEQQ	QOEYSWPVI	
<i>F. sylvatica</i>	MSVTEAM N EEE..VENE.....	QNSPSPEVAE I TEAT.....	QOEYCWPVI
<i>F. excelsior</i>	M GEEGADAEHQ.....	QPNPDTTESTEFTETP.....	SNGAYSWPLV
<i>S. robusta</i>	S FDAPP <i>H</i> RTYHFYQQFR <i>T</i> .SPNPNFLKG V KWSPDGSC F LASSD D NTLRI F SLPDNGS SD		
<i>P. chinensis</i>	S FDAPP <i>H</i> RTYHFYQQFR <i>T</i> .GPNPNNFLKG V KWSPDGSC F LASSD D NTLPI F SLPDNGS SD		
<i>H. chinensis</i>	S FDAPP <i>H</i> RTYHFYQQFR <i>T</i> .SPNPNFLKG V KWSPDGSC F LASSD D NTLRN F SLPDNGS SD		
<i>D. turbinatus</i>	S FDAPP <i>H</i> RTYHFYQQFR <i>T</i> .SPNPNFLKG V KWSPDGSC F LASSD D NTLPI F SLPDNGS SD		
<i>V. mangachapoi</i>	S FDAPP <i>H</i> RTYHFYQQFR <i>T</i> .SPNPNFLKG V KWSPDGSC F LASSAD D NTLRI F SLPDNGG SD		
<i>B. pendula</i>	R FDVPP <i>H</i> RTYHFYHQFR <i>T</i> .GSNPNNFLKG V KWSPDGSC F LTSSED D NTLRSFT L PDYGSGG		
<i>O. rehderiana</i>	R FDVPP <i>H</i> RTYHFYNOFR <i>T</i> .GSNPNNFLKG V KWSPDGSC F LTSSED D NTLRVFT L PDNGSGG		
<i>Q. robur</i>	R FDVPP <i>H</i> RTYHFYNQFR <i>N</i> .SPNPNFLKA I KWSPDGSC F LTSSED D NTLRVFT L PDNGSGG		
<i>F. sylvatica</i>	Q FDVLPHRTYHFYHQFR <i>T</i> .APNPNNFLKA V KWSPDGSC F VTSSED D NTLRVFT L PDNGSGG		
<i>F. excelsior</i>	Y DAHPYRTYHFFKQFR <i>T</i> AA <i>S</i> NPNNFLKG V KWSPDGSC F UTCCDD D NTLHVFT L PYDDSIN		
<i>S. robusta</i>	Y VNTNSSIPAE D SFAADL V VREGESVYDFC W YFYM S ASDPVTCVFATTTRDHPIHLWDAT		
<i>P. chinensis</i>	Y VNTTHSSIPAE D SAADI V VREGESVYDFC W YFYM S ASDPVTCVFATTTRDHPIHLWDAT		
<i>H. chinensis</i>	Y VNTHSSIPAE D SYAADL V VREGESVYDFC W YFYM S ASDPVTCVFATTTRDHPIHLWDAT		
<i>D. turbinatus</i>	N INTHSSVPAEDSYAADL V VREGESVYDFC W YFYM S ASDPVTCVFATTTRDHPIHLWDAT		
<i>V. mangachapoi</i>	Y VNTHSSVPAEDSYAADL V VREGESVYDFC W YFYM S ASDPVTCVFATTTRDHPIHLWDAT		
<i>B. pendula</i>	D VSTCSTA D EDSYAADV V VHEGESVYDFC W YFYM S ASDPVSCVFASTTRDHPIHLWDAT		
<i>O. rehderiana</i>	D VSTWSVTD D EDSYA V VREGESVYDFC W YFYM S ASDPVSCVFASTTRDHPIHLWDAT		
<i>Q. robur</i>	D INTCSIAAD D EDSYAAD V LMNEGESVYDFC W YFYM S ASDPVSCVFASTARDHPIHLWDAT		
<i>F. sylvatica</i>	D VNTCSIAAD D EDSYA V ANL V MNEGESVYDL C WYFYM N SSDPVSCVFASTARDHPIHLWDAT		
<i>F. excelsior</i>	Y VNTCASAP D EDSYVANL V AREGESVYDYC W YFHM S ASDPDL C CVYATTTRDHPIHLWDAT		
<i>S. robusta</i>	S GLLRCTYRAYDAVDEITAAFSIS F NFG G TKIFAGYN K TIRVFDVHRPGRDFA O YSTLQG		
<i>P. chinensis</i>	S GLLRCTYRAYDAVDEITAAFSIS F NFA G TKIFAGYN K TIRVFDVHRPGRDFA O YSTLQG		
<i>H. chinensis</i>	S GLLRCTYRAYDAVDEITAAFSIS F NFA G TKIFAGYN K TIRVFDVHRPGRDFA O YSTLQG		
<i>D. turbinatus</i>	S GLLRCTYRAYDAVDEITAAFSIS F NFA G TKIFAGYN K TIRVFDVHRPGRDFA O YSTLQG		
<i>V. mangachapoi</i>	S GLLRCTYRAYDAVDEITPAFSIS F NFA G TKIFAGYN K TIRVFDVHRPGRDFT O YSLTQG		
<i>B. pendula</i>	S GLLRCTYRAYDAMDEIAAAFSIA F NPH G TKIFAGYN K AVRVD I HRPGRD F E Q HS T LQG		
<i>O. rehderiana</i>	S GLLRCTYRAYDAMDEIAAAFSIA F NPH G TKIFAGYN K AVRVD I HRPGRD F E Q HS T LQG		
<i>Q. robur</i>	S GLLRCTYRAYDAMDEITAAFSIA F NPF G TKIFAGYN K AVRM F DI H RPGRD F K Q HS T LQG		
<i>F. sylvatica</i>	S GLLRCTYRAYDAMDEITAAFSIA F NFA G TKIFAGYN K TVRVFD I HRPGRD F K Q HS T LQG		
<i>F. excelsior</i>	S GLLRCTYRAYDAMDEITAAFSIG F NPS G TKIFAGYN S SLRIFDVHRPGRD F E Q HS T LQG		
<i>S. robusta</i>	N KEGQTGI I SAIAF S PTHSGMLAT G SYSQTTAIY K EDNMELL L YLILHG Q EGGI I THVQFSKD		
<i>P. chinensis</i>	N KEGQTGI I SAIAF S PTHSGMLAT G SYSQTTAIY K EDNMELL L YLILHG Q EGGI I THVQFSKD		
<i>H. chinensis</i>	N KEGQTGI I SAIAF S PTHSGMLAT G SYSQTTAIY K EDNMELL L YLILHG Q EGGI I THVQFSKD		
<i>D. turbinatus</i>	N KEGQTGI I SAIAF S PTHSGMLAT G SYSQTTAIY K EDNMELL L YLILHG Q EGGI I THVQFSKD		
<i>V. mangachapoi</i>	N KEGQRGI I SAIAF S PTHSGMLAT G SYSQTTAIY K EDNMELL L YLILHG Q EGGI I THVQFSKD		
<i>B. pendula</i>	N KEGLGGI I SAIAF C PTHTGLLAM G SYSQTTAIY T EDNMELL L YLILHG Q EGGV V THVQFSKD		
<i>O. rehderiana</i>	N KEGLAGI I SAIAF C PTHTGLLAM G SYSQTTAIY T EDNMELL L YLILHG Q EGGV V THVQFSKD		
<i>Q. robur</i>	N KEGQTGI I SAIAF C PTHTGLLAM G SYSQTTAIY Q EDNMELL L YLILHG Q EGGV V TH.....		
<i>F. sylvatica</i>	N KEGQTGILSSIAF C PTHTGLLAM G SYSQTTGC I YQEDNMELL L YLILHG Q EGGV V THVQFSKD		
<i>F. excelsior</i>	N KEGOSGI I SSIAF S PTHSGVLAT G SYSQTTAIY T EDNMELP L YLILHG Q EGGV V THVQFSKD		
<i>S. robusta</i>	G NYLYTGGRKDPYIMCWD R DIRKAVEVVYKLYRSTE S TNQRI Y F D IEPY Y GRY L GTGG Q DGLV		
<i>P. chinensis</i>	G NYLYTGGRKDPYIMCWD R DIRKAVEVVYKLYRSTE S TNQRI Y F D IEPY Y GRY L GTGG Q DGLV		
<i>H. chinensis</i>	G NYLYTGGRKDPYIMCWD R DIRKAVEVVYKLYRSTE S TNQRI Y F D IEPY Y GRY L GTGG Q DGLV		
<i>D. turbinatus</i>	G NYLYTGGRKDPYIMCWD R DIRKAVEVVYKLYRSTE S TNQRI Y F D IEPY Y GRY L GTGG Q DGLV		
<i>V. mangachapoi</i>	G NYLYTGGRKDPYIMCWD R DIRKAVEVVYKLYRSTE S TNORMY F DIEPY Y GRY L GTGG Q DGLV		
<i>B. pendula</i>	G NYLYTGGRKDPYILCWDMRKAVDVVKLYRSSE Y TNQRI A F D IEPS GR H LGTGG Q DGLV		
<i>O. rehderiana</i>	G NYLYTGGRKDPYILCWDIRKAIDVVVKLYRSSE C TNQRI L F D IEPL GR H LGTGG Q DGLV		
<i>Q. robur</i>	G NYLYTGGRKDPYILCWDIRKAVDVVKLYRSSE S TNQRI L F D IEPL GR H LGTGG Q DGLFV		
<i>F. sylvatica</i>	G NYLYTGGRKDPYILCWDIRKAVDVVKLYRSSE..... D CFV		
<i>F. excelsior</i>	G NYLYTGGRKDPYILCWDIRNTVDIVYKLYRSS K D T NQRI Q F D IEPL GR Y LGTGG Q DGLV		

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<i>S. robusta</i>	H I Y D L Q T G Q W I S G Y Q A A A D T V N G F N F H P F L P M A A S S S G H R R F Q I P E E D T E E L F . . L R G D E
<i>P. chinensis</i>	H I Y D L Q T G Q W I S G V Q A A A D T V N G F T F H P F L P M A A S S S G H R R F Q I P E E D T E E V F . . L R G D E
<i>H. chinensis</i>	H I Y D L Q T G Q W I S G F Q A A A D T V N G F T F H P F L P M A A S S S G H R R F Q I P E E D T G E L F . . L R G D E
<i>D. turbinatus</i>	H I Y D L Q T G Q W I S G F Q A A A D T V N G F T F H P F L P M A A S S S G H R R F Q I P E E D T E E L F . . L R G D E
<i>V. mangachapoi</i>	H I Y D L Q T G Q W I S G F Q A A A D T V N G F T F H P F L P M A A S S S G H R R F Q I P E E D T E E L F . . L R G D E
<i>B. pendula</i>	H I Y D L Q T G H W V S S F H A A L D T V S G F S F H P F L P M A A S S S G H R R F V V P D D T Y E D M P L T L S G N E
<i>O. rehderiana</i>	H I Y D L Q T G H W V S S F H A A L D T V N G F S F H P F L P M A A S S S G H R R F V V P D D T Y E D M P L T L S G N E
<i>Q. robur</i>	H I Y D L Q T G H W V S S F Q A A S D T V S G F S F H P F L P M A A S S S G H R R F V V P D D L Y E D V P . . L S G N E
<i>F. sylvatica</i>	H I Y D L Q T G N W V S S F Q A A L D T V S G F S F H P F L P M A A S S S G H R R F V V P D D V S E D I P . . L S V L L
<i>F. excelsior</i>	H I Y D L Q T G Q W V S S F Q A A L D T V N G F A F H P F L P M A A T S S G H R R F G G L D D F Q E N M D . . L S G D E
<i>S. robusta</i>	N C A S V W S F S Y T S M A E S G V G M N A D H A K K S V G G A E S H V H Y L P M Y V L N S I C V I G F Q A N L H P S H
<i>P. chinensis</i>	N C A S V W S F S Y T S M A E S G V G M N A G D F N S Q S E N G N I H C D S
<i>H. chinensis</i>	N C A S V W S F S Y T S I A D S G V G M N T G D F N K Q P E N E D I H C D S
<i>D. turbinatus</i>	N C A S V W S F S Y T S M A E S G V G M N A S D F N S Q S E N E N I H R D S
<i>V. mangachapoi</i>	N C A S V W S F S Y T S M A E G S V S K N A G D F D L Q S E N E N V H C D S
<i>B. pendula</i>	N C A S V W S F S I P T M V E N D T E I K G D D S N S L S L H E N L Q H D P
<i>O. rehderiana</i>	N C A S V W S F S I A S T V E N D T E I N G D D S N C P S E H E N L H H D P
<i>Q. robur</i>	N C A S V W N F S V A S . V E N D T E L N G N D F N N L S E H E E L H Q G P
<i>F. sylvatica</i>	I C G I F L K Y L F G L
<i>F. excelsior</i>	N C A S V W S F S C S S T S D T S S I I E S G N

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<i>S. robusta</i>	GDA T LL ..ANE NFP ..IAD..KMK GEKKASCV ..	R LADITNLQQR ..PKLSI QDAKM
<i>P. chinensis</i>	GD A T LL ..AK ENCP ..IAD NKMKGEKKASGA ..	R LVDITNLQQR ..PKLSI QDAKM
<i>H. chinensis</i>	GD A T LL ..AK ENCP ..IAD NKMKGEKKASGA ..	R LADITNLQQR ..PKLSI HNAKM
<i>D. turbinatus</i>	GD V T LL ..G KENCA ..IAD NKMKGEKKACGA ..	R LADITNLQQR ..PKLSI QDAKM
<i>V. mangachapoi</i>	GD A T LL ARDKENCA ..IAE NKMKGEKKACGA ..	R LADITNLQQR ..PKLSI QDAKM
<i>B. pendula</i>	DGA F V L ..G SENCV ..AGDD KAKEVVKGSKI ..GSALRR R LADISNLQQQPKQVNQEAK .	
<i>O. rehderiana</i>	DGDF V L ..G SENCV ..DGDD KTKGVVKGSKI ..GSAQRR R LADISNLQQR ..PKMVN QEAK .	
<i>Q. robur</i>	DA A T V L ..D SENCVAL ARDDKTGMVKGSKI ..GSAQRK R LADISNLQQR ..PRPVD QEVK .	
<i>F. sylvatica</i>	DGA I V L ..D SEIC I ..ARDD KTKGMVKGSKI ..GSAQRK R LADISNLQQR ..PRPVNE DVK .	
<i>F. excelsior</i>	EGFL I L ..G SENAV ..TAGD KHKGEKLTNPCPGSAAARR KLADISNVPK ..SGPSF QGEK .	

<i>S. robusta</i>	RQSPS F NTKE YIEKL OKENMTLMKVLA DR ..	
<i>P. chinensis</i>	YQSPS F NTKE YIEKL OKENMTLMKVLA DR ..	
<i>H. chinensis</i>	CQSPS F NTKE YIEKL OKENMTLMKMLA DR ..KYVLHYLFHSSIFSLVAYLFIEFSLDLCGFA	
<i>D. turbinatus</i>	HQSTS F NSKE CIEKL OKENMTLMKVLA DR ..	
<i>V. mangachapoi</i>	PQSTS F NAKE YIEKL OKENMTLMKVLA DR ..	
<i>B. pendula</i>	QMPIS LTAKE YVEKL OK ..	
<i>O. rehderiana</i>	QLPIS LTSNKE YVEKL OK PKENMTLMKILAER ..	
<i>Q. robur</i>	KLPV SLTTKE YIEKL Q ..	
<i>F. sylvatica</i>	QLPLS LSTTEE YIEKL QRENLTLMKVLA DR ..	
<i>F. excelsior</i>	PQSIS RTKE YIDQI QKEHVALTMLAQ ..	

<i>S. robusta</i>	...NKVIEL|SGIELQKMRINLQKMQQQN|LQLAQA|SQMLAELNA|GKDRLRALQHELG	
<i>P. chinensis</i>	...NKVIEL|SGIELQKMKINLQKMQQQN|LQLAQA|SQMLAELNA|GKDRLRALQHELG	
<i>H. chinensis</i>	L I F V D|SKVIEL|GGIELQKMRINLQKMQQQN|LQLAQA|SQMLAELNA|GKDRLRALQHELG	
<i>D. turbinatus</i>	...NKVIEL|SAIELQKMRINLQKMQQQN|LQLAQA|SQMLAELNA|GKDRLRALQHELG	
<i>V. mangachapoi</i>	...NKVIEL|SGIELQKMRINLQKMQQQN|LQLAQA|SQMLAELNA|GKDRLRAIQHELG	
<i>B. pendula</i>	...NKIIIE|SGIELQKLRINLQKMQQQN|LQLAQA|SQMLAELNL|GKDRLKALQHELG	
<i>O. rehderiana</i>	...NKIIIE|SGIELQKLRINLQKMQQQN|LQLAQA|SQMLAELNL|GKDRLKALQHELG	
<i>Q. robur</i>	...NKVIEL|SGMELQKLRINLQKMQQQN|PQLAQA|SQMLAELNS|GKDRLRVLQHELG	
<i>F. sylvatica</i>	...NKVIEL|SGIELERLRVNLLKMQEQN|QQLAQS|NTKMLAELNS|GKDRLRVLQHELG	
<i>F. excelsior</i>	...NKIIIE|SGIELERLRVNLLKMQEQN|QQLAQS|NTKMLAELNS|GKDRLRVLQHELG	

<i>S. robusta</i>	KNGLL|KARN|LEAE|EKA AKAGIFQT S GYQVPTKKFDK ..P GE ..RE E N KCCNTNR RRR R	
<i>P. chinensis</i>	KNGLL|KARN|LEAE|D AKAGGNFT S GHQFATKKLDK ..P GE ..HE E N KPCNTNR RRR Q	
<i>H. chinensis</i>	KNGLL|KARN|LEAE|E AKAGIFQT S GHQVATKKLDK ..P GE ..HE E N KPCNTNR RRR Q	
<i>D. turbinatus</i>	KNGLL|KARN|LEAE|E AKAGIFQT S GHRVVTKKLDK ..P..P..	
<i>V. mangachapoi</i>	KNGLL|KARN|LEAE|G AKAGIFRT S SDHRVVTKKLDK ..P DE ..	
<i>B. pendula</i>	KNGLL|NARKL|DLEV|VAKRRLRC QNTGNEEGTTKCN E..AGE|SSQAD|K D C KPCNPN RRR R	
<i>O. rehderiana</i>	KNGLL|NTRKLD|DLEV|VAKRRLRC QNA GNEVGTSKCSE ..AGE|SSQAD|K D C KPCSTN KRR Q	
<i>Q. robur</i>	KNGLL|KAR KL|DLEV|VAKRRLRC QNA GNEVGTSKCSE ..AGE|SSQAD|K D C KPCNTN RRR Q	
<i>F. sylvatica</i>	KNVNL|KAR KL|N|VKEKMLTC|QDAGNEVGTA D DAAQAGE|SSQAD|KG G C KPCNTN RRR Q	
<i>F. excelsior</i>	KNGLL|RARQ|LQEE|E KERM KPCQN VDAEV V KLICKED ..P G KSLIED R D G RPQNTR KRSQ	

<i>S. robusta</i>	SKIE|SSGS|S SNVKPIH SAMEKVGK|K|...RFKS|Q|ESEPT|E DAFE|T|DTKFVSPPHD	
<i>P. chinensis</i>	SKIE|SSGS|S STVKPIH LAMEKVGK|K|...RFKS|Q|ESEPT|E DAFE|T|DTKFVSPPHD	
<i>H. chinensis</i>	SKIE|SSGS|S STVKPIH LAIKEVGK|K|...RFKS|Q|ESEPT|E DAFE|T|DTKFVSPPHD	
<i>D. turbinatus</i>	...ASGS|S STVKP SHSATEKVGK|K|...RFKS|Q|ESEPT|E DAFE|T|DTKFVSPPHD	
<i>V. mangachapoi</i>	SKIE|SSGS|S STVKPIH SATERS VGK|K|...RFKS|Q|ESEPA|E DAFE|T|DTKFVSPLPHE	
<i>B. pendula</i>	SKNQ|SLGP|PTTAELVHAKENVEN|K|R|CLRRQSARFKSE|ESEPT|E DLFE|I|D|ODHQASGPTIV	
<i>O. rehderiana</i>	SKNQ|SLGP|PTTAEPAHAKENVEN|K|R|CLRRQSARFKSE|ESEPT|E DLLE|I|D|KT..SGSTIV	
<i>Q. robur</i>	SKKQ|SLGP|PTTAKPVHAKENVEN|K|R|CLRRQSARFKSE|EPEPT|E DLFE|I|D|KASGPTSLKPV	
<i>F. sylvatica</i>	SKNQ|SLGP|PTTAKPVHAKENVEN|K|R|CLRRQSARFKSE|EPEPT|E DLFE|I|D|KASGPTSLKPV	
<i>F. excelsior</i>	S|.|.|.|HRSSDQV|.|.|.|.	

<i>S. robusta</i>	G MV YER ..	C PSLCG SSVQMEQE QG .SAPG..
<i>P. chinensis</i>	G MV YER ..	C PSSSG SSVQKEE EG .CAPG..
<i>H. chinensis</i>	G MV YES ..	C PSSSG SSVQKEQE KV .CAPG..
<i>D. turbinatus</i>	G I VYKS ..	C PASF SSVQKEQE QE .CAPG..
<i>V. mangachapoi</i>	G MV HES ..	C PASSG SSVQKEQE EGNSAPG ..
<i>B. pendula</i>	K LV H TKEYV DKKSHCSRRKSARLKS ESE PI DDLFC CNEAGG SSQADKG DYRRCHTNKRR	
<i>O. rehderiana</i>	K LV P TKEHV DKKRR . SRRQSARFKSE EPEPT EDLFC CNEAEE STQADKG DYKPCHTNR RR	
<i>Q. robur</i>	..	
<i>F. sylvatica</i>	..	
<i>F. excelsior</i>	..	

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<i>S. robusta</i>	.V E T Q E L R T SVGR P L H H V V E K A D N K R V L S R K S T F L Q S Q V P E P T E D V L E M D E A K Y R.....
<i>P. chinensis</i>	.V E T Q E L R T SVGR P L H H V V E K A D N K R V L S R K S T F L Q S Q V P E P T E D V L E M D E A K Y H.....
<i>H. chinensis</i>	.I E T Q E L R T S I IGR P L H H V V E K A D N K R V L S R K S T F L Q S Q V P E P T E D L L E I D E A K Y D.....
<i>D. turbinatus</i>	.V E T Q E L R T SVGR P L H H V V E K A D N K R V P S K R S T F L Q S Q V P E P T E D V F E I D D T K F P.....
<i>V. mangachapoi</i>	.V E T Q E L R T SVGR P L R S M V D K A D N K R V L S R K S T F F O P Q V P E P T E D V L G I D E A K S H.....
<i>B. pendula</i>	Q S E N Q S L G S T T V E P I . H A K E N V E N K R .C L R R Q S T E F K S E E S E P T E D L I E I D K A S G P T I V K.....
<i>O. rehderiana</i>	Q S E N Q S L G S T A T E P V . H A K E N V E N K R .R L R R Q S A F F K S E E S E P T E D I .E I D K A S A P T <i>I</i> V K.....
<i>Q. robur</i>	.....
<i>F. sylvatica</i>	.....
<i>F. excelsior</i>	[.][.][.][.][.][.].H A E E I V R N K R C L R R Q S A F F K S E
<i>S. robusta</i>	I S P L H E E T L H L N V P V L S G S S V Q K E Q G N R A T G V K T R E L R T S V G R P L C D V V E K A D N K R V.....
<i>P. chinensis</i>	V S P L C E E T L H L N V P V L S G S S V Q K E Q G N R A T G V K T Q E L R T S V G R P L H D V V E K A D N K R V.....
<i>H. chinensis</i>	V S P L C E E T L H L N V P V L S G S S V Q K E Q G N R A T G V K T Q E L R T S V G R P L H D V V E K A D N K R V.....
<i>D. turbinatus</i>	I S S L H E E A L H L N V P A S S G S S L Q K E E G C N R A K G V E T Q E L R T S V R R P S C D V V E K A D N K R V.....
<i>V. mangachapoi</i>	V S P L H E E T L P L N V P P S S V S S L R K E E G G N G A T G V E T Q E L R T S V G R P L C G V V E K A D N K R V.....
<i>B. pendula</i>	L V P T K E H V D N K R .P S R R Q S A R F K S E E P G P I E D L F E I D K A S P T T L K P V H A E S I G N.....
<i>O. rehderiana</i>	L V H T R E H F D K K R Q H S R R Q S A R F K S E P G P I E D L F E I D K A S P T T L K P V H A I E S <i>G</i> N.....
<i>Q. robur</i>	.....
<i>F. sylvatica</i>	.....
<i>F. excelsior</i>	[.][.][.][.][.][.].H A E E I V R N K R C L R R Q S A F F K S E
<i>S. robusta</i>	S K R K S T R L Q S Q V P E P T E D V F E I D T K F P I S S L H E E M V H V N V P A S A S S S T P K E E Q G G I N A P.....
<i>P. chinensis</i>	S K R K S S R L Q S Q V P E P T E D V F E I D T K F P I S S L H E E M V H V N V P A S V S S S T P K E E Q G G I N V P.....
<i>H. chinensis</i>	S K R K S T R L Q S Q V P E P T E D V F E I D T K F P I S S L H E E M V H V N V P A S V S S S T P K E E Q G G S N A P.....
<i>D. turbinatus</i>	S K R K S T R L Q S Q V P E P T E D V F E I D T K F P I S S L H E E E A L H L N V P A S G S S L Q K E E E G I N A P
<i>V. mangachapoi</i>	S K R K S T R L Q S Q V P E P T E D V F E I D T K F P I S S L H E E E A M V H N P A S C V S S T P N E K Q G G T N A P.....
<i>B. pendula</i>	.K R Q S A R S K S V E P Q E T E D L F E I Y D A R F P V S P L L D S V H E T S Q M A S L S I K K E D E G N T A H
<i>O. rehderiana</i>	.K R Q S A R S K S V E P Q E T E D L F E I Y D A R F P V S P Q I D D S V H E T G Q M A L S I E R E D E G N T A L
<i>Q. robur</i>	.....
<i>F. sylvatica</i>	.....
<i>F. excelsior</i>	[.][.][.][.][.][.].E K E P A E D L F E T C D A R F P V C S L P D D T V L E N D S I V S A A V K N E V K E C V P A P
<i>S. robusta</i>	E G E V Q E L R R T SVGR P L R K A A E K V Q S Y K E I P L K V K M R R P E
<i>P. chinensis</i>	E G E V Q E L R R T SVGR P L R K A A E K V Q S Y K E I P L N V K M R R P E
<i>H. chinensis</i>	E G E V Q E L R R T SVGR P L R K A A E K V Q S Y K E I P I N V K M R R P E
<i>D. turbinatus</i>	E G E V Q E L R R T SVGR P L R K A A E K V Q S Y K E I P L N V K M R R D E
<i>V. mangachapoi</i>	E G E V Q E L R R T SVGR P L R K A A E K V Q S Y K E I P L N V K M R R D E
<i>B. pendula</i>	S L E A Q E I R R S S V G R P L R R A A E K Q S Y K E I S I N V K M R R L Q
<i>O. rehderiana</i>	S L E A Q E I R R S S V G R P L R R A A E R I Q S Y K E I P I N L K M R R M D G S L K.....
<i>Q. robur</i>	R F E S Q E N R R S S V G R P L R R A A E K Q S Y K E I P L N I K M R R N E
<i>F. sylvatica</i>	R L E A Q E M R R S S V G R P L R R A A E K Q S Y K E I V P V N I K M R R K E.....
<i>F. excelsior</i>	R Y E P Q K F G R S S L G R P S R Q A A I K V Q S Y K E I P L N V K M R

K SKI3

<i>S. robusta</i>	[MV] E D EGRK Q LEESV E AN P DDPSL H FDLGVY L WET.. E TEA..
<i>P. chinensis</i>	M KGTVE D DEGRK Q LEESV K AN P DDPSL H FDLGVY L WET E I G T E TEA..
<i>H. chinensis</i>	M KETV E DEGRK Q LED S I E AN P DDPSL H FDLGVY L WET.. E TE..
<i>D. turbinatus</i>	M KETG E DEER R LEESV E AN P DDPSL H FDLGVY L WET.. E A E TEG..
<i>V. mangachapoi</i>	M KETVQ E DEER R LEESV E AN P DDPSL H FDLGVY L WET.. E E E RE..
<i>B. pendula</i>	YYFAKD MTLSM H GLL EE E GE ETV Q LEESV N AR P DDPSL H FDLGV L WQK.. G GES..	
<i>O. rehderiana</i>	M EKT E ESE E AVL R LEESV N AC P DDPSL H LDIGV L LWEK.. G GKL..
<i>Q. robur</i>	M EKT E ESE E EVV L LEESV N AH P DDPSL H FDLGV R LWEN.. G GEE..
<i>F. sylvatica</i>	HITCNVLVYVNLYNVTEE EES E AIL R LEESV N AH P DDPSL H FDLGL L LWEK.. G GEE..	
<i>F. excelsior</i>	M AL E E E DE V T V K Q LOE S I D SD P DDPSL H FN L LGVL L W E K.. G EKQ..
<i>S. robusta</i>	Q E S KET A AEHFL I S A KLN P QN A AF K YLGH Y A K FC L DV Q RALKCY Q RAVS L N P DDS D VG	
<i>P. chinensis</i>	R E C KET A AEHFL I S A KLN P QN A AF K YLGH Y A K FC L DV Q RALKCY Q RAVS L N P DDS D AG	
<i>H. chinensis</i>	.S KET A AEHFL I S A KLN P QN A AF K YLGH Y A N F C L D V Q RALKCY Q RAVS L N P DDS D AG	
<i>D. turbinatus</i>	R E S KEAAAEHFV	
<i>V. mangachapoi</i>	.S KEAAAEEHFV S AKLN P QN A AF K YLGH Y A N F C L D V Q RALKCY Q RAVS L N P DDS D AG	
<i>B. pendula</i>	.E EKEKAAEHFV I SATL N SN Q AA F YRFL G L Y A Q V S ADT Q RALKCY K AVS L N P DDS H SG	
<i>O. rehderiana</i>	.E EKEKAAEHFV I S A KL H P Q GA F YRFL G L Y A Q I S ADT Q RALKCY Q RAVS L N P DDS H SG	
<i>Q. robur</i>	S NN KEKA AAEHFV I S A K LN P QN Q AA F YRFL G H Y S G V S LDT Q RGL K CY Q RAVS L N P DDS Q SG	
<i>F. sylvatica</i>	S N KEKA AAEHFV I S A K LN P QN Q AA F YRFL G H Y AG V S L D TQ RGL K CY Q RAVS L N P DDS Q SG	
<i>F. excelsior</i>	Q G R E K A V E H L V I A AKL N QN Q AA F YRFL G H Y T Q VSS D P Q RALK C Y Q RAIT N P D DS D AG	
<i>S. robusta</i>	E A F CELLD Q G K GES LE LA V C D AS D K S PRA F WA F R R M G F Q QV H Q N K W SEA V Q S L Q H A IR	
<i>P. chinensis</i>	E A F CELLD Q G K GES LE LA V C D AS D K S PRA F WA F R R M G F Q QV H Q N K W SEA V Q S L Q H A IR	
<i>H. chinensis</i>	E A F CELLD Q G K GES LE LA V C D AS D K S PRA F WA F R R M G F Q QV H Q N K W SEA V Q S L Q H A IR	
<i>D. turbinatus</i>	.....
<i>V. mangachapoi</i>	E A L CELLD Q G E AK S LE EL A V C D AS D K S PRA F WA F R R M G LL Q QV H Q N K W SEA V Q S L Q H A IR	
<i>B. pendula</i>	E A L CDLLD Q G K GES LE E S L C RE A S A K S P K AF W R R L G Y L QL H Q N K W SEA V P S L Q H A IR	
<i>O. rehderiana</i>	E A L CDLLD Q G K GES LE A S L C RE A S A K S P K AF W R R L G Y L QL H Q N K W SEA V H S L Q H A IR	
<i>Q. robur</i>	E A L CDLLD K G K GES LE V A V C RE A S E K S P R AF W R R L G Y L QA H Q K K W P E A V Q S L Q H A IR	
<i>F. sylvatica</i>	E A L CDLLD R G K GES LE V A V C RE A S E K S P R AF W R R L G Y L QA H Q N K W SEA V Q S L Q G I R	
<i>F. excelsior</i>	E A I CDLLD K G K GES LE V A V C RE A S E K A R F W R R L G Y QL A H Q G K W SEA V Q S L H A IR	
<i>S. robusta</i>	G Y P T S AD M W E VR Q L A P L L I LN F ML S F Q QI L S Y GRAIE L D D T R V F AL V E S G N I H L M LGSF	
<i>P. chinensis</i>	G Y P T S AD M W E VR Q Q	
<i>H. chinensis</i>	G Y P T S AD M W E AL G LA	
<i>D. turbinatus</i>	G Y P T S AD M W E.....	
<i>V. mangachapoi</i>	G Y P T S AD M W E AL G LA	
<i>B. pendula</i>	G Y P T S AD L W Q AL G LA	
<i>O. rehderiana</i>	G Y P T S AD L W Q AL G LA	
<i>Q. robur</i>	G Y P A C P E L W Q AL G LA.....	
<i>F. sylvatica</i>	G Y P A C AD L W Q AL G LA	
<i>F. excelsior</i>	G Y P F T C A D L W Q AL G LA	
<i>S. robusta</i>	R K G V E Q F QQ A L K I S P Q S V A Y GL A S G L G L S K E C I SL G F K W G AS L E	
<i>P. chinensis</i>	R K G V E Q F QQ A L K I S P Q S V A Y GL A S G L G L S K E C I SL G F K W G AS L E	
<i>H. chinensis</i>	R K G V E Q F QE A L K I S P Q S V A Y GL A S G L G L S K E F E <i>ISSGFAGFKWGASLEA.....</i>	
<i>D. turbinatus</i>	R K G V E Q F QQ A L K V S P S V S A Y GL A S G L G L S K E F E <i>ISSGFAGFKWGASLEA.....</i>	
<i>V. mangachapoi</i>	R K G V E Q F QO V L K I S P R S V P R A Y GL A S G L G L S K E C I SV G F K W G AS L E	
<i>B. pendula</i>	K K G V E Q F L Q AL D I S P Q S V A Y GL A S G L G L K E C I N L G F R W G AS L E	
<i>O. rehderiana</i>	K K G V E Q F L Q AL D I S P Q S V A Y GL A S G L G L K E C I N L G F R W S A S L E.....	
<i>Q. robur</i>	K E G V E R F K Q AL E I S H E S V A Y GL A S G L G L K A W IN L G F R W G AS L E.....	
<i>F. sylvatica</i>	K E G V E R F QQ A L K I S P E S V A Y GL A S G L G L C L A K S C I N L G F K W G AS L E.....	
<i>F. excelsior</i>	R K G V E Q F QE A L K T S P L N V S A H Y GL G S A F L G F A K E C <i>INSGAFRWGATLE.....</i>	
<i>S. robusta</i>	K A S T R L S G N L S C I W K L L G D I Q L T Y A H F V P W A E E S M S S K Y D E E T F N N S I L S W R R C C L M AVI	
<i>P. chinensis</i>	K A S T Q L S G N L S C I W K L L G D I Q L T Y A Q F Y P W A E E S M S S K Y D E E T F N S I S L S W R R C C L M AVI	
<i>H. chinensis</i>	K A S A R L S G N F S C I W K L L G D I Q L T Y A Q F Y P W A E E S M S S K Y D E E T F C N S I L S W R R C C L M AVI	
<i>D. turbinatus</i>	K A S T R L S G N L S C I W K L L G D I Q L T Y A Q F Y P W V E E S M S S K Y D E K T F S N S I L S W R R C C L M AVI	
<i>V. mangachapoi</i>	K A S T R L S G N L S C I W K L L G D I Q L T Y A Q F Y P W V E E S M S S K Y D E E T F S N S I L S W R R C C L M AVI	
<i>B. pendula</i>	K V G T H L AG N I S C I W K L H G D I Q L A Y A K C F P W T E Q G Q GLE F D V E A F N A S I L Y W Q T C C I A AV	
<i>O. rehderiana</i>	K A G T H L AG N I S C I W K L H G D I Q L A Y A K C F P W T E Q G Q GLE F D A E A F N A S I L Y W Q T C C I A AI	
<i>Q. robur</i>	K T S T H L A E N M S C I W K L H G D V Q L A Y A K C F P W M E E G Q Q GLE F D V E T F N A S I L W K K T C I L A AI	
<i>F. sylvatica</i>	K A S T H L A E N M S C I W K L H G D V Q L A Y A K C F P W M E E G Q Q GLE F D L D T F N A S I L W K Q T C S L A AI	
<i>F. excelsior</i>	A D G T Q L S G N I S C L W K L H G D I Q L M A R C F P W M E E F R L S E T D E K T F H Y S I N S W K S T C C L AA	

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<i>S. robusta</i>	SARNSYQRALN	LAPWQANIYT	DIAISSDLSSL	KGDHEYI	QNAWQLP	EKMALGALLEGD
<i>P. chinensis</i>	SARNSYQRALN	LAPWQANIYT	DIAITSSDLSSL	NGDHEYI	QNAWQLP	EKMALGALLEGD
<i>H. chinensis</i>	SARNFYQRALN	LAPWQANIYT	DIAITSSDLSSL	NGDHEYI	QNAWQLP	EKMALGALLEGD
<i>D. turbinatus</i>	SARNSYQRALN	LAPWQANIYT	DIAITSSDLSSL	NGDHEYI	QNAWQLP	EKMALGALLEGD
<i>V. mangachapoi</i>	SARNSYQRALN	LAPWQANIYS	DIAITSSDLSSL	NGDCEYI	QNAWQLP	EKMALGALLEGD
<i>B. pendula</i>	SAKCSYQRALH	MAPWQANIYT	DIAIASDLSSL	NKSYGNNL	NAWQLS	EKMALGALLEGD
<i>O. rehderiana</i>	SAKHSYQRALH	MAPWQANIYT	DIAIASDLSSL	NKSYENN	NAWOLSA	KMALGALLEGD
<i>Q. robur</i>	SAKC SYQRALH	LAPWEANIYT	DIAITADLSSL	TMSDGNDF	NDWQLSE	KMALGALLEGD
<i>F. sylvatica</i>	SARC SYQRALH	LAPWEANIYA	DIAITADLSSL	TMSVGNNV	NACQLSE	KMALGALLEGD
<i>F. excelsior</i>	SASRSYQRALH	LTPWQANIYV	DIAIASDINFSL	KEDPNGLD	NAWSLA	EKMCLGGILLEGD
<i>S. robusta</i>	NSVFWIVLGCLSNN	QALRQHALIRGLQ	LDVSLAIAWANL	LGKLYREED	DEKK	LARQAFDCAR
<i>P. chinensis</i>	NSEFWIVLASLSNN	QALRQHALIRGLQ	LDVSLAIAWANL	LGKLYREED	DEKK	LARQAFDCAR
<i>H. chinensis</i>	NSEFWIVLGCLSNN	QALRQHALIRGLQ	LDVSLAIAWANL	LGKLYREED	NEKK	LARQAFDCAR
<i>D. turbinatus</i>	NSEFWMVLGCLSNN	QALRQHALIRGLQ	LDVSLAIAWANL	LGKLYREED	NEKK	LARQAFDCAR
<i>V. mangachapoi</i>	NSEFWIVLGCLSNN	QALRQHALIRGLQ	LDVSLAIAWANL	LGKLYREED	NEKK	LARQAFDCAR
<i>B. pendula</i>	NIIEFWVALGCLS	DHDALKQHALIRGLQ	LDVSLAVGWAYLGKLYRKEGA	QOLAKOT	FD	DCAR
<i>O. rehderiana</i>	NNEFWVALGCLS	DHSALKQHALIRGLQ	LDVSLAVGWAYLGKLYRKEGA	QOLAKO	QAF	DCAR
<i>Q. robur</i>	NYEFWVALGCLS	DHNALKQHALIRGLQ	LDVSLAVGWAYLGKLYRKEGANQ	LARKA	QAF	DCAR
<i>F. sylvatica</i>	NYEFWVALGCLS	DHNALKQHALIRGLQ	LDVSLAVGWAYLGKLYRKEGANQ	LARKA	QAF	DCAR
<i>F. excelsior</i>	NYEFWVALGCLS	NHIELKQHSLIRGLQ	LDVSLAVGWAYLGKLYRQE	GEKO	QQA	FDRAR
<i>S. robusta</i>	SIDPSLALPWAGMAADAD	VRE	STLDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>P. chinensis</i>	SIDPSLALPWAGMSADAD	VRE	STLDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>H. chinensis</i>	SIDPSLALPWAGMSADAD	VRE	STLDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>D. turbinatus</i>	SIDPSLALPWAGMSADAD	VRE	STLDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>V. mangachapoi</i>	SIDPSLALPWAGMSADAD	VRE	STLDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>B. pendula</i>	SIDPSLALPWAGMSADFHARD	LAPE	DEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS	
<i>O. rehderiana</i>	SIDPSLALPWAGMSADFHARD	PSDE	DEAFESCLRAVQIL	PSDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS
<i>Q. robur</i>	SIDPSLALPWAGMSADFHARD	PSDE	DEAFESCLRAVQIL	PSDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS
<i>F. sylvatica</i>	SIDPSLALPWAGMSADFHARD	PSDE	DEAFESCLRAVQIL	PSDEAFESCLRAVQIL	PLAEFQIGLAKFALLSGHL	LSS
<i>F. excelsior</i>	SIDPSLALPWAGMSADSRKLKP	DEAYEC	CLLAVQIF	PLAEFQIGLAKFALLSGHL	QSGYLQSS	
<i>S. robusta</i>	QVFQAIQQAVQRT	PHY	PESHNLNGLVREARFEYQAAV	SSYYRLARFAASSISSITDPKSHLR		
<i>P. chinensis</i>	QVFQAIQQAVQHT	PHY	PESHNLNGLVREARFEYQAAV	SSYYRLARFAASSISSITDPKSHLR		
<i>H. chinensis</i>	QVFQAVQAVQRT	PHY	PESHNLNGLVCEARFEYQAAV	SSYYRLARFAASSISSITDPKSHLR		
<i>D. turbinatus</i>	QVFQAIQQAVQRA	PHY	PESHNLNGLACEARFEYQAAV	SSYYRLARFAASSISSGSDPKTHLR		
<i>V. mangachapoi</i>	QVFQAIQQAVQRT	PHY	PESHNLNGLVCEARFEYQAAV	SSYYRLARFAASSISSGSDPKTHLR		
<i>B. pendula</i>	QVFQAIQQAVQHAPHS	PESHNLNGLVCE	SEFVDYQOSAAAYRRAHCASI	SCSASISCSA	SVS	KSYTR
<i>O. rehderiana</i>	QVLGAIQQAVQHAPHS	PESHNLNGLVCE	SRFDYQOSAAAYRRAHCASI	SCSASISCSA	SIS	KSCTR
<i>Q. robur</i>	QVFQAIQQAVQHAPQ	PESHNLNGLVCE	ARFYDQOSAAAYRRAHCASI	CSPFD	SVPKSHTR	
<i>F. sylvatica</i>	QVFQAIQQAVQHAPQ	PESHNLNGLVCE	ARFYDQOSAAAYRRAHCASI	SSFPGS	SVPKSHTR	
<i>F. excelsior</i>	EVFGAIRHALQRAPHY	PESHNLNGLVCE	SRGYQOSAITSYRLARCAIRYFAGELSVSFLK			
<i>S. robusta</i>	DISINLARSLCRAGNAI	DAVOECEIDL	KEKGLLDAEGLQIYAFSLWQLGKHELAISVTRTL			
<i>P. chinensis</i>	DISINLARALCKAGNAI	DAVOECEIDL	KEKGLLDVEGLQIYAFSLWQLGKHELAISVTRTL			
<i>H. chinensis</i>	DISINLARSLCRAGNAI	DAVOECEIDL	KEKGLLDTTEGLQIYAFSLWQLGKHELAISVTRTL			
<i>D. turbinatus</i>	DISINLARSLCRAGNAI	DAVOECEIDL	KEKGLLDTTEGLQIYAFSLWQLGKHELAISVTRTL			
<i>V. mangachapoi</i>	DISINLARSLCRAGNAI	DAVOECEIDL	KEKGLLDTTEGLQIYAFSLWQLGKHELAISVTRTL			
<i>B. pendula</i>	DISINLARSLTKAGNAI	DALLECEKD	NKEGMLDAEGLQIYAFSLWQLGKQDLALSVLVRNL			
<i>O. rehderiana</i>	DVSINLARSLSKAGNAI	DALLECED	NKEGMLDAEGLQIYAFSLWQLGKQDLALSVLVRNL			
<i>Q. robur</i>	DISINLARSLCKAGNAI	DALOECEIDL	NKEGMLDVEGLQVYAFSLWKLDRDLALSVLVRNL			
<i>F. sylvatica</i>	DISINLARSLCKAGNAL	DALOECEIDL	NKEGMLDVEGLQVYAFSLWKLDRDLALSVLVRNL			
<i>F. excelsior</i>	DISINLARSLCRAGNVI	DAVEECESL	HKKGLLDTEGLHIYALSLWQLGKDALSVTRAL			
<i>S. robusta</i>	AASVSTMRTAAGA	ASVSIFICRL	LLYYISGLDSAINSILKMPKELFQSSKISFVMSAIHALD			
<i>P. chinensis</i>	AASVSTMQTAAGA	ASVSIFICRL	LLYYISGLDSAINSILKMPKELFQSSKISFVMSAIHALD			
<i>H. chinensis</i>	AASVSTMRTAAGA	ASVSIFICRL	LLYYISGLDSAINSILKMPKELFQSSKISFVMSAIHALD			
<i>D. turbinatus</i>						
<i>V. mangachapoi</i>	AASVSTMWTAAGA	ASVSIFICRL	LLYYISGLDSAINSILKMPKELFQSSKISFVMSAIHALD			
<i>B. pendula</i>	ALSVSTMQKSVAAP	VSVSIFICRL	YCISGLDSAISSILKMPKELFQNSGVSVVSAIYALD			
<i>O. rehderiana</i>	AASVSTMQKSVAAS	VSVSIFICRL	YCISGLDSAISSILKMPKELFQNSRVSFIVSAIHALD			
<i>Q. robur</i>	AASVSMEQTSVASP	VSVSIFICRL	YFCMGLDSDAISIILKMPKELFQNSGISFIVSAIHTLD			
<i>F. sylvatica</i>	AVRVSAMEQTSVASP	VSVSIFICRL	YFCMGLDSDAISIILKMPKELFQNSGISFIVVSAIHTLD			
<i>F. excelsior</i>	AAGILSMEQKLA	AAASVSLICR	LLYYISQESAITSILKMPKELFQSSKISFVVSAIHVLD			

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<i>S. robusta</i>	QSNRLESVVSSSRYLYSSHEEISGMHYLIALNELIKHGLEDHLGQSAVGHLRKALHMYP
<i>P. chinensis</i>	QSNRLESVVSSSCCYLYSSHEEITGMHYLIALNNLIKHGLEDHLGQSAVGHLRKALHKYP
<i>H. chinensis</i>	QSNRLESVVSSSRYFLSSHEEITGMHYLIALNKLICKHGLEEHLGQSAIGHLRKALHMYP
<i>D. turbinatus</i>	.....
<i>V. mangachapoi</i>	QSNRLESVVSSSRYFLSSHEEITGMHYLIALNKLICKHGLEDHLGQSAVGHLRKALHMYP
<i>B. pendula</i>	QSNRLESVVSSSRSFVQSPVEVAGMHFMTALSKVVKHGTEFCLGVQSGVAHLRKALHMFP
<i>O. rehderiana</i>	QSNRLESVVSSSRSIVQSPVEVAGMHFMTALSKLVKGTEFCLGVQCGIAHLRKALHMFP
<i>Q. robur</i>	TCDRLEPVVSSSRFLTSHEEITMHFLIALSKLVKGTEFCLGQSGVAHLRKALHMYP
<i>F. sylvatica</i>	ICNRLESVVSSSRCFLTSPPEEIIGMHFMTALCKLVKGTECSCLGFQSGVAHLRKAIHMYP
<i>F. excelsior</i>	QNDQLESVVSSRSSVTSDEEITAMHTLIAVCKLVKGSKDCLAIQKGVDHLRKALHKYP

<i>S. robusta</i>	NSVLLRNLLGYLLLSEDWNTTHVSsrcsiIDSSDYKEGLKSAWEIIGAGAVACHVLC
<i>P. chinensis</i>	NSVLIR.....
<i>H. chinensis</i>	NSVLIRNLNGYLLLSEDWNTTHVSsrcsiIDASDYKEGLKSAWEIIGAGAVACYVLC
<i>D. turbinatus</i>	.....
<i>V. mangachapoi</i>	NSVLIRNLNGYLLLSEDWNTTHVSsrcsiIDASDHKEGLKSAWEIIGAGAVACYVLC
<i>B. pendula</i>	NSSLMRNLNGYLLLSEKWNNDTHVATRCNIDASDCAKKEGLKSASEILGAGAVACYAIG
<i>O. rehderiana</i>	NSSLMRNLNGYLLLSEKWNNDTHVATRCNIDSTDCANKEGLKSASEILGAGAVACYAIG
<i>Q. robur</i>	NSSLIRNLNGYLLLSEKWNNDTHVATRCCNVSTDQNKEGLKSASEILGAGAVACYAVG
<i>F. sylvatica</i>	NSSLIRNLNGYLLLSEKWNNDTHVATRCCNVSTDQNKEGLKSASEILGAGAVACYAVG
<i>F. excelsior</i>	NSSVLRNLNGYLLLSEQRDLYLATRCSPFIDLSDHKKEEGLKSAEIVGAGTVACYSTG

<i>S. robusta</i>	NREPKFSFPTCSYQCLNGPGSTKEQKCLRRREPWNHNVRYLLVNLLLQKAREERFPVHLC
<i>P. chinensis</i>	NREPKFSFPTCSYQCLNGSESIKELKQKCFRRREPWNHKPQYLLVNLLLQKAREERFPVHLC
<i>H. chinensis</i>	NREPKFSFPTCSYQCLNGSESIKELKQKCFRRREPWNHNMQYLLVNLLLQKAREERFPVHLC
<i>D. turbinatus</i>	.....CFRRREPWNHNMQYLLVNLLLQKAREERFPVHLC
<i>V. mangachapoi</i>	NREPKFSFPTCSYRCLNGSGSIEKLQKCFRRREPWNHNMQYLLVNLLLQKAREERFPVHLC
<i>B. pendula</i>	NKNPKFSFPTCTYQCLKAPGAIQQQLQKCLHQEPWNHNVRYLLILNFLQKAREERFPVHLC
<i>O. rehderiana</i>	NKNPKFSFPTCTYQCLKAPGAIQQQLQKCLHQEPWNHNMQYLLVNLLLQKAREERFPVHLC
<i>Q. robur</i>	NSNPKFSSFTCTYQCLNGHGAIIQQQLQKCLHQEPWNHNVRYLLILNFLQKAREERFPVHLC
<i>F. sylvatica</i>	NSNPKFSSFTCTYQCLNEPGAIQQQLQD.....
<i>F. excelsior</i>	SYNGRFSFPTCRPQWPSGSGAIRLQKNLHQEPWNLNMRYLLTVNLLQKAREERFPVHLC

<i>S. robusta</i>	TILERLIALSLSNEFYSGKDIDCILYQKFQLLLCASEICLQGGNIAGCINLAKNASALFLP
<i>P. chinensis</i>	.....
<i>H. chinensis</i>	TILERLIALSLSNEFYSGKDIDCILYQKFQLLLCASEICLQGGNIAGCINHAKNASALFLP
<i>D. turbinatus</i>	TILERLVALSLSNEFYSGKDTSCLYQKFQLLLCASEICLQVGNIADCINHAKNASALFLP
<i>V. mangachapoi</i>	TILEHLIALSLSNEFYSGKGISCLYQKFQLLLCASEICLQGGNIADCVNHAKNASALFLP
<i>B. pendula</i>	IVLERLISVALSSDLYTKTDMS.....YQKFQLLLCASEIRLQSEDNIGCINHAKNASALFLP
<i>O. rehderiana</i>	IVLKRLLISVALSSDLYTKTDMS.....YQKFQLLLCASEISLQSEDNIGCVNHAKNASALFLP
<i>Q. robur</i>	ITLKRLLMSVALPSEVYSKTND.....YQKFQLLLCASEISLHSGNKTGCIDHAKNASKLLLP
<i>F. sylvatica</i>	ITLKRLLMSVALPSEVYSKTND.....YQKFQLLLCASEISLYSGNKIGCINHAKNASKLLLP
<i>F. excelsior</i>	LVLERLVAVALSNQSYSRKDSLSSQYNMFHLLCAAEVSLQQGNHSECLKHARLATGLSVH

<i>S. robusta</i>	EYLFVGHLLLCRAYAAEGNCMNLQEYKKCLELKTDHFHVWLCLKVIESQYNLQSGSNT
<i>P. chinensis</i>	.....
<i>H. chinensis</i>	ESYLFVGHLLLCRAYAAEGNFMNVQEYKKCLELKTDHFHVWLCLKVIESQYNLQSGSNT
<i>D. turbinatus</i>	ESYLFVGHLLLCRAYAAEGNFMNVQEYENCLELKTDHFHVWLCLKVIESQYKLQSGSNT
<i>V. mangachapoi</i>	ESYLFVGHLVLCRAYAAEGNFMNQOEYEYKCLELKTDHFHVWLCLKVIECQYKLQSGSNT
<i>B. pendula</i>	DDYLFFSHQLLCRAYAAESDLNLIKEYIRCLELKTDYHGWICLKFIELRYNVQNDENI
<i>O. rehderiana</i>	DDYLFFSHQLLCRAYAAESDLNLIKEYIRCLELKTDYRIGWICLKFIELRYNVQNDENI
<i>Q. robur</i>	DAYLFFSHQLLCRAYAVEGDIINLQKEYIRCLELKTDYHGWICLKFEVESQYHVQTDLN
<i>F. sylvatica</i>	DAYLFFSHQLLCRAYAVEGDIINLQKEYIRCLELRTDYHGWICLKLESQYHVQTDLN
<i>F. excelsior</i>	NSSLFFVHLLLCRAYAAEENNIVSLTEKEYRCMELRTDSHIGWICLKFIESTRYRLQNDSTI

<i>S. robusta</i>	IELSLENECSRGNSNWNMWMADVSVLVLGLICIWQDFLSAEEFLQHACSLAGADSCFFLC
<i>P. chinensis</i>	.....
<i>H. chinensis</i>	IELSLENECRGSSSNWNMWMADVSVLVLGLICIWQDFLSAEEFVNQACSLAGADSCFFLC
<i>D. turbinatus</i>	IELSLENECRGSSSNWNMWMADVSVLVLGMICIWQDFLSAEEFVNQHACSLGGAESCFFLC
<i>V. mangachapoi</i>	IELSLENECRGSSSNWNMWMADVSVLVLGLICIWQDFLSAEEFVNQHACSLAGADSCFFVC
<i>B. pendula</i>	LELSFKESSKERNYSWNMWMADVFLNVWGLISLWNEDFLSAEEFLTQACSLAGAESCLFLC
<i>O. rehderiana</i>	LELSSKFKESTERDYWNMWMADVFLNVWGLISLWNEDFLSAEEFLAQACSLAGAESCLLLC
<i>Q. robur</i>	LDLCFKECSTERDYWNMWMADVFLNVWGLISIWNQDFLSAEEFLAQACSLAGAESCLFLC
<i>F. sylvatica</i>	LELSFKEYSKEENYSWNMWMARFLYLVGLISIWNQDFLSAEEFLAQACSSAGAESCLFLC
<i>F. excelsior</i>	LALNFEECSKDIKNSWNMWMADVFDLVQGLIAWMSGDFIGAEEFLMQACSGGGESCF

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<i>S. robusta</i>	HGAICMELARQFNDSEFLSHAVRSI KKAQ TTSFIPIPLVA
<i>P. chinensis</i>
<i>H. chinensis</i>	HGAICMELARQFNDSEFLACAVRSI KKAQ TTSFIPIPLVA
<i>D. turbinatus</i>	HGAISMELARQFNDSEFLSHAVRSI KKAQ TTSFILTPLVA
<i>V. mangachapoi</i>	HGAICMELARQFNDSEFLSLAIRS I KKAQTTSFIPIPLVA
<i>B. pendula</i>	HGATCMELARQLRDSK F LLSLAVKS I AKA E ASV
<i>O. rehderiana</i>	HGATCMELARKLCDSK F LLLA V KS L TKA Q ETSV
<i>Q. robur</i>	HGAICMELARQS RGS Q F LSLAVKS I TKA Q ETSV
<i>F. sylvatica</i>	HGAICMELARQSSGSQ F LSLAVKS I TKA H K T S
<i>F. excelsior</i>	HGAICMELARQHCDSK Y ISL A IRSI K KA E TS
	STPLPIM S LLA Q AEASLGSKGKWE EKL
<i>S. robusta</i>	RLEWI SWFP VECLIDPWFM M IKKFIADI K SHVANYSSNVFVVSPL
<i>P. chinensis</i>	.....
<i>H. chinensis</i>	RLEWI SWFP
<i>D. turbinatus</i>	RLEWI SWFP
<i>V. mangachapoi</i>	RLEWI SWFP
<i>B. pendula</i>	RLEWF SWFP
<i>O. rehderiana</i>	RLEWF SWFP
<i>Q. robur</i>	RLEWF FAWP
<i>F. sylvatica</i>	RLEWC SWFP
<i>F. excelsior</i>	QDEWF SWFP
	EMRH AELFFQMHL LA
	GLGIARTSMLF.....
	EMRH AELFFQMHL LA
	EMRP AELFFQMHL LA
	EMRP AELFFQMHL LA
	EMRP AELFFQMHL LA
	ETRP AELLFQMHL LF
<i>S. robusta</i>	RQ LEARTD SSSR VE C COSPL QWVVRAIHTNPS S ARYWKVL K R L AS
<i>P. chinensis</i>	.....
<i>H. chinensis</i>	.....
<i>D. turbinatus</i>	RQ LEASTD SSSR VEC C COSPL QWVVRAIHTNPS S ARYWKVL K R L AS
<i>V. mangachapoi</i>	RQ LQAGTD SSSR VEC C COSPL QWVVRAIHTNPS S ARYWKVL K R L TS
<i>B. pendula</i>	RQ SKSMSI SSSN VEFC C COSPER WILRAIHTNPS C IRYW KVLQ KL L T
<i>O. rehderiana</i>	RQ SKSVSI SSSN NAELC C COSPER WILRAIHTNPS C ARYWKVL W KV..
<i>Q. robur</i>	RQ SKSDPK SPSN VEFC C COSPEK WVLRAIHTNPS C IRYW KVLQ KL M T
<i>F. sylvatica</i>	RQ SKSGPN TSAH VESY C COSPEK WVLRAIHTNPS C IRYW KVLQ KL I T
<i>F. excelsior</i>	RQ LK ...ESSS SPDS C CNPLR WIL QAI HTNPS C IRYW KFLQ KN R E

RFK

<i>S. robusta</i>	. . . M S S F P L T T T F F L P S L S S C R S L P S L Q L F P Q C I . . .
<i>P. chinensis</i>	. . . M S S L P L T T S L F P P S L S S C R S L P S L Q L F P Q C I . . .
<i>H. chinensis</i>	. .
<i>D. turbinatus</i>	. . . M S S L P L T S S L F L P S L S S C R S L P S L Q L F P Q C I . . .
<i>V. mangachapoi</i>	. . . M S S L P L T S S L F L P S L S S C R S L P S L Q L F P H Y I . . .
<i>B. ceiba</i>	. . . M G S I L V S S S L I I L A S L S H R S L P S L K S R P Q H V . . .
<i>H. syriacus</i>	. . . M G S I L V P S S L H L P S L S H R S F P K L Q S Q P R H I . . .
<i>D. zibethinus</i>	. . . M P R S I L V P S S L I I P S L S Q G S L P R F Q S Q P Q H I . . .
<i>T. cacao</i>	. . . M R S I L L P C S F L H P S P P R L S L P R L Q S Q P R H I . . .
<i>C. capsularis</i>	M I M R S I L L P S A L L L P S P T R V S L P R L P Q L Q H I . . .
	G T G N H C D R Y H A S P F H L S V P S G P S C K

<i>S. robusta</i>	S . S C K R K W L P G A A T P . N E G V A S V I N F E D F V E K D W S F L D S D E L . . .
<i>P. chinensis</i>	S . S C K R K W L P G A A T P . N E G V A S V I N F E D F V E K D W S F L D S D E L . . .
<i>H. chinensis</i>	. . . G T K L L P G A A T P . N E E V V S V I N F E D F V E K D W S F L D S D E L . . .
<i>D. turbinatus</i>	S . S C K R K W L L A G A A T P . N E G V V S A I D F E D F V E K D W S F L D S D E L . . .
<i>V. mangachapoi</i>	S . S W K R K W L L P G A A T P . N E G V V S V I N P E D F V E K D W S F L D S D G M . . .
<i>B. ceiba</i>	L . P C C H L S L A I A A N A S N E E A V P V I N I E D F Y E K D W S F L D S D E L . . .
<i>H. syriacus</i>	S L L Y N H Q P L A V A A N A S S E G V V S V I N P E D F V E K D W S F L D S D E L . . .
<i>D. zibethinus</i>	A . V C S H R S L A G A A N A S N E G A V P V I N I E D F C E K D W S F L D S D E L . . .
<i>T. cacao</i>	S . L C S H Q S L A G T A N A S N E G A V S V I N I E D F Y E K D W S F L D S D Y L . . .
<i>C. capsularis</i>	S . V C K H R F L A G A P N A T D E G A V S V I K I E D F Y E K D W S F L D S D E L . . .
	S T D Q V K Q N I D R I I S A G E

<i>S. robusta</i>	I E G T S R V L V S I G S E G F V D H L V E S S P C Q M L L V V H D S L F L L S L I K E K Y D K V K C W Q G E L I H V P
<i>P. chinensis</i>	I E G T S R V L V S I G S E G F V D H L V E S S P C Q M L L V V H D S L F L L A L I K E K Y D K V K C W Q G E L I H V P
<i>H. chinensis</i>	I E E T S G V L V S I G S E G F V D H L V E S S P C Q M L L V V H D S L F L L A L I K E K Y D K V K C W Q G E L I Y V P
<i>D. turbinatus</i>	I E E T S R V L V S I G S E G F V D H L V E S S P C Q M L L V V H D S L F L L A L I K E K Y D K V K C W Q G E L I Y V P
<i>V. mangachapoi</i>	I E E T S R V L V S I G S E G F V D H L V E S S P C Q M L L V V H D S L F L L A L I K E K Y D K V K C W Q G E L I Y V P
<i>B. ceiba</i>	I E E T S R V L V S I G S E G F V D H L V E S S P C Q F L V V V H D S I F V L A G I K E K Y D K V K C W Q G E L I Y V P
<i>H. syriacus</i>	I S D T S R V L V S V G S E G F V D Y L V E S S P S Q L L V V H D S I F V L A M I K E K Y D E V R C W Q G E L I Y V P
<i>D. zibethinus</i>	I D E T S R V L V S I G S E G F V D H L V E S S P S Q L L V V H D S I F V L A G I K E K Y D E V R C W Q G E L I Y V P
<i>T. cacao</i>	I E E T S R V L V S I G S E G F V D H L V E S S P S Q L L V V H D S I L I L A G I K E K Y D E V K C W Q G E L I G V P
<i>C. capsularis</i>	I E E S S R V L V S I G S E G F V D H L V E S S P S Q L L V V H D S I F I L A G I K E K Y D K V K C W Q G D L I Y V P

<i>S. robusta</i>	E K W A P L D V V F L Y F L P A L P F A L D Q V F G A L A K R C S P G A R L V I S H P Q G R K V L T Q Q R E Q F P D V I
<i>P. chinensis</i>	E K W A P V D V V F L Y F L P A L P F T L D Q V F E A L A K R C S P G A R L V I S H P Q G R K V L T Q Q R E Q F P D V I
<i>H. chinensis</i>	E K W A P L D V V F L Y F L P A L P F T L D Q V F E A L A K R C S P G A R L V I S H P Q G R K V L A Q Q R K H F P D V I
<i>D. turbinatus</i>	E K W V P L D V V F L Y F L P A L P Q I T L D Q V F E A L V K R C S P G A R L V I S H P Q G R K V L V Q Q R K Q F P D V I
<i>V. mangachapoi</i>	E K W V P L D V V F L Y F L P A L P Q I T L D Q V F E A L V K R C S P G A R L V I S H P Q G R K V L V Q Q R K Q F P D V I
<i>B. ceiba</i>	E K W S P L D V V F L Y F L P A L P F K L D Q V F S A L A K R C S S G S R L V I S H P Q G R E V L E Q Q R K Q F P D V I
<i>H. syriacus</i>	E K W S P L D V V F L Y F L P A L P F E L D Q I L A A M A K R C S S G A R V V I S Y P L C R E K L E Q Q R K Q F P D L I
<i>D. zibethinus</i>	E K W S P L D V I F L Y F L P A L P F K L D Q I F V A L A K R C S P G A R L V I S H P Q G R E V L E Q Q R K Q F P D V I
<i>T. cacao</i>	E K W S P L D V V F L Y F L P A L P F K L D Q I F T L L A K R C S P G A R L V I S H P Q G R A V L Q Q Q G K Q F P D V I
<i>C. capsularis</i>	E K W S P L D V V F L Y F Q P A L P F K L D Q I F E A L A K R C S P G A R L V I S H P Q G R Q V L E L Q R Q Q P D V I

<i>S. robusta</i>	V S N I P D K M T L E K V A E A H S F K V K K F I D E P A L Y L A V L N F C N P R S ..
<i>P. chinensis</i>	V S N I P D K M T L E K V A E A H S F K M K K F I D E P G L Y L A V L N F C N P R S ..
<i>H. chinensis</i>	V A D I P D K M T L E K V A K A H S F K M K K F V D E P G L Y L A V L T F C N P R S ..
<i>D. turbinatus</i>	V S D I P D K R T L E K V A K A H S F E M K K F I D E P G L Y L A V L K F C N A R S ..
<i>V. mangachapoi</i>	L L D I I T R P L L K Y A S L F H F S .. .
<i>B. ceiba</i>	I A G L P E K I T L Q K I A A D H S F E M T E F V D E P G F Y L A V L K F T R A N S ..
<i>H. syriacus</i>	I G N L P E K K L L Q K V A A D H S F E M T E F V D E P G F Y L A V L K F T K A N S ..
<i>D. zibethinus</i>	I A N I P E K T T L Q K V A A D H S F E M T E F V D E P G F Y L A V L K F T K A N I ..
<i>T. cacao</i>	V A N I P D K T T L Q R V A A D H S F E M T E F E D E P G F Y L A V L K F I K A N N E V
<i>C. capsularis</i>	I A N I P D K T T I O K V A A D H S F E M T D F V D E P G F Y L A T L K F I K

M APX

<i>S. robusta</i>	.....	A S R C I T R A	V L I R C N K I E T D D V I L G S G E S C F R R R D A L R V A G A T I G M E L L A S S G S
<i>P. chinensis</i>	.....	A N R C I T R A	V F I R C N K I E T D D V F V S A E S C F R R R D V L R V A G A T I G M E L L A S S G S
<i>H. chinensis</i>	.....	A N R C I T R A	V F I R C N K I E T D D V F G S G E S C L R R R D V L R V A G A T I G M E L L A S S G S
<i>D. turbinatus</i>	.....	A N R C I S R A	V F I R C D K I E T D D V S C S G E S C F R R R D V L R V A G V T I G M E L L A S S G S
<i>V. mangachapoi</i>	.....	A N R C I T R A	V F I G C N K I E A D D V S G A G E S C F G R R R D V L R V A G A T I G M E L L A S S G S
<i>B. pendula</i>	A T I A A	A T R Y T P S H A	V T I R C Y K M E T . G V I A E D E D R F R R R E I L K C F G V T I G M E L L A S S G S
<i>O. rehderiana</i>	A T I A A	A T R Y P S H A	V T I R C Y K M E T . G V I A E D E D R F C R R D I L K C F G V T I G M E L L A S S G S
<i>Q. robur</i>	T T . . .	T N R Y P S Y A K Y Q V T V R C N K M E I .	D A T A E D E D R F C R R D I L K C A G V T I G M E L L A S S G L
<i>F. sylvatica</i>	T S T S S T	T R Y P S H A	V T V R C N K M E I . D V T A G D E D R F C R R D I L K C V G V T V G M E L L A S S G S
<i>F. excelsior</i>	.....	L S R C S P H S	G V I N C . K I E A . H V N S A D . G E S R R D I L H C F G A T I S M D L I A R S T S

<i>S. robusta</i>	F I E T A S A A D L I Q R R Q R S E F L S S I K G I L T T A I E	G T P D V I P S I L T L A L N D A M T Y D Q A T K S G G
<i>P. chinensis</i>	F I E T A S A A D L I Q R R Q R S E F L S S V K G I L T A M A I E	G T P D L I P S I L L T L A L N D A M T Y D K A T S S G G
<i>H. chinensis</i>	F I E T A S A A D L I Q R R Q R S E F L S S V K G I L T T A I E	G T P D L I P S I L L T L A L N D A M T Y D K A T S S G G
<i>D. turbinatus</i>	F I E T A S A A D L I Q R R Q R S E F L S S V R G I L T A T A I E	G T P D L I P S I L L T L A L N D A M T Y D K A T K S G G
<i>V. mangachapoi</i>	F T E A A S A A D L I Q R R Q R S Q F L S S V K G I L T V A A I E	G T P D L I P P I L T L A L N D A M T Y D K A T K S G G
<i>B. pendula</i>	F V E K A S A A D L I Q R R Q R S E F L S V K G I L S T A I K G	G S P D L I P P I L T L A L N D G M T Y D K A T K T G G
<i>O. rehderiana</i>	F L E K A S A A D L I Q R R Q R S E F L S V K G I L S T A I K G	G S P D L I P P I L T L A L N D I M T Y D K A T K S G G
<i>Q. robur</i>	F V E K A S A A D L I Q R R Q R S E F L S V K G I L S T A I K G	G N V E L L P S L L T L A L N D A M T Y D K A T K S G G
<i>F. sylvatica</i>	F V E K A S A A D L I Q R R Q R S D F O S N I K G I L S T A I E	G N T D L I P S L L T L A L N D A T T Y D K A T K S G G
<i>F. excelsior</i>	F V E V A N A A D L I Q R R Q R S E F Q S A I K G T F A E S F K	G N P D L I P S A T K S G G

<i>S. robusta</i>	P N G S I H F S S E I S R P E N K G L S A A L R L L E D A K K E I D S F S K G G P I S F A D L I Q Y A A Q	G A I K A T F
<i>P. chinensis</i>	P N G S I R F S S E I S R P E N K G L S A A L R L L E D A K K E I D S F S K G G P I S F A D L I Q Y A A E	G A L K A T F
<i>H. chinensis</i>	P N G S I H F S S E I S R P E N K G L S A A L R L L E D A K K E I D S Y S K G G P I S F A D L I Q Y A A E	G A L K A T F
<i>D. turbinatus</i>	P N G S I H F S S E I S R P E N K G L S A A L R L L E D A K K E I D S Y S K G G P I S F A D L I Q Y A A Q	G A I K A T F
<i>V. mangachapoi</i>	P N G S I H F S S E I S R P E N K G L S A A L S L L E D A K K E I D S Y S K G G P I S F A D L I Q Y A A Q	G A I K A T F
<i>B. pendula</i>	P N A S I R F S S E I S R P E N K G L S A A M N L L E B A K K E I D S Y S K G G P I S Y A D L I Q Y A A Q	G A I K A T F
<i>O. rehderiana</i>	P N A S I R F S S E I S R P E N K G L S A L N L L E B A K K E I D S Y S K G G P I S Y A D L I Q Y A A Q	S A V K A T F
<i>Q. robur</i>	A N G S I R F S S E I S R P E N K G F S A A L N L L E B A K K E I D S Y S K G G P I S Y A D L I Q Y A A Q	G V L K S T F
<i>F. sylvatica</i>	P N G S I R F S S E I S R P E N K G L S A A L N L L E B A K K E I D S Y S K A G P I S Y A D L I Q Y A A Q	G A V K A T F
<i>F. excelsior</i>	P N G S I R F S S E I S R P E N K G L A A A L N L L E B V K K E I D S Y S K G G P I S Y A D L I Q Y A A Q	S A I K S T F

<i>S. robusta</i>	L A S S I R K C G G N E E K G R F L Y T A F G S N G Q W G L F D K Q F G R T D T E	E P D P E G R I P L W E K A S V Q E M
<i>P. chinensis</i>	L A S A I R K C G G N E E K G R L L Y T A Y G S S G Q W G L F D K Q F G R T D T E	E P D P E G R I P L W E K A S V Q E M
<i>H. chinensis</i>	L A S A I R K C G G N E E K G R L L Y T A Y G S N G Q W G L F D K Q F G R T D T E	E P D P E G R I P L W E K A S V Q E M
<i>D. turbinatus</i>	L A S A I R K C G G N E E K G R L L Y T A Y G S N G Q W G L F D K Q F G R T D T E	E P D P E G R I P L W E K A S V Q E M
<i>V. mangachapoi</i>	L A S A I R K C G G N E E K G R L L Y T A Y G S S G Q W G L F D K Q F G R T D T E	E P D P E G R I P L W E K A S V Q E M
<i>B. pendula</i>	L A S A I R K C G G N E E Q K G S L L Y T A Y G S S G Q W G L F D K Q F G R A D T Q	E P D P E G R V P Q W E K A S V K E I
<i>O. rehderiana</i>	L A S A I R K C G G N V E K G N L L Y T A Y G S S G Q W G L F D K Q I G R A D T Q	E P D P E G R V P Q W M K A S V K E I
<i>Q. robur</i>	L A S A I R K C G G N V E K G R L L Y T A Y G S N G Q W G L F D K Q F G R S D T Q	E P D P E G R V P L W E N A N V K E M
<i>F. sylvatica</i>	L A A S I R K C G G N V E K G R L L Y T A F G S A G Q W G L F D K Q F G R A D T Q	E P D P E G R V P Q W E K A S V K D M
<i>F. excelsior</i>	L A S A I R K C G G N K E K G A L L Y T A Y G S T G Q W A L F D K Q F G R S D A Q	E P D P E G R V P Q W E K A S V Q E M

<i>S. robusta</i>	K D K F K A I G L G P R Q L A V M S A F L G P D Q N A T E A L L A T D P D V S P W V Q K Y Q R S R E T L S Q T D Y E V D
<i>P. chinensis</i>	K D K F K A I G L G P R Q L A V M S A F L G P D Q N A T E A L L A T D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>H. chinensis</i>	K D K F K A I G L G P R Q L A V M S A F L G P D Q N A T E A L L A T D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>D. turbinatus</i>	K D K F K A I G L G P R Q L A V M S A F L G P D Q N A T E A L L A T D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>V. mangachapoi</i>	K D K F K A I G L G P R Q L A V M S A F L G P D Q N A T E A L L A T D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>B. pendula</i>	K D K F S A I G F G P R Q V A V M S A F L G P D Q A T E A F L A A D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>O. rehderiana</i>	K D K F S A V G F G P R Q L A V M S A F M G P D Q A T E A F L A A D P D V S P W V Q K Y Q R S R E T V S Q T D Y E V D
<i>Q. robur</i>	K D K F V A I G F G P R Q L A V M S A F L G P D Q A T E A L L A T D P D V S P W V Q K Y Q R S R E T V S E T D Y E V D
<i>F. sylvatica</i>	K D K F S A I G F G P R Q L A V M S A F L G P D Q A T E A L L A T D P D V S K W V Q K Y Q R S R E T V S E T D Y E V D
<i>F. excelsior</i>	K D K F S A I G F G P R Q L A V M S A F L G P D Q A T E E A L A S D P E V A K W V L Q Y Q R S R E T V S Q T D Y E V D

<i>S. robusta</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V P K V D L S K L K L
<i>P. chinensis</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V P K V D L S K L K L
<i>H. chinensis</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V P K V D L S K L K L
<i>D. turbinatus</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V P K V D L S K L K L
<i>V. mangachapoi</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V P K V D L S K L K L
<i>B. pendula</i>	L I T T L T K L G S L G Q Q I N Y E A Y S Y P K K V D L S K L K L
<i>O. rehderiana</i>	L I T T L T K L G C L G Q K I N Y E A Y S Y P V K K V D L S K L K L
<i>Q. robur</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V Q R V D L S K L K L
<i>F. sylvatica</i>	L I T T L T K L S R L G Q Q I N Y E A Y T Y P V Q R V D L S K L K L
<i>F. excelsior</i>	L I T T L T K L S S L G Q Q I N Y E A Y T Y P V K K V D L S K L K L

n XDH

<i>S. robusta</i>	Y	T	I	E	L	L	E	I	V	A	D	Q	P	S	M	H	V	L	F	I	P	G	N	P
<i>P. chinensis</i>	Y	T	I	E	L	L	E	I	V	A	D	Q	P	S	M	H	V	L	F	I	P	G	N	P
<i>H. chinensis</i>	Y	T	I	E	L	L	E	I	V	A	D	Q	P	S	M	H	V	L	F	I	P	G	N	P
<i>D. turbinatus</i>	Y	T	I	E	L	L	E	I	V	A	D	Q	P	S	M	H	V	L	F	I	P	G	N	P
<i>V. mangachapoi</i>	Y	T	I	E	L	L	E	I	V	A	D	Q	P	S	M	H	V	L	F	I	P	G	N	P
<i>B. pendula</i>	Y	T	T	E	L	L	E	I	R	A	D	D	P	K	M	H	V	L	F	I	P	G	N	P
<i>O. rehderiana</i>	Y	T	T	E	L	L	E	I	R	A	G	D	P	K	M	H	V	L	F	I	P	G	N	P
<i>Q. robur</i>	Y	T	T	E	L	L	E	I	H	A	D	D	P	K	M	H	V	L	F	I	P	G	N	P
<i>F. sylvatica</i>	V	Q	T	N	P	I	P	K	L	K	D	P	L	I	F	D	C	A	T	C	P	.	.	.
<i>F. excelsior</i>	Y	K	T	D	L	L	E	I	H	A	R	D	P	S	L	H	V	V	F	I	P	G	N	P

<i>S. robusta</i>	V	T	F	Y	T	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>P. chinensis</i>	V	T	F	Y	T	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>H. chinensis</i>	N	P	Q	F	T	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>D. turbinatus</i>	V	T	F	Y	T	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>V. mangachapoi</i>	V	T	F	Y	T	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>B. pendula</i>	V	T	F	Y	K	E	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>O. rehderiana</i>	V	A	F	Y	K	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>Q. robur</i>	V	S	F	Y	K	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>F. sylvatica</i>	V	A	F	Y	K	D	F	V	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.
<i>F. excelsior</i>	I	S	F	Y	T	D	F	L	E	S	L	F	E	L	G	G	T	A	S	I	A	...	.	.

<i>S. robusta</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>P. chinensis</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>H. chinensis</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>D. turbinatus</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>V. mangachapoi</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>B. pendula</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>O. rehderiana</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>Q. robur</i>
<i>F. sylvatica</i>	E	L	Q	N	T	E	I	P	L	I	L	V	G	H	S	I	G	S	Y	I	S	R	P	E	K	V		
<i>F. excelsior</i>	E	F	Q	D	V	E	V	P	I	I	L	V	G	H	S	I	G	A	Y	I	S	R	P	E	K	V		

<i>S. robusta</i>	I	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>P. chinensis</i>	I	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>H. chinensis</i>	I	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>D. turbinatus</i>	I	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>V. mangachapoi</i>	I	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>B. pendula</i>	S	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>O. rehderiana</i>	S	I	I	G	K	I	A	M	S	K	V	L	S	T	S	A	S	F	L	V	A	S	G	L	P	R	T	
<i>Q. robur</i>
<i>F. sylvatica</i>	M	L	L	V	F	E	R	S	R	V	S	V	A	L	S	G	F	L	S	T	R	L	V	K	N	Q	A	
<i>F. excelsior</i>	S	F	I	R	L	A	G	S	Q	F	L	C	A	A	A	A	A	L	G	S	W	S	P	A	V	S	F	

<i>S. robusta</i>	M	R	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>P. chinensis</i>	M	R	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>H. chinensis</i>	M	Q	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>D. turbinatus</i>	M	Q	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>V. mangachapoi</i>	M	Q	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>B. pendula</i>	M	R	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>O. rehderiana</i>	M	R	N	V	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>Q. robur</i>
<i>F. sylvatica</i>	I	R	N	S	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	
<i>F. excelsior</i>	I	R	N	M	L	F	M	A	M	T	E	F	Q	K	L	A	E	T	P	D	W	A	F	M	R	E	N	

O GPS

<i>S. robusta</i>	FFKVGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIT	EMIHVA
<i>P. chinensis</i>	FFKVGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIT	EMIHVA
<i>H. chinensis</i>	FFKVGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIS	EMIHVA
<i>D. turbinatus</i>	FFKVGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAK	IT EMIHVA
<i>V. mangachapoi</i>	FFKVGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIT	EMIHVA
<i>B. pendula</i>	FFKMGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIT	EMIHVA
<i>O. rehderiana</i>	FFKMGVEGKRFRPTVLLLMAT	ALNVRRIPEQPVSRVGD	T VATDLRTRQQCIAEIT	EMIHVA
<i>Q. robur</i>	WVKVGF...YLESLVLLMATA	MNISILEPFSLRGP	GDALETRARQQRIAEIT	EMIHVA
<i>F. sylvatica</i>	FFKLGEVGKRFRPTVLLLMAT	AMDVSILEPPESGP	GDALETRLRVRQRIAEIT	EMIHVA
<i>F. excelsior</i>	FFKIGVEGKRFRPTVLLLMAT	ALNLPMSCLEPDATVHTSSV	E LTRRQQCVAEIT	EMIHVA

<i>S. robusta</i>	SLLHDDVLDDADKRRGIGS	LNAVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>P. chinensis</i>	SLLHDDVLDDADKRRGIGS	LNAVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>H. chinensis</i>	SLLHDDVLDDADKRRGIGS	LNAVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>D. turbinatus</i>	SLLHDDVLDDADKRRGIGS	LNAVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>V. mangachapoi</i>	SLLHDDVLDDADKRRGIGS	LNAVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>B. pendula</i>	SLLHDDVLDDADTRRGIGS	LNFVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>O. rehderiana</i>	SLLHDDVLDDADTRRGIGS	LNFVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>Q. robur</i>	SLLHDDVLDDADTRRGIGS	LNFVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>F. sylvatica</i>	SLLHDDVLDDADTRRGIGS	LNFVMGNK.	LAVIAGDFLSSRACVALASLKN	.
<i>F. excelsior</i>	SLLHDDVLDDADTRRGIGS	LNFVMGNK.	LAVIAGDFLSSRACVALASLKN	PRLMLEYPSI

<i>S. robusta</i>	.....TEVVSSLAT	VVEHLVTGETMQMTTSEQRSS	.....
<i>P. chinensis</i>	.....TEVVSSLAT	VVEHLVTGETMQMTTSEQRSS	.....
<i>H. chinensis</i>	.....TEVVSSLAT	VVEHLVTGETMQMTTSEQRSS	.....
<i>D. turbinatus</i>	.....TEVVSSLAT	VVEHLVTGETMQMTTSEQRSS	.....
<i>V. mangachapoi</i>	.....TEVVSSLAT	VVEHLVTGETMQMTTSEQRSS	.....
<i>B. pendula</i>	.....TEVVSSLAK	VVEHLVTGETMQMTTSEQRCS	.....
<i>O. rehderiana</i>	.....TEVVSSLAK	VVEHLVTGETMQMTTSEORCC	QFTLQLVVAYVANVLLCTFIS
<i>Q. robur</i>	.....TEVVSSLAK	VVEHLVTGETMQMTTSEORCS	.....
<i>F. sylvatica</i>	.....TEVVSSLAK	VVEHLVTGETMQMTTSEQRCS	.....
<i>F. excelsior</i>	SSDQLLAISVVSSLAT	VVEHLVTGETMQMTTSDORCS	.....

<i>S. robusta</i>	.....I EYIMOKTYKKTASLISNSCKAIALLAGQTTEVAVLA	FEYGKNLGLAFQ	.....
<i>P. chinensis</i>	.....IEHIMOKTYKKTASLISNSCKAIALLAGQTTEVAVLA	FEYGKNLGLAFQ	.....
<i>H. chinensis</i>	.....IEYIMOKTYKKTASLISNSCKAIALLAGQTTEVAVLA	FEYGKNLGLAFQ	.....
<i>D. turbinatus</i>	.....IEYIMOKTYKKTASLISNSCKAIALLAGQTTEVAVLA	FEYGKNLGLAFQ	.....
<i>V. mangachapoi</i>	.....LDYIMOKTYKKTASLISNSCKAIALLAGQTTEVAVLA	FEYGKNLGLAFQ	.....
<i>B. pendula</i>	.....MEYIMOKTYKKTASLISNSCKAIALLAGQTAEVAML	AYEGRNLGLAYQ	.....
<i>O. rehderiana</i>	.....LLTKLTFRNTIMEYIMOKTYKKTASLISNSCKAIALLAG	QTAGVAMLAYEYGRNLGLAYQ	.....
<i>Q. robur</i>	.....MEYIMOKTYKKTASLISNSCKAIALLAGQTAEVAML	AYEYGKNLGLAYQ	.....
<i>F. sylvatica</i>	.....MEYIMOKTYKKTASLISNSCKAIALLAGQTAEVAML	AYEYGKNLGLAYQ	.....
<i>F. excelsior</i>	.....MEYIMOKTYKKTASLISNSCKAIALLAGQTTEVSIMAF	EYGKNLGLAYQ	.....

<i>S. robusta</i>	LIIDDVLDFGTGTSASLGKGS LTDI RLGI ITAP	I LFAMEEFPQLRAVV DQG	.FDNPANIDI
<i>P. chinensis</i>	LIIDDVLDFGTGTSASLGKGS LTDI RHGII TAP	I LFAMEEFPQLRAVV DQG	.FDNPANIDI
<i>H. chinensis</i>	.....	.....	.....
<i>D. turbinatus</i>	LIIDDVLDFGTGTSASLGKGS LSDIRHGII TAP	I LFAMEEFPQLRAVV DQG	.FDNPANVDI
<i>V. mangachapoi</i>	LIIDDVLDFGTGTSASLGKGS LSDIRHGII TAP	I LFAMEEFPQLRAVV DQG	.FDNPANVDI
<i>B. pendula</i>	LIIDDVLDFGTGTSASLGKGS LSDIRLGII TAP	I LFAMEEFPQLRAVV DQG	.FDNPANVDL
<i>O. rehderiana</i>	LIIDDVLDFGTGTSASLGKGS LSDIRHGII TAP	I LFAMEEFPQLRAVV DQG	.FDNPANVDL
<i>Q. robur</i>	LIIDDVLDFGTGTSASLGKGS LSDIRHGII TAP	I LFAMEEFPQLREVV DQG	.FDNPANVDL
<i>F. sylvatica</i>	LIIDDVLDFGTGTAASLGKGS LSDIRHGII TAP	I LFAMEEFPQLREVV DQG	.FDNPANVDL
<i>F. excelsior</i>	LIIDDVLDFGTSTSLGKGS LSDIRHGII TAP	I LFAMEEFPPELRAVV DQG	.FDNPVNVDL

<i>S. robusta</i>	ALEYLGKSHGIQRTRELAIK	KHANLAA	AIDSLPESNDEDVRRSRRALIDL	TQIVITRNK.
<i>P. chinensis</i>	ALEYLGKSHGIQRTRELAIK	KHANLAA	AIDSLPESDDEDVRRSRRALIDL	TQIVITRNK.
<i>H. chinensis</i>	.....GGACNINTHRDL	CNT	.....	.....
<i>D. turbinatus</i>	ALEYLGKSHGIQRTRELAIK	KHANLAA	AIDSLPESDDEDVRRSRRALLDL	TQIVITRNK.
<i>V. mangachapoi</i>	ALEYLGKSHGIQRTRELAIK	KHANLAA	AIDSLPESDDEDVRRSRRALLDL	TQIVITRNK.
<i>B. pendula</i>	ALEYLGKSRGIQRTRELAIK	KHANLAA	AIDSLPESDDEDVRRSRRALLDL	TQIVITRNK.
<i>O. rehderiana</i>	ALEYLGKSRGIQKTRELAIK	KHANVAA	AIDSLPESDDEDVRRKSRRALV	DLTQRVITRTK.
<i>Q. robur</i>	ALDYLGKSRGIQRARELAK	KHANIAA	AIDSLPESNDEDVRRKSRRALLDL	TTERVITRTK.
<i>F. sylvatica</i>	ALDYLGKSRGIQRARELAK	KHANIAA	AIDSLPESNDEDVRRKSRRALV	DLTTERVITRTK.
<i>F. excelsior</i>	ALEYLGKSCGIQRTRDL	A R K H A N F A	AIDSLPRNDDEVQRSRALVEL	TQRVITRTK.

p ADH

<i>S. robusta</i>	PVYHYCAVSSFSEYTVVHS GCAVKVSS FVPLDKICLLSCGVAAAGLGAAWNVA D ISPGSTV
<i>P. chinensis</i>	PVYHYCAVSSFSEYIVVHS C CAVKVSS L A P LDKICLLSCGVAAAGLGAAWNVA D ISPGSTV
<i>H. chinensis</i>	PVYHYCAVSSFSEYTVVHS G CAVKVSS Y A P LDKICLLSCGVAAAGLGAAWNVA D ISPGSTV
<i>D. turbinatus</i>	PVYHYCAVSSFSEYTVVHS G CAVKVSS F A P LDKICLLSCGVAAAGLGAAWNVA D ISPGSTV
<i>V. mangachapoi</i>	PVYHYCAVSSFSEYTVVHS G CAVKVSS F A P LDKICLLSCGVAAAGLGAAWNVA D ISPGSTV
<i>B. pendula</i>	PVYHYCAVSSFSEYTVVHS G CAVKVSS L A P E K ICLLSCGVAAAGLGAAWNVA D ISPGSSV
<i>O. rehderiana</i>	.....SF.QLSVLNNGV.....VLLGLGAAWNVA D ISEGSTV
<i>Q. robur</i>	PIYHYCAVSSFSEYTVVHS G CAVKVSP L A P E K ICLLSCGVAAAGLGAAWNVA D ICKGSTV
<i>F. sylvatica</i>	PIYHYCAVSSFSEYTVVHS G CAVKVSP L A P E K ICLLSCGVAAAGLGAAWNVA D ISKGSTV
<i>F. excelsior</i>	S V YHYCAVSSFSEYTVVHS G CAVKISS S A P E K ICLLSCGVAAAGLGAAWKVANVS E GSTV

<i>S. robusta</i>	VIFGLGTVGLSVVAQGARLRGASRIIGIDTNPEKCEKAKAFGVTEFLNPND C NEPIIQQVIK
<i>P. chinensis</i>	AIFGLGTVGLSVVAQGAKLRGASRIIGIDTNPEKCEKAKDFGVTEFLNPND C NEPIIQQVIK
<i>H. chinensis</i>	VIFGLGTVGLSVVAQGAKLRGASRIIGIDTNHEKCEKAKAFGVTEFLNPND C NEPIIQQVIK
<i>D. turbinatus</i>	VIFGLGTVGLSVVAQGAKLRGASRIIGIDTNPEKCEKAKAFGVTEFLNPNECNEPIIQQVIK
<i>V. mangachapoi</i>	VIFGLGTVGLSVVAQGAKLRGASRIIGIDTNPEKCEKAKVFGVTEFLNPNECTEPIIQQVIK
<i>B. pendula</i>	VIFGLGTVGLSVVAQGAKLRGASQIIGVDTNPEKAEKAKAFGVTEFLNPND S NEPMQQVIK
<i>O. rehderiana</i>	AIFGLRTVGLSVVAQGAKLRGASQIIGVDTNPEKGEKAKAFGVTKFLNPND S DEPLQQI I K
<i>Q. robur</i>	VIFGLGTLGLSVVAQGAKLRGASRIIGVDTNPEKGEIAKAFGITEFLPD N SNEPIIQQVIK
<i>F. sylvatica</i>	VIFGLGTVGLSV.....V.....I K
<i>F. excelsior</i>	VIFGLGTVGLSVVQGAKLRGASRIIGVDTNPEKN E KAKAFGVTDLLNPND Y NEPIAQVIK

<i>S. robusta</i>	RITDGGTDYSFECIGDTGM I T T ALQS C CGWGLT I TLGVPKVKPEVAAHYGLFLTGRTL R
<i>P. chinensis</i>	HLTDGGTDYSFECIGDTGM I T T ALQS C CGWGLT I TLGVPKVKPEVAAHYGLFLTGRTL R
<i>H. chinensis</i>	RITDGGTDYSFECIGDTGM I T T ALQS C CGWGLT I TLGVPKVRPEVAAHYGLFLTGRTL R
<i>D. turbinatus</i>	RITDGGTDYSFECIGDTGM I T T ALQS C CGWGLT I TLGVPKVKPEVAAHYGLFLTGRTL R
<i>V. mangachapoi</i>	RITDGGTDYSFECIGDTGM I T T ALQS C CGWGLT I TLGVPKVKPEVAAHYGLFLTGRTL R
<i>B. pendula</i>	RITGGGADYSFECIGDTGM V T T ALQS C CGWGLTV T LGVPKEKPEMKAHYGLFITGRTLK
<i>O. rehderiana</i>	RITGGGADYSFECIGDTGM V T T ALQS C CGWGLTV T LGVPKEKPEVTAHYGLFLTGRTLK
<i>Q. robur</i>	RITGGGADYSFECIGDTGM V T T ALQS C CGWGLTV T LGVPKVKEPEVTAHYALFLTGT L K
<i>F. sylvatica</i>	RITGGGADYSFECIGDTGM V T T ALQS C CGWGLTV T LGVPKVKEPEVTAHYALFLTGT L K
<i>F. excelsior</i>	RMTDGGADFAFECIGDTGM V T T ALQS C CGWGLTV T LGVPKVKEITAHYGLLTGRTLK

<i>S. robusta</i>	GSLFGGWKPKTDLPSLV D KY I NKE I QIDDFITHNL P FEDIN K AFSLMRE G CLRCV I HMP
<i>P. chinensis</i>	GSLFGGWKPKTDLPSLV D KY I NKE I QIDDFITHNL P FEDIN K AFSLMRE G CLRCV V HMP
<i>H. chinensis</i>	GSLFGGWKPKTDLPLLV D KY I NKE I QIDDFITHNL P FEDIN K AFSLMRE G CLRCV V HMP
<i>D. turbinatus</i>	GSLFGGWKPKTDLPSLV E KY I NKE I QIDDFITHNL P FEDIN K AFSLMRE G CLRCV I HMP
<i>V. mangachapoi</i>	GSLFGGWKPKTDLPSLV D KY I NKE I QIDDFITHNL P FEDIN K AFSLMRE G CLRCV I HIP
<i>B. pendula</i>	GSLFGGWKPKS D IPS L VD M Y T K E I D E L I T HNMPFEDIN K AF D L M K E GRCLRCV I HMP
<i>O. rehderiana</i>	GSLFGGWKPKS D IPS L SLV D MY T N K E I I D E F I T HNMPFEDIN K AF D L M K E GRCLRCV I HMP
<i>Q. robur</i>	GSLFGGWKPKS D IPS L SLV E KY M K E I D E F I T HN I PFEDINTA F NLMRE G CLRCV I HMP
<i>F. sylvatica</i>	GSLFGGWKPKS D IPS L SLV D MY I K E I D E F I T HNMPFEDINQAFNLMRE G CLRCV I HMP
<i>F. excelsior</i>	GSSLGGWKPKS D IPS L SLV N MY L K Q E I K I DEY I THN I A F EDIN E AFELMRD G CLRCV I HMO

q NGLY1

<i>S. robusta</i>	MVARKF LVRHDDSDFDVDYNTDNGFEVFKFQLFSLTSI	PDEQKILG.E.DGD	RVVSS DSD
<i>P. chinensis</i>	.....	.....	.....
<i>H. chinensis</i>	MVARKF LVRHDDAAFDVDYDTDDGFEVFKFQLFSLTSI	PDEQKVA	TCLSSGKMWIALCL
<i>D. turbinatus</i>	MVARKF LVRHDDSAFDVDYDTDDGFEVFKFQLFSLTSI	PDEQKILG.E.DDD	RVVSS DSD
<i>V. mangachapoi</i>	MVARKF LVRHNGAAFDVDYDTDDGFEVFKFQLFSLTSI	I	PDDQKILG.E.DDD
<i>B. pendula</i>	MVARKF QLHNDSDFDVDYDTDDGFEVFKFQLFSLTSI	L	PDEQKIVS.V.DDD
<i>O. rehderiana</i>	MVARKF RVRHSDHEFDVDYDTDDGFEVFKFQLFSLTSI	L	PDEQKIVS.V.DEN
<i>Q. robur</i>	MVARKF QRHNDADFV	V	DGNRVLSDD
<i>F. sylvatica</i>	MVARKF QRHNDADFV	V	DENRVVYD
<i>F. excelsior</i>	MVARKF QVHNGSTFDLDYDTDDGFEVFKFQLFSLTSI	P	DDERTVSD

<i>S. robusta</i>	LVT I SEK LRLVS.....	I	S E D K E K Q E E T A E S S Q K S	D	S E F	I	K	S D E E L A R I L Q A E E E A L L	H Q
<i>P. chinensis</i>
<i>H. chinensis</i>	ATL I SSP FRRSSGWYRSLKTDKKEQETAEANSQKDSDFLK	I	S D E E L A R K L Q A E E E A L L	Q					
<i>D. turbinatus</i>	LLA I SDK KLRLVS.....	I	S E E N K E K Q E E T T E S S R E K F	D	T E I	I	S D E E L A R I L Q A E E E A L L	Q	
<i>V. mangachapoi</i>	LV TI SEK LRLVS.....	I	S E E D K E K Q E E T T E S R E K F	D	T E I	I	S D E E L A R M L Q A E E E A L L	Q	
<i>B. pendula</i>	LIS I SEK LRVVS.....	I	I N D E V Q E Q R G T E S T S N S V R N D S Q	L	M	I	S D E E L A R M L Q A E E E A L L	F Q	
<i>O. rehderiana</i>	LIS I SEK LRVVS.....	I	I N D E V Q E H Q G T G S T S N S V R N D F Q S	L	I	I	S D E E L A R M L Q A E E E A L L	Q	
<i>Q. robur</i>	LIS VAERLRLVS.....	V	N D E V N E Q P Q P Q S S H I A G N A A A L	M	S D E Q L A R I L Q A E E E A L M	L Q			
<i>F. sylvatica</i>	LVS I SER RLRLVS.....	V	N D E V K Q P Q P E S A G N D A A L G M	S	S D E E L A R M L Q A E E E A L M	L Q			
<i>F. excelsior</i>	LEM I SHK RLRLLS.....	I	I D E V E K E K T E P D F A K S D E E F A R L L Q A E E E A L M	M	Q				

<i>S. robusta</i>	QYAVV E.....	N	S S Q F E R Q I R P Y I S R V L M Y E D P	V	R Q E A A R K S V P V D	K	L E E K S L V S L A R ..	E G
<i>P. chinensis</i>	.....	.....	.....	.....	.....	.....	.....	.....
<i>H. chinensis</i>	QYAVG E.....	D	S G Q F G R Q I R P Y I S Q V L M Y E E P	V	R Q E A A R K T V P V D	K	L E E K A L V S L A R ..	E G
<i>D. turbinatus</i>	QYAVG E.....	H	H S S Q F E Q Q I R P Y I S Q V L M Y E D P	V	R Q E A A R K T V P V D	K	L E E K A L V S L A R ..	E G
<i>V. mangachapoi</i>	QYAVG QDKSDKSSQFQRIRPYISQVLMYEDP	S	R Q E A A R K T V P V D	K	L E E K A L V S L A R ..	E G		
<i>B. pendula</i>	QYVAAD	D	D N G E F E R R I R P Y V D Q V R M Y E D P	V	R Q E A A R K T V P V D E E	E	L E E K A L V S L A K ..	E G
<i>O. rehderiana</i>	QYVAEE	D	D N G E F E S K I R P Y V D Q V R M Y E D P	V	R Q E A A R K T V P V E E	E	L E E K A L V S L A K ..	E G
<i>Q. robur</i>	PHIAGG	S	S T E D F E R Q I R P Y V D Q V R M Y E D P	V	V Q O A R K T A P V D E	E	L E E K A L V A L A R ..	E G
<i>F. sylvatica</i>	QYVAPE	N	T G D F E R Q I R P Y V D Q V G L Y E D S	V	R Q E A A R K T V P V E E	E	L E E K A L I S L A K V W G G	E G
<i>F. excelsior</i>	QFVASE	N	K E Q V E Q R I R P Y V G Q V L M Y E D P	H	R Q E A A R K T V P V D	K	L E E K A L I A L A R ..	E G

<i>S. robusta</i>	NFK|PSK S|E Q D H A F L L Q L L F W F K Q S F S |W V N A P P C D|G.....	C G K E T S N Q		
<i>P. chinensis</i>	.....	.....
<i>H. chinensis</i>	NLK|PSK S|E Q D H A F L L Q L L F W F K Q S F S |W V N A P P C D|G.....	C G N E T K N Q		
<i>D. turbinatus</i>	NLK|PSK S|E Q D H A F L L Q L L F W F K Q S F S |W V N A P P C D|G.....	C G N E T T S Q		
<i>V. mangachapoi</i>	NLP|PSK S|E Q D H A F L L Q L L F W F K Q S F S |W V N E P P C D|G.....	C G N E T R S Q		
<i>B. pendula</i>	NFK|PSK I|E Q D D A F L L Q L L F W F K Q S F R |W V N A P P C D|G.....	C G S K T I S H		
<i>O. rehderiana</i>	NFN|PSK I|E Q D H A F L L Q L L F W F K S F R |W V D V P P C D|G.....	C G S K T V R Q		
<i>Q. robur</i>	NFEP|PSK V|E Q D H A F L L Q L L F W F	C G S E T I N Q		
<i>F. sylvatica</i>	G V E I N	L K L Y L	W E S G V G I A L Q A L K T L L K D F F S V N F T S	C G S E T I S Q
<i>F. excelsior</i>	NFN|PTK N|E K D H A F L L Q L L F W F K Q S F R |W V N A P P C D|S	C N N E T V S Q		

<i>S. robusta</i>	GMG AALPTEL SYGATR V ELYRCNFC SRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>P. chinensis</i>	. MG MA LPTEL SYGAT Q V ELYWCNFCSRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>H. chinensis</i>	GMG AALPAEL SYGAT R V ELYRCNFC SRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>D. turbinatus</i>	GMG AALPTEL SYGAN R V ELYRCNFC SRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>V. mangachapoi</i>	GMG AALPTEL SYGA I R V ELYRC HFC SRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>B. pendula</i>	GMG SPLPSEI Q Y G A S R V ELYIC|SFC SRITRFP RY NDPLKL V ETRKGRCG	E W A N C F T L Y C R
<i>O. rehderiana</i>	GMG SPLPSEI Q Y G A S Q V ELYLC|SFC SRITRFP RY NDVLKL V ETRRGRCG	E W A N C F T L Y C R
<i>Q. robur</i>	GMG SPDSES Q Y G A S R V ELYR	F W K Q E E G V A G S G P I A L R F I V E
<i>F. sylvatica</i>	GMG SPLSSEI Q Y G A S R V ELYR	L W K Q E G G V A G S G P I A L H F I V E
<i>F. excelsior</i>	GMG MANSSES LY G A S R I ELYRC KLC S N V T R F P R Y N D P M K L L E T R KGRCG	E W A N C F T L Y C R

<i>S. robusta</i>	S FGYESR.....	L	I LDFTDHVWTECVS|ESL|GRWMHLDPC|D|G|VYD|K	P L L Y E K G W N K K L
<i>P. chinensis</i>	S FGYESR.....	L	I LDFTDHVWTECVS|EFL|GRWMHLDPC|E|G|VYD|K	P L L Y E K G W N K K L
<i>H. chinensis</i>	S FGYESR.....	L	I LDFTDHVWTECVS|ESL|GRWMHLDPC|E|G|VYD|K	P L L Y E K G W N K K L
<i>D. turbinatus</i>	S FGYESR.....	L	I LDFTDHWLTECVS|ESL|GRWMHLDPC|E|G|VYD|R	P L L Y E K G W S K K L
<i>V. mangachapoi</i>	S FGYESR.....	L	I LDFTDHWLTECVS|EGL|GRWMHLDPC|E|G|VYD|K	P L L Y E K G W N K K L
<i>B. pendula</i>	A FGYESR.....	L	I LDFTDHWLTECVS|QVL|R|GRWMHLDPC|E|G|VYD|R	P L L Y E K G W S K K L
<i>O. rehderiana</i>	A FGYESR.....	L	I LDFTDHWLTECVS|QVL|R|GRWMHLDPC|E|G|VYD|I	P L L Y E K G W S K K L
<i>Q. robur</i>	LLAMNHVW.....	L	I LDFTDHWLTECVS|QVL|R|GRWMHLDPC|E|G|VYD|K	P L L Y E K G W N K K L
<i>F. sylvatica</i>	LLAMNPVCDOIHTTDQVLDFTDHWLTECVS|EL|GRWMHLDPC|D|G|VYD|K	P L L Y E K G W G K K L		
<i>F. excelsior</i>	A FGYESR.....	L	I LDFTDHWLTECVS SY GRWMHLDPC E G IFD N	P L L Y E K G W N K K L

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<i>S. robusta</i>	N Y A I A I A R D G V Y D V T K R Y T R K W H E V L S R R T I T E S S V L S V L T S L T K E C R R S L T I E V I S V L
<i>P. chinensis</i>	N Y V I A I A I A R D G V Y D V T K R Y T R K W H E V L S R R T I T E S S V L S V L T S L T K E C R R S L T S E V I S A L
<i>H. chinensis</i>	N Y A I A I A I A R D G V Y D V T K R Y T R K W H E V L S R R T I T E S S V L S V L T S L T K E C R R S L T I E V I S V L
<i>D. turbinatus</i>	N Y V I A I A I A R D G V Y D V T K R Y T R K W H E V L S R R T I T E S S V L S V L T S L T K E C R R S L T I E V I S V L
<i>V. mangachapoi</i>	N Y V I A I A I A R D G V H D V T K R Y T R K W H E V L S R R T I T E S S V L S V L T S L T K E C R R S L R I E V I S V L
<i>B. pendula</i>	N Y A I A I A I A K D G V Y D V T K R Y T R K W H E V L S R R N I T E P A L S A V L T T I T Q E C R R G F T S Q V I S E L
<i>O. rehderiana</i>	N Y A I A I A I A K D G V C D V T K R Y T R K W H E V L S R R N I T E P A V S A V L T T I T Q E C R R G F T S Q V I S E L
<i>Q. robur</i>	N Y A I A I A S K D G V C D V T K R Y T R K W H E V L P R R N I I T E P A L S A L A T I T Q E C R R G F T S Q V I S E L
<i>F. sylvatica</i>	N Y A I A I A I A K D G V Y D V T K R Y T R K W H E I L S R R N I I T E P A L S A F L T T L T Q E C R R G F T S Q V I S E L
<i>F. excelsior</i>	D Y I I A I A I A K D G V Y D V T K R Y T R K W H D V L S R R V I T E S T L A A I I F N I T R E R R K N I M P E M I T L

<i>S. robusta</i>	E D R D K T E R E A L E R G L H A T D D V S I S L P G R Q S G D K E W R I S R S E F G S D S . W G C S S C P V R M C I
<i>P. chinensis</i>	E D R D K T E R E A I E R G L H S A D D V S I S L P G R Q S G D K E W R I S R S E F G S G S . W G C S S C P V . . .
<i>H. chinensis</i>	E D R D K T E R E A L E R G L H S T D D V S I S L P G R Q S G D K E W R I S R S E F G S D S . L G C S S C P V R M C T
<i>D. turbinatus</i>	E N R D K T E R E A L E S G S L Y S S D D V S I S L P G R Q S G D K E W R I S R S E F G S D S . L G C S S C P V R M C T
<i>V. mangachapoi</i>	E D Q D K T E R E S L E R G L H S T D D V S I S L P G R Q S G D K E W R I S R S E F G S D S . L G C S S C P V R L C T
<i>B. pendula</i>	D D R D K K K E R E V L E R D L H S T D D C S I S L P G R Q S G D K E W R K L R L M E F G S D S . L T C S S C P V R I C I
<i>O. rehderiana</i>	D D R D K K K E R E V L E R D L H S T D D G S I S L P G R Q S G D K E W R K L R L M E F G S D S . L S T S S C P V R K C V
<i>Q. robur</i>	D K R D Q M E R E A L E R D L H S T D D T S I S L P G R Q S G D E E W R K S R Q E F G S D S . L S S S S C P V R I C V
<i>F. sylvatica</i>	D N R D R K E R E E I E R D L H S T D D T S I S L P G R Q S G D E E W R K S R Q E F G S D S . L S S S S C P V R I C V
<i>F. excelsior</i>	D K R D R S E A E E L E R S L F S K D D T S I S L P G R Q S G D R E W R I S R S E F V S D D Q Y A L S S S S C P V R R C V

<i>S. robusta</i>	DE H V A E I Y N A F S P V L H K F L E H S L T A H K G A E V L K I V E E T L I D L K K L P Y K T R R A F L K I A P T N
<i>P. chinensis</i>	. . . . . . . . . . . . L L E H S L T A R K G A E V L K I F E E T L I D L K K L P Y K T R R A F L K I A P T T
<i>H. chinensis</i>	DE H V A E I Y N A F S P V L D K F L K H S L T A H K G A E V L K I F E E T L I N L K K L P Y K T R R A F L T
<i>D. turbinatus</i>	DE H V T E I Y N A F S P V L H F V E H S L T A H K G A E V L K I F E E T L I N L K K L P Y K T R R A F L K S A P T T
<i>V. mangachapoi</i>	DE H V T Q I Y N A F S P V L D F E H S L T A H K G A E V L K I F E E T L I D L K K L P Y K T R R A F L K S A P T T
<i>B. pendula</i>	DE H V T R I Y N A F H P V L S Q F V K E E H A K A K A I K E L K I F K G I I M E V K N S P F K T R K V S I D S V S N S
<i>O. rehderiana</i>	DE H V T R I Y N A F H P V L S Q F V K E E H A K A K A I K A R L K N F G K I T M D V K N S P F K T R K V S I D L V S N S
<i>Q. robur</i>	DE H V T R I Y N A F C P V L S Q F V K E E N P K I K A I K A L E F F K K I L M D L K N T P F K M R K A S I D S A S N T
<i>F. sylvatica</i>	DE H V T R I Y N A F C P V L S Q L V K E E D S K S K A I K V L E F F K G I L M D V K N S P F K M R K A S I D S V S D S
<i>F. excelsior</i>	DE H V T K I Y N A F F P V V C E L V E K S F D K S R A I E L L E S F K R I L V N L K N S P F K T R R T T I N A V S N G

<i>S. robusta</i>	G T S L V H Q L L P S F N A L L N A L S L K S E L D A E G R V Q I C L A G D P V K T S L A L P V V L H A L D E L M N D L
<i>P. chinensis</i>	G T S L V H Q L L P S F N A L L N A L S L K S E L D A E G R V Q I C L A G D P V K T S L A L P V V L H A L D E L M N D L
<i>H. chinensis</i>	G T S L V H Q L L P S F N A L L N A L S L K S E L L V E G R V Q I C L A G D P V K T S L A L P V V L H A L D E L M N D L
<i>D. turbinatus</i>	G T S L V D Q L L P S F N A L L N A L S L K S E L D A E G R V Q I C L A G D P V K T S L A L P V V L H A L D E L M N D L
<i>V. mangachapoi</i>	G T S L L H Q L L P S F N A L L N A L S L K S E L D A E G R V Q I C L A G D P V K T S L T L P V V L H A L D E L I N D L
<i>B. pendula</i>	T Q A F V H Q L L P S F A E L L D A L S L K S M M D P D G K V D I C L A G D P V R T S L A L P V V L D A L D D M V H N L
<i>O. rehderiana</i>	T Q A F V H Q L L P S F A E L L D A L S L K S M M D P D G K V D I C L A G D P V K T S L A L P V V L D A L D D M V H N L
<i>Q. robur</i>	I Q A I V H Q L L P S F G E L L N A V S L K S V D P D G R V D I C L A G D P V K T S L G L P V V L D A L D D M I Q N L
<i>F. sylvatica</i>	I K A F V H Q L L P S F G E L L N A V S L K S V D P D G R V D I C L A G D P I K T S L A L P V V L D A L D D M I H N L
<i>F. excelsior</i>	A R S F I . E M L P L F A Q L L D A L S L K S R E S G V K G I T E I C L A S D P V K T S V A L P V V F H A L D D L I Y N I

<i>S. robusta</i>	H K C D N F G K D S L S F P I V R E N R I C S G S V I L A S G E E L P F G I A T A A F D G T R M S K W E E P N G A Q G C W
<i>P. chinensis</i>	Y K C D D F G K D S L S F P I L R L N R I C S G S V I L A S G E E L P F G I A T A A F D G T R V S K W E E P N G A Q G C W
<i>H. chinensis</i>	N K C D K F G K D S L S F P I L R L N R I C S G S V I L A S G E E L P F G I A T A A F D G T R M S K W E E P N G A Q G C W
<i>D. turbinatus</i>	I K C D K F G N D S L S F P I V R L N R I C S G S V I L A S G E E L P F G I A T A A F D G T R M S K W E E P N G A Q G C W
<i>V. mangachapoi</i>	Y I C D K F S K D S L S F P I V R L N R I C S G S V I L A S G E E L P F G I A T A A F D G T R M S K W E E P N G A Q G C W
<i>B. pendula</i>	N K C D N F G E . . V S F P I L K S N R I H S G S V I L A S G E E L P F G I A T S A F D G I Q T S K W E E P N G A Q G C W
<i>O. rehderiana</i>	. . V S F P I L K S N R I H S G S V I L A S G E E F P F G I A T S A F D G I Q T S K W E E P N G A Q G C W
<i>Q. robur</i>	K K I D N F V E D S L S P I L K L N R I H S G F V R A S G E E L P V G I A T S A F D G T R N F K W D E P N G A K G C W
<i>F. sylvatica</i>	K K I D N F G E D S L S P I L K L N R I H S G S V I L A S G E E I P L G I A T S A F D G T R D S K W E E P N G A K G C W
<i>F. excelsior</i>	N T C G K L T K E S L S P I L K L N R I C S G F V I L A S G E E L P F G I V T S A F D G T R M S K W E E P N G A T G C W

<i>S. robusta</i>	I M Y K T K D N Q M K E L V A Y E L M S A N D A P E R D P M D W V V E G S D D G G S S W H V L D E Q T S O L E D K R F Q
<i>P. chinensis</i>	I M Y K T K D N Q M K E L V A Y E L M S A N D A P E R D P M D W V V E G S D D G G S S W H V L D K Q T S O L E D K R F Q
<i>H. chinensis</i>	I M Y K T K D N Q M K E L V A Y E L M S A N D A P E R D P M D W V V E G S D D G G S S W H V L D K Q T S O L E D K R F Q
<i>D. turbinatus</i>	I M Y K T K D N Q M K E L V A Y E L M S A N D A P E R D P M D W V V E G S D D G G S S W H V L D E Q T S O L E D K R F Q
<i>V. mangachapoi</i>	I M Y K T K D N Q L K K L V A Y E L M S A N D A P E R D P M D W V V E G S D D G G S S W H V L D E Q T S O L E D K R F E
<i>B. pendula</i>	I M Y K V E D N R M H E L V A Y E L M S A N D A P E R D P M D W V V E G S N D G G S S W H L L D K Q T S O L F E D K R F Q
<i>O. rehderiana</i>	I M Y K V K D N R M L E L V A Y E I I M S A N D A P E R D P M D W V V E G S N D G G S S W H L L D K Q T S O L F E D K R F Q
<i>Q. robur</i>	I M Y E V A D D K M H E L V A Y E I I M S A N D A P E R D P M D W V V E G S N D G R S S W H L L D K Q T S O M F E D K R F Q
<i>F. sylvatica</i>	I T Y K V S D D K M H E L V A Y E I I M S A N D A P E R D P M N W V V E G S N D G G S T W H V L D K Q T S O M F E D K R F Q
<i>F. excelsior</i>	I I Y K L I D N Q M H E L V A Y E L M S A N D A P E A D P M D W V V E G S D D G G S S W H I L D K O I S O M F E D K R F Q

r NDH

<i>S. robusta</i>	MLAMDGSWVQEFNLLSTRET.....KIISLSYRVLDEVMI	MELLSPKA	SSVSSSPFS
<i>P. chinensis</i>	.....	MAFRRLFGFFT	CIVYL
<i>H. chinensis</i>	.MVLGESKQNLSTQSTPSFSEAVPSWKIISLSYRVLDEVMI	MELLSPKA	SSVSSSPFS
<i>D. turbinatus</i>	.....	.....	MYL
<i>V. mangachapoi</i>	.....	MTMELSSPKA	SSVSSSPFS
<i>B. pendula</i>	.....	.....	MEVVSSKDSSVASSSPFS
<i>O. rehderiana</i>	.....	.....	MEVVSSKESSSVASSSPFS
<i>Q. robur</i>	.....	.....	MEVLSPKDSSVASSSPFS
<i>F. sylvatica</i>	.....	.....	MEVLSPKDSSVASSSPFS
<i>F. excelsior</i>	.....	MD	CSSLSSPFS
<i>S. robusta</i>	SPNTSALLRIKITIS. .WSOETGLPVSLRVRIFDRIFSLHKHPMFSKSGYFQKRLTESNEL		
<i>P. chinensis</i>	CNFVEEVLSFGILDPPVRSQETGLPVSLRVRIFDRIFSLHKHPMFSKCGYFQKRLTESNEL		
<i>H. chinensis</i>	SPNISALLRIKIIIS. .WSQETGLPVSLRVRIFDRIFSLHKHPMFSKSGYFQKRLTESNEL		
<i>D. turbinatus</i>	CNSVEQLSFGILDPPVRSQETGLPVSLRVRIFDRIFSLHKHPMFSKSGYFQKRLTESNEL		
<i>V. mangachapoi</i>	SPNISALLKIKIIIS. .WSQETGLPVCLRVRLGDRIFSLHKHPMFSKSGYFQKRLTESNEL		
<i>B. pendula</i>	SPNIGALLKIKIIIS. .WSQETGLPVSVRVRVGDRIFNVLHKPLSSSKSGYFKKRLDDSTD		
<i>O. rehderiana</i>	SPNIGALLKIKVIS. .WSOETGLPVCVRVRVGDRIFNLHKNPPLSSSKSGYFQKRLNDSTD		
<i>Q. robur</i>	SPNIGALLKIKVIS. .WSOETGLPVSVRVRVGDRIFNLHKYPLSSSKSGYFKERLNDSTD		
<i>F. sylvatica</i>	SPNIGALLKIKVIS. .WSOETGLPVSVCRVRAADRTFNLHKPLTCKSGYLKKEKLNESEN		
<i>F. excelsior</i>	SPNVAALLKIKIIIS. .WSKETGLPVSVCRVRAADRTFNLHKPLTCKSGYLKKEKLNESEN		
<i>S. robusta</i>	ELPQNFPGGPETFEMIVLFIFYGSSLTLVDPPFNVAALRCAAELFLEMTEEYCTGNLCDRFDLY		
<i>P. chinensis</i>	ELPQNFPGGPETFEMIVLFIFYGSSLTLVDPPFNVAALRCAAELFLEMTEEYCTGNLCDRFNLY		
<i>H. chinensis</i>	ELPRNFPGGPETFEMIVLFIFYGSSLTLVDPPFNVAALRCAAELFLEMTEEYCTGNLCDRFDLY		
<i>D. turbinatus</i>	ELPQNFPGGPETFEMIVLFIFYGSSLTLVDPPFNVAALRCAAELFLEMTEEYCTGNLCDRFDLY		
<i>V. mangachapoi</i>	ELPQNFPGGPETFEMIVLFIFYGSSLTLVDPPFNVAALRCAAELFLEMTEEYCTGNLCDRFDLY		
<i>B. pendula</i>	ELPQGFPGGPETFEMIALFLIFYGSSTFVDPFNVAALRCAAELFLEMTEEDYCSNLCERFDLY		
<i>O. rehderiana</i>	ELPQGFPGGPETFEMIALFYVGSSLTLVDPPFNVAALRCAAELFLEMTEEDYCSNLCERFDLY		
<i>Q. robur</i>	ELPQDFPGGSDTFEMIALFYVGSSLTLVDPPFNVAALRCAAELFLEMTEEDYCSNLCERFDLY		
<i>F. sylvatica</i>	ELPQDFPGGPDTFEMIALFYVGSSLTLVDPPFNVAALRCAAELFLIMTEDYCSNLCERFDLY		
<i>F. excelsior</i>	TLPNSFPGGPVTFEMIALFMYGSSLTLVDPPFNVAALRCAAELFLQMTEDYGSNLCERFDLY		
<i>S. robusta</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>P. chinensis</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>H. chinensis</i>	...VVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>D. turbinatus</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVS		
<i>V. mangachapoi</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>B. pendula</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>O. rehderiana</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>Q. robur</i>	LNQVVVLQSWDDTLIVLQKCQALLEWSSELLIVSRCIESLAFCACMEILDPERRRDRPVVT		
<i>F. sylvatica</i>	LNQVVVLQNWDDTLIVLQKCQPLLESELLELLIVGRCIESLAFCACMEILDPERRRDOPVVT		
<i>F. excelsior</i>	LNQVVVLQSWDGTLIVLQKCQPLLPWAELLIVSRCIETLAFMACACMEILDPERRRREHPVVT		
<i>S. robusta</i>	SEALAGEAWSHEAGKTIVSQELWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYT		
<i>P. chinensis</i>	SEALAGEAWSYEAGKTIVSQELWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYT		
<i>H. chinensis</i>	SEALAGEAWSCEAGKTIVSQELWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPMIIVFYA		
<i>D. turbinatus</i>	SEALAGEAWSCEAGKTIVSQELWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYA		
<i>V. mangachapoi</i>	SEALAGEAWSCEAGKTIVSQELWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYT		
<i>B. pendula</i>	SEALASQAWNSETVKIEIVSQDLWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYA		
<i>O. rehderiana</i>	SEALASQAWNCTEVKEIVNQDWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYA		
<i>Q. robur</i>	SEALASQAWNCTEVKEIVMSQDWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYT		
<i>F. sylvatica</i>	SEALASQAWNCTEVKEIVSQDWIKDIITALPFGFFKRIIGSSLRQGMKEKFVSPIIIVFYT		
<i>F. excelsior</i>	IKALAHQHWTNQRNLNDVMSHDLLIKDIITALPFLFFKRIIGSSLRQGMKEKFVSPIIIVFYV		
<i>S. robusta</i>	NKWILSQKTHQFWEKASPCKMGENDTNIKFSVILQGILDLLPIGEKASRAIPVGFYFALLS		
<i>P. chinensis</i>	NKWILSQKTHQFWEKASPCKMGENDTNIKFSVILQGILDLLPMGEKASRAIPVGFYFALLS		
<i>H. chinensis</i>	NKWILSQKTHQFWEKASPCKMGENDTNIKFSVILQGILDLLPMGEKASRAIPVGFYFALLS		
<i>D. turbinatus</i>	NKWILSQKTHQFWEKASPCKMGENDTNIKFSVILQGILDLLPMGEKASRAIPVGFYFALLS		
<i>V. mangachapoi</i>	NKWILSQKTHQFWEKASPCKMGENDTNIDVSVVLQGILDLLPMGEKVSRAIPVGFYFALLS		
<i>B. pendula</i>	NKWVVSQKTRQFWESAAEKGDDDTNRKVAAILQGILDLLPMGGKASRLIPVGFYFALLS		
<i>O. rehderiana</i>	NKWVVSQKTRQFWENSAEKIGDDTNCKVAAILQGILDLLPMGGKAGRLLIPVGFYFALLS		
<i>Q. robur</i>	NKWVLSQKTHQFWENSTERIGDDTNKVVAAILQGLIDLLPMGEKASRVIPVGFYFALLS		
<i>F. sylvatica</i>	NKWVLSQKTHQFWENSAEKIGDDTNKVVAAILQGILDLLPMGEKASRVLPVGFYFALLS		
<i>F. excelsior</i>	NKRILPNCSV.....SKSRVDE.....LSIILGGIIDLLPMGEKAGKAI PVDFYFALLS		

NDH

<i>S. robusta</i>	R S L E F G L R S D R M V K L Q D Q I A S M L H F A Q G E D L L H L Q I G T . E S I S S S K E L A A L R S I F S T Y V S
<i>P. chinensis</i>	R S L K F G L R S D S M V K L Q D Q I A S M L H F A Q V E D F L L S L Q I G T . E S I S S S K E L T A M R S I F S T Y V S
<i>H. chinensis</i>	R S L K F G L R S D S M V K L Q D Q I A S M L H F A Q V E D F L L H L Q I G I . E S V S S S K E L A A M R S I F S T Y V S
<i>D. turbinatus</i>	R S L E F G L R S D S M A K L Q D Q I A S M L H F A Q V E D F L L H L R I G T . Q S I S A K K V L A A M R S I F S T Y V S
<i>V. mangachapoi</i>	R S L E F S L R S D S M V K L Q D Q I A S M L H F A Q V E D F L L H L R I G T . K A I S S S K E L A A M R S I F S T Y V S
<i>B. pendula</i>	R S L E V G L R S D D H K V K L Q D Q I A S R L Q F A Q V E D F I L P K M G T . D S I S S S G I E L A T M E S I I S T Y V S
<i>O. rehderiana</i>	R S L E V G L R S D D H K V K L Q D Q I A S M L H F A Q V E D F I L P K M G T . D S I S S S G I E L A T M E S I I S T Y V S
<i>Q. robur</i>	R S L E V G L R S D . . . K L Q D Q I A S M L H F A Q V E D F F H P K M G M . E S I S P S I E L A T M E S I I S L Y V S
<i>F. sylvatica</i>	R S L E V G F R S D N T V K L H D Q I A S M L H F A Q V E D F I H P K I G M . K S I S S S I E L A T M E S I I S I Y V S
<i>F. excelsior</i>	F S L E U D L R N D R L E K L Q H Q I S S L L H A Q V E D F L L P K D G T N Q S I S S C R E L S I M E S I V S T Y M S

<i>S. robusta</i>	. Y K V E T N H T P S A S N S T I A E L W D T F I R V A S D L E M G P Q S F M E L I E T V P I S Y R L N H D L L Y R A
<i>P. chinensis</i>	. Y K V E T N H T L S A S N S T I A E L W D T F I L Q V A S D L E M G P Q S F M E L I E T V P I S Y R L N H D L L Y R A
<i>H. chinensis</i>	. Y K V E T N H T P S A S N S T I A E L W D T F I L Q V A S D L E M G P Q S F M E L I E T V P I S Y R L N H D L L Y R A
<i>D. turbinatus</i>	. Y K G E T N Y N P S A S N S T I A E L W D T F I M Q V A S D L E M G P Q S F M E L I E T V P I S Y R L N H D L L Y R A
<i>V. mangachapoi</i>	. Y K V E T N H T P S A S N S T I A E L W D T F I V Q V A S D L E M G P Q T F M A L I E T V P I S Y R L N H D L L Y R A
<i>B. pendula</i>	. S N L D T N H T P S T R N S V V A E L W D I L D S H I V P D P D I G P A R F M E L V E R V P N S C R O S H D O L Y R A
<i>O. rehderiana</i>	. S N L D K N H T P S A R N S V V A E L W D V P D I S H I V P D P D I M G P K R Y M E L I E R V P I S W R Y N H D O L Y R A
<i>Q. robur</i>	. S N S D T N H I S S R K N S F V A E L W D A Y L S H I A P D P D M G P K R F M E L I E R V P I S W R H G H D O L Y R A
<i>F. sylvatica</i>	. S N S D T N H I S S R K N S F V A E L W D A Y L S H I A P D P D M G P K R F M E L I E R V P I S W R H G H D O L Y R A
<i>F. excelsior</i>	Y L N T E R N R T P S E N N S V V A E L W D L Y L S Q I A T D S Q L G C K R L M D L I E T I P I S S R Q S H D N L Y K T

<i>S. robusta</i>	M N S L L Q A H K D I S Q E E R G M V C K Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>P. chinensis</i>	M N S F L Q A H K D I S Q E E R G M V C K Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>H. chinensis</i>	M N S F L Q A H K D I S Q E E R G M V C K Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>D. turbinatus</i>	M N S F L Q A H K D I S Q E E R G M V C K Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>V. mangachapoi</i>	M N S F L K A H K D I S Q E E R G M V C K Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>B. pendula</i>	M N T F L Q A H P S I S Q E E R G A V C K Y L N C O K L S Q E A C I D A V Q N E L M P L R L I V Q A L F V Q Q L G T H Q
<i>O. rehderiana</i>	M N T F L Q A H P S I P Q E E R G A V C K Y L N C O K L S Q E A C I D A V Q N E L M P L R L I V Q A L F V Q Q L S T H Q
<i>Q. robur</i>	M D T F L Q S H P G I S Q E E R G A V C R Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F V Q Q L N T H Q
<i>F. sylvatica</i>	M N T F L Q A H P G I S Q E E R G A V C R Y L N C O K L S Q E A C I E A V Q N E L M P L R L I V Q A L F A Q Q L N T H Q
<i>F. excelsior</i>	L N N F L L S P H I S Q D E K G L V C K Y L N C O K L S Q E V C I E A V Q N E M M P L R L I V Q V L F V Q Q L N T Q Q

<i>S. robusta</i>	A F K E C S E S F R Y T . . . G P F S G S V P S S R C P N T K S Q I L G E S . . . P Y T D G A E E G S S K P L S F L L Q N E
<i>P. chinensis</i>	A F K E C S E S F R Y T . . . G P F S G S V P S S R C P N T K S L T L G E S . . . P Y T D G A E E G S S K P L S F L L Q N E
<i>H. chinensis</i>	A F K E C S D S F R Y T . . . G P F S G S V P S S R C P N T K S L T L G E S . . . P F T G G T E E G S S K P L S F L L Q N E
<i>D. turbinatus</i>	A F K E C S D S F R Y T . . . G P F S G S L P S S E C A N T K S L T L G E S . . . P Y T D G A E E G S S K P L S F L L Q N E
<i>V. mangachapoi</i>	A F K E C S D S F R Y T . . . G P F S G S L P S S R C P N S K S L T L G E S . . . P Y T D G A E E G S S K P L S F L L Q N E
<i>B. pendula</i>	A F R E C S D S F R H A H C G E F S G S L S S T R Y P N S K S Q N L G E S . . . P Y T D G A Q P G . R R P L S F L L Q K D
<i>O. rehderiana</i>	A F R D C S D S F R Y A H C G E F S G S L S S S R Y P N S K S Q N L G E S . . . P Y T E G A Q P G . R R P L S F L L Q K D
<i>Q. robur</i>	A F K E C S D S F R H A H C G D F S G S L S S T R C P N S K S Q N L G E S . . . P Y T D G A E P G . G R P L S F L L Q K D
<i>F. sylvatica</i>	A F K E C S D S F R Y A H C G D F S G S L S S T R C P N S K S Q N L G E S . . . P Y T D G A E P G . S R P L S C L L O K E
<i>F. excelsior</i>	A F R E C S D S F R Y A N C G E F T G S L S S S R L T N S K S Q N L G E S P M P Y I K G S E G G G S K P L S S W L Q K D

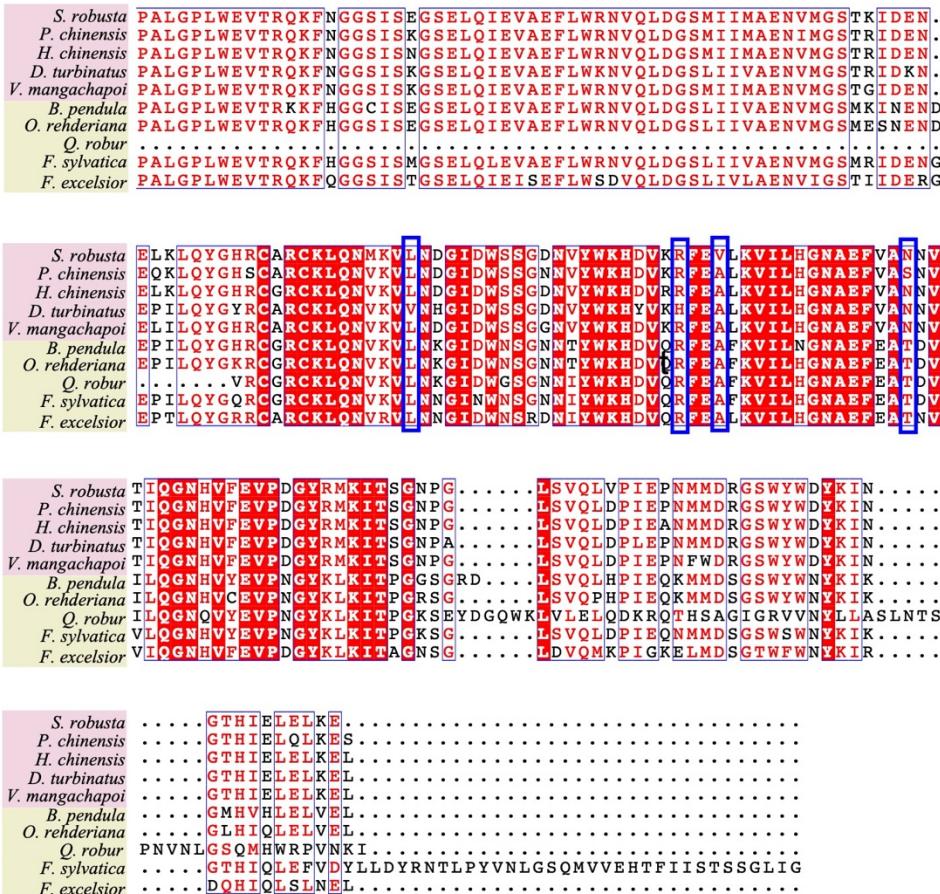
<i>S. robusta</i>	L A I D E C D F S . . . R K D Y E S T S F R I Q N L E K E L M S L K R T L Q L H N M S K N S G S N S N K T K S G K T
<i>P. chinensis</i>	L A I D K C D F S . . . R N D Y E S T S F R I Q N L E K E L M S L K R T L Q L H N M S K N S G S N P N K T K S S K T
<i>H. chinensis</i>	L A I D K C D F S . . . R K D Y E S T S F R I Q N L E K E L M S L K R T L Q L H N M S K N S G S N S N K T K S S K T
<i>D. turbinatus</i>	L V I D E C D F S . . . R K D Y E S T S F R I Q N L E K E L M S L K R T L Q L H N M S K T G S N S D K T K S S K T
<i>V. mangachapoi</i>	L A I D K C D F S . . . R K D Y E S T S F R I Q N L E K E L V S L K R T L Q L H N M S K N T E S N S D K T K S S K T
<i>B. pendula</i>	I S . . . P E F S . . . R N E Y E S T S L R I Q N L E Q E L M S L K R T L Q L N Q I S K T A E P I S T K K Q S M L K P
<i>O. rehderiana</i>	S S . . . P E F S . . . R N E Y E S T S L R I Q N L E Q E L M S L K R S L Q L N Q I S K T T E P I S T K K Q C M L K P
<i>Q. robur</i>	L A M Q R P D F S . . . R Q E Y E S T S F R I Q T L E Q E L M S M K R T L Q W Q N I S K R T E P I S T K A Q G T K P
<i>F. sylvatica</i>	L T M Q R P E F S . . . R Q E F E S T S F R I Q S L E Q E L M S L K R N L Q W Q N I S K R T E P I S T K T Q G M K P
<i>F. excelsior</i>	L T S S S S E F S S E F P K R D Y E S T S F R I Q N L E N E F M S L K R S L Q L Q Q I L K K N E K N T K K T . . . E P

<i>S. robusta</i>	H G L G K R S V S K R G N P F G Q E . T G C I C S V N F A S Q R R Y A S R L L K V I C R F A L F G S R K S K R K Q G A S
<i>P. chinensis</i>	H G L G K R S V S Q R G N P S G Q V . T G C I C S V N F A S Q R R Y A S R L L K V I C G F A L F G G R K S K R K Q G A S
<i>H. chinensis</i>	H G L G K R S V S K R G N P I G Q V . T G C I C S V N F A S Q R R Y A S R L L K V I C R F A L F G S R K S K R K Q G A S
<i>D. turbinatus</i>	Y G L G K R S V S K R E N P F G Q V . T G C I C S V N F A S Q R R Y A S R L L K V I C R F A L F G S R K S K R K Q G A S
<i>V. mangachapoi</i>	Y G L G K R S V S K R G N P F G Q V . T G C I C S V N F A S Q R R Y A S R L L K V I C R F A L F G S R K S K R K Q G A S
<i>B. pendula</i>	Y G M E S R S L S K K R N P L G Q V . T G C I C S V N F A S Q R K Y A S R I L K I F H W I T L F G S R K Q R K S G A H
<i>O. rehderiana</i>	Y G M E S R S L S K K R N P L G Q V . T G C I C S V N F A S Q R K Y A S R I L K I F H W M T L F G S R K Q R K S G A H
<i>Q. robur</i>	Y G M E S R S L S K K R N P L G Q V . T S C I C S V N F A S Q R K Y A S R L L K I F R H I S F F G S R K P K R K S G A V
<i>F. sylvatica</i>	Y G M E S R S L S K K R N P L G Q V . T S C I C S V N F A S Q R K Y A S R L L K V L R R I T L F G S R K P K R K S G . .
<i>F. excelsior</i>	Y G L G E R R M S K K K N P L G Q V N A S C I C T I N F A S Q R N Y A N R L L K V L Q K I S L F G R G R S K R K P V A A

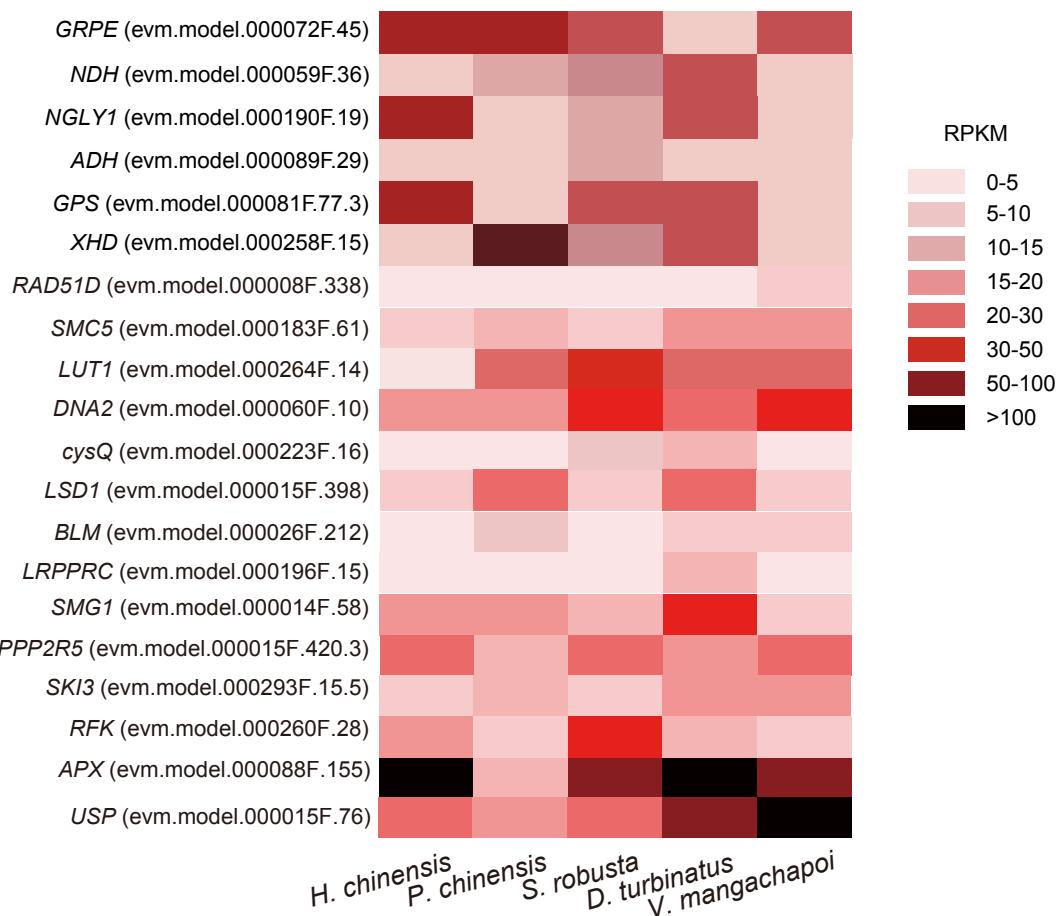
S GRPE

<i>S. robusta</i>	MATLLKT.PPLKA P. KPKCCVSFRHRIHSTGIPRRS	SLRLD.SAPS LR
<i>P. chinensis</i>	MATLLKT.PPLKA P. KPKCCVSFRHRIHSTGIPRRS	SLRLD.SAPS LR
<i>H. chinensis</i>	MATLLKAPPPLAWRPPTPI LKS KPFCCVSFRHRIHSTGIPRRS	SLRLE.SAPS LR
<i>D. turbinatus</i>	MATLLKT.PPLKA P. KPKCCVSFRHRIHSGGIPRRSS	SLRLD.SPPS LR
<i>V. mangachapoi</i>	MATLLKT.PPLKA P. KPKCCVSFRHRIHSTGIPRSRS	SLRLE.SAPS LR
<i>B. pendula</i>	.....	MRGED.GIEF.MFD.
<i>O. rehderiana</i>	MATVLKT.PTIRVALPPRPTTE SSK KEKPFCCVSFRH	STPKHSRLSSLRFS.RIPS LR
<i>Q. robur</i>	.....	.....
<i>F. sylvatica</i>	MATVLNT.PTIRA PFPPR.. STISSKSQKPFCCVSFRH	STTKPSLP.LTSLRFSSHHLPSLR
<i>F. excelsior</i>	.....	MVVLG....
<i>S. robusta</i>	FVKLVSI ASGG.E ETETAAE SKEQV QETE	I EDSSD GAVAVE
<i>P. chinensis</i>	FVKLVSI ASGG.E ETETAAE SKEQV QETE	I EDSSD GTVAVK
<i>H. chinensis</i>	FVKLVSI ASGG.E ETETAAE SKEQV QETE	I EDSSD GSVAVE
<i>D. turbinatus</i>	FVKLVSI ASNGG.E ETETAAE SKEQV RETE	E EDSSD GAVAVE
<i>V. mangachapoi</i>	FVKLVSI ASGG.E ETETAAE SKEQV QATE	I EDSSD GAVAVE
<i>B. pendula</i>	.VEF.	AEDILD GAVRIE
<i>O. rehderiana</i>	FVKFV PFASSG.D TETTD TQEEV QQQQ	RDIV DGAAGVE
<i>Q. robur</i>	FVKFV PFASSG.E TET TODE QEQPQQQE QVQVRGID LEARKE RN IY	EDIED GAVGVE
<i>F. sylvatica</i>	FVKFV PFASSGET ET TET TODE QEQPQQQE QVQVRGID LEARKE RN IY	NLD GVVGVD
<i>F. excelsior</i>	.....	.....
<i>S. robusta</i>	DGAG.D ENS DVEE IST SAV ALL LQS YKEA LAS NNE AKV AEE F ESF L OSI T DE EV K DLE K VV	K VV
<i>P. chinensis</i>	DGAG.D ENS DVEE IST SAV ALL LQS YKEA LAS NNE AKV AEE F ESF L OSI T DE EV K DLE K VV	K VV
<i>H. chinensis</i>	DGAG.D ESS DVED IST SAV ALL LQS YKEA LAS NNE AKV AEE F ESF L OSI T DE EV K DLE K VV	K VV
<i>D. turbinatus</i>	DGAG.D ESS DVEE IST SAV ALL LQS YKEA LAS NNE AKV AEE F ESF L OSI T DE EV K DLE K VV	K VV
<i>V. mangachapoi</i>	DGVD.D ESS DVEE VP SAV ALL LQS YKEA LAS NNE AKV AEE F ESF L OSI T DE EV K DLE K VV	K VV
<i>B. pendula</i>	DGTS.D DT V TGAE EV P D SVI ISL R Y KEA LA S N D E S R V I E I S L K S V E D E X T T L R VV	K VV
<i>O. rehderiana</i>	DVTS.D DT V TGDE EV PP PSV I S L Q Y KEA LA S N D E S R V I E I S L K S V E D E X T T L R VV	K VV
<i>Q. robur</i>	DISSDD D V NGAE EV P ASA I V SS L Q Y KEA LA S N D E S R V I E I S L K S V E D E X T T L R VV	K VV
<i>F. sylvatica</i>	DGTSD D G T DD D IN GNE EV P S AIL SS L Q Y KEA LA S N D E S R V I E I S L K S V E D E X T T L R VV	K VV
<i>F. excelsior</i>	..... SDGDT V A E EP PA SA V V A L N Y R E A L A N N D E A K V A D I E S F L E S I E S E X T E L R VV	.....
<i>S. robusta</i>	SLSEELA TEKDR ILR I SADF DN F RK R TER ER R LSL V K NAQ GEV LEN L S V I D DN F ER AK D QI	QI
<i>P. chinensis</i>	SLSEELA TE TDR ILR I SADF DN F RK R TER ER R LSL V K NAQ GEV LEN F LPV I D DN F ER AK D QI	QI
<i>H. chinensis</i>	..... GTE KDR ILR I SADF DN F RK R TER ER R LSL V K NAQ GEV LEN F LPV I D DN F ER AK D QI	QI
<i>D. turbinatus</i>	SLSEELT VEKDR ILR V SADF DN F RK R TER ER R LSL V K NAQ GEV LEN L LPV I D DN F ER AK D QI	QI
<i>V. mangachapoi</i>	SLSEELAME KDR ILR I SADF DN F RK R TER ER R LSL V K NAQ GEV LEN L LPV I D DN F ER AK D QI	QI
<i>B. pendula</i>	SLSEELSTE KAR ILR I SADF DN F RK R TER ER R LSL V T NAQ GEV V S L L V I D DN F ER AK A QI	QI
<i>O. rehderiana</i>	YLSEELTE KAR ILR I SADF DN F RK R TER ER R LSL V T NAQ GEV V S L L V I D DN F ER AK A QI	QI
<i>Q. robur</i>	SLSEELTE KER ILR I SADF DN F RK R TER ER R LSL V T NAQ GEV V S L L V I D DN F ER AK T QI	QI
<i>F. sylvatica</i>	SLSEELSTD KER ILR I SADF DN F RK R TER ER R LSL V T NAQ GEV V S L L V I D DN F ER AK S QI	QI
<i>F. excelsior</i>	TLSEELSS ERD ILR I SADF NN F RK R TER ER R LSL V S NAQ GEV V S L L V I D DN F ER AK A QI	QI
<i>S. robusta</i>	KVATE GEEK INNSY QSI Y KQF I E ILG S L G V V V ET V G Q P F D P M L H E A I M R E D S T D Y E E G I	.....
<i>P. chinensis</i>	KVATE GEEK INNSY QSI Y KQF I E ILG S L G V V V ET V G Q P F D P M L H E A I M R D S T D Y E E G I	.....
<i>H. chinensis</i>	KVATE GEEK INNSY QSI Y KQF I E ILG S L G V V V ET V G Q P F D P M L H E A I M R E D S T D Y E E G I	.....
<i>D. turbinatus</i>	KVATE GEEK INNSY QSI Y KQF I E ILG S L G V V V ET V G Q P F D P M L H E A I M R E D S T D Y E E G I	.....
<i>V. mangachapoi</i>	KVATE GEEK INNSY QSI Y KQF I E ILG S L G V V V ET V G Q P F D P M L H E A I M R E D S T D Y E E G I	.....
<i>B. pendula</i>	KVETD GEEK INNSY QSI Y KQF I E ILG S L G V V V TAG N P F D P L L H E A I M R E D S N E Y E E G I	.....
<i>O. rehderiana</i>	KVETD GEEK INNSY QSI Y KQF I E ILG S L G V V V TAG N P F D P L L H E A I M R E D S N E Y E E G I	.....
<i>Q. robur</i>	KVETE GEEK INNSY QSI Y KQF I E ILG S L G V V V TAG N P F D P L L H E A I M R E D S N E Y E E G I	.....
<i>F. sylvatica</i>	KVETE GEEK INNSY QSI Y KQF I E ILG S L G V V V TAG N P F D P L L H E A I M R E D S N E Y E E G I	.....
<i>F. excelsior</i>	KVETE GEEK INNSY QSI Y KQF I E ILG S L G V V V TAG N P F D P M L H E A I M R E G S T E F K D G I	.....
<i>S. robusta</i>	ILQEF RKGF KLGER LLR PAM MV KVS	AGPGPA K V E V E P S E G G A N T S E T T N
<i>P. chinensis</i>	ILQEF RKGF KLGER LLR PAM MV KVS	AGPGPA K V E V E P S E G G A N T S E T T N
<i>H. chinensis</i>	ILQEF RKGF KLGER LLR PAM MV KVS	AGPGPA K V E V E P S E G G A N T S E T T N
<i>D. turbinatus</i>	ILQEF RKGF KLGER LLR PAM MV KVS	AGPGPA K V E V E P S E G G A N T S E T Q E S E T T N
<i>V. mangachapoi</i>	VLD EFS RN PSQFC SGFM KT W I R F	AGPGPA K V E V E P S E G G A N T S E T Q D I E T T N
<i>B. pendula</i>	VIE E FRKG F KLG D R L L R P S M V K V S	AGPGPV K V D Q V E S S E G
<i>O. rehderiana</i>	VIE E FRKG F KLG D R L L R P S M V K V S	AGPGPA K V D Q V E S S E G
<i>Q. robur</i>	IIQEF RKGF KLG D R L L R P S M V K V S	AGPGPA K V D Q V E E V E S T E G
<i>F. sylvatica</i>	ILQEF RKGF KLG D R L L R P S M V K V S	AGPGPA K V D Q V E E V E S T E G
<i>F. excelsior</i>	VLE EYR GF KLG D R L L R P S M V K V S	AGPGPV K V D Q V E G E A S N K

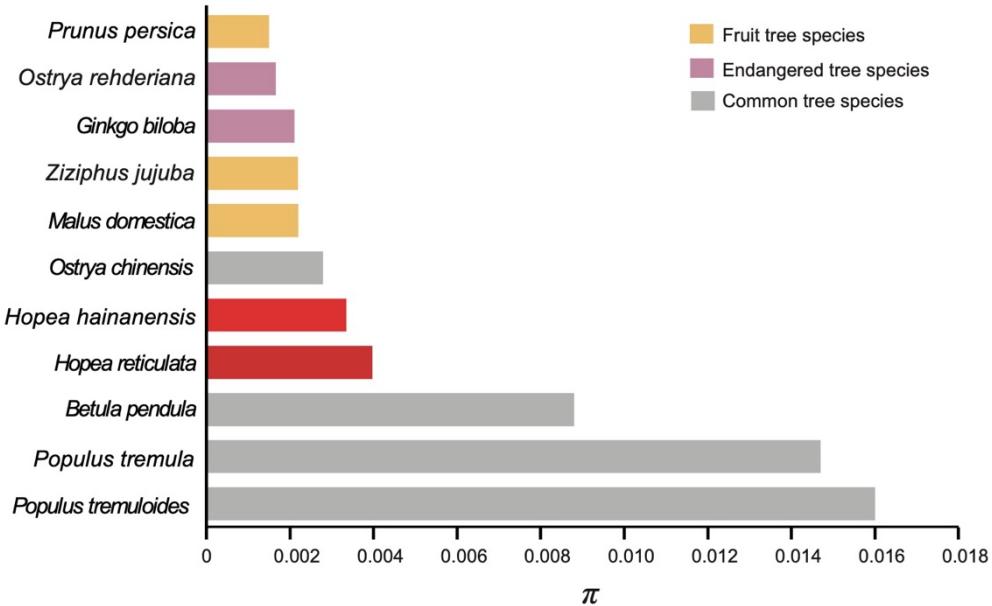
t USP



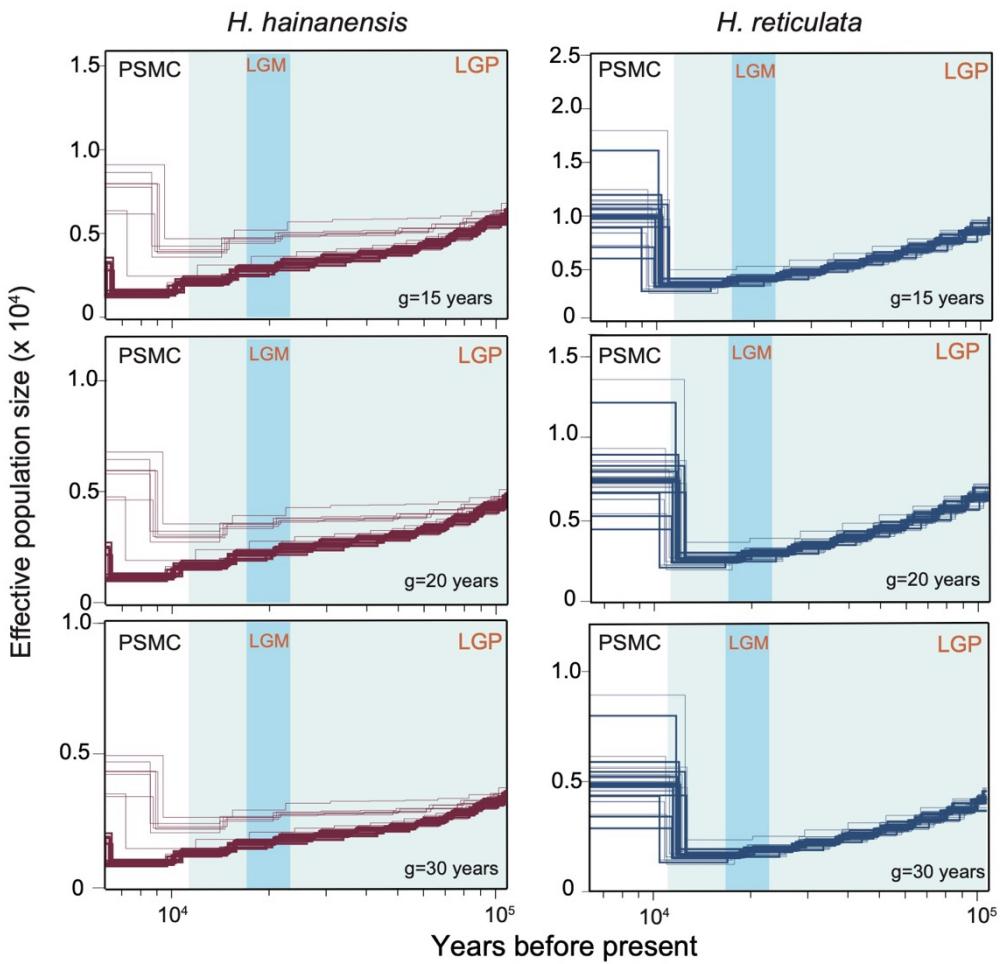
Supplementary Figure 7. Positively selected sites in RAD51D (a), SMC5 (b), LUT1 (c), DNA2 (d), cysQ (e), BLM (f), LRPPRC (g), LSD1 (h), SMG1 (i), PPP2R5 (j), SKI3 (k), PFK (l), APX (m), XDH1 (n), GPS (o), ADH (p), NGLY1 (q), NDH (r), GRPE (s) and USP (t). Blue frames are used to highlight the positively selected sites supported by the comparison between the genomes of our focal Dipterocarpoideae species and those of five temperate tree species. The function of each gene is shown in Supplementary Data 2.



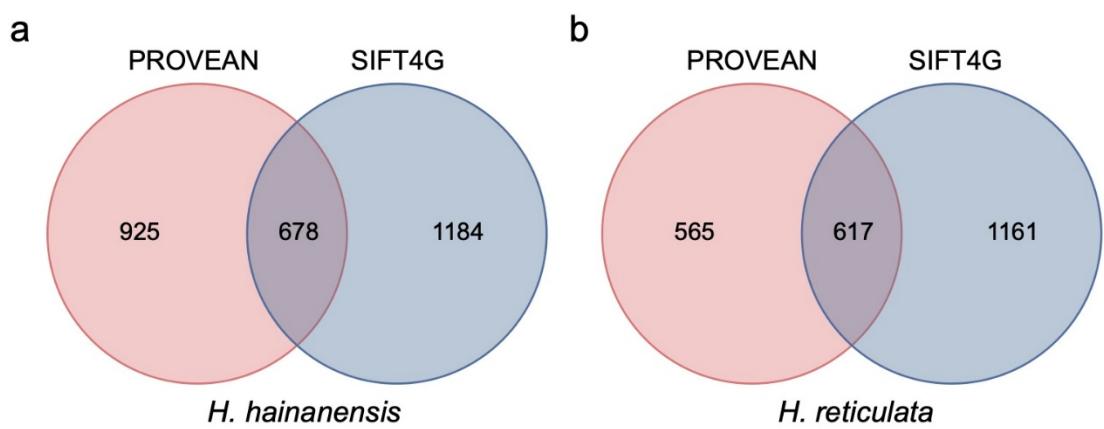
Supplementary Figure 8. Expression of the 20 positively selected genes involved in the responses of plants to environmental stresses in the comparisons between the genomes of our focal Dipterocarpoideae species and those of five temperate tree species comparisons of genomes. The function of each gene is shown in Supplementary Data 2. Expression level of each gene is estimated based on the transcriptome data (Illumina RNA-seq) for gene structure prediction (see Supplementary Table 21). RPKM: reads per kilobase per million mapped reads. Source data are provided as a Source Data file.



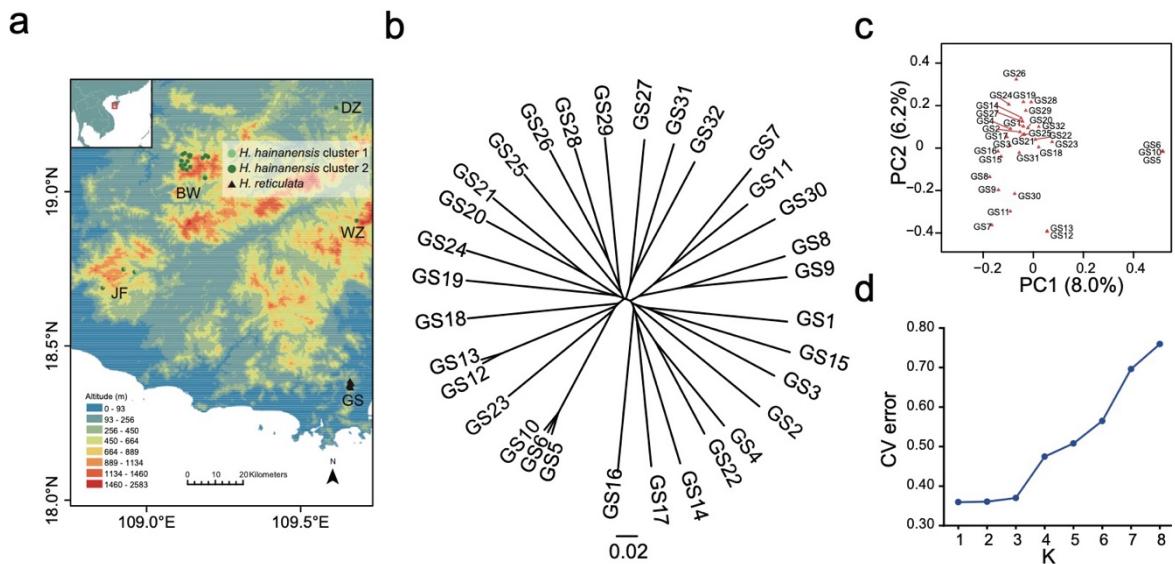
Supplementary Figure 9. Nucleotide diversity (π) of *Hopea hainanensis* and *H. reticulata* populations at the genomic level, with further comparisons with π values from the genomes of other nine tree species^{6,7,8,9,10,11,12}. Source data are provided as a Source Data file.



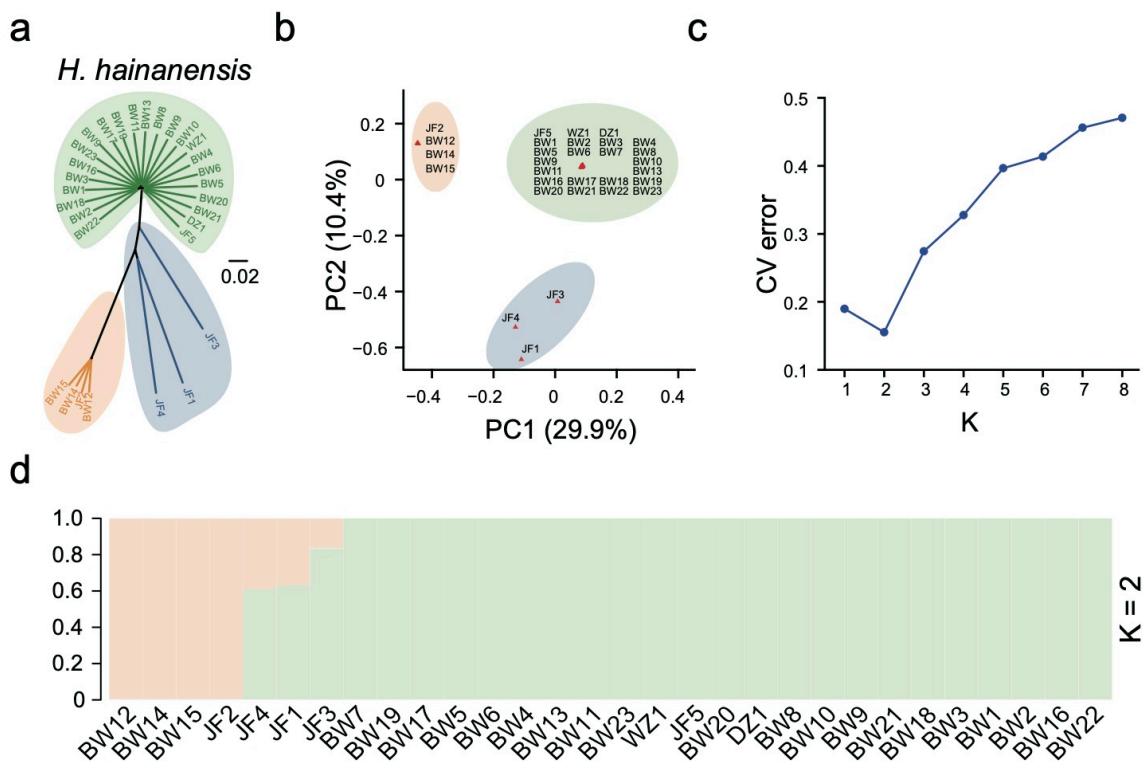
Supplementary Figure 10. Demographic dynamics of *H. hainanensis* (n=30) and *H. reticulata* (n=32) inferred using PSMC.



Supplementary Figure 11. Venn diagrams of the deleterious mutations (DDMs) detected within *H. hainanensis* (n=30) and *H. reticulata* (n=32) populations based on the results from analyses using PROVEAN and SIFT4G.



Supplementary Figure 12. The sampling locations of wild *H. hainanensis* and *H. reticulata* trees for resequencing and analysis of population genomics (a), neighbour-joining phylogenetic tree (b), principal component analysis (PCA) (c) and results of genetic structure analysis for the *H. reticulata* ($n=32$) population using genetic clustering (d). The sampling map was drawn by Chao-Nan Liu. All sampled trees are located on Hainan Island, China. BW: Bawangling, DZ: Danzhou city, JF: Jianfengling, WZ: Wuzhi mountain, and GS: Ganshiling. Cross-validation error (CV error) of each assumed genetic group number (K) was estimated, and assignment of sampled trees were performed according to the first two principal components from PCA analysis. Source data of Supplementary Fig. 12d are provided as a Source Data file.



Supplementary Figure 13. Results of neighbour-joining phylogenetic tree (a), principal component analysis (PCA) (b), and genetic clustering (c, d) for the sampled trees of *H. hainanensis* ($n=30$). Cross-validation error (CV error) for each assumed genetic group number (K) was estimated, and assignment of sampled trees were performed according to the first two principal components from PCA analysis. Source data of Supplementary Fig. 13c are provided as a Source Data file.

Supplementary Tables

Supplementary Table 1. The results of genome size estimation using flow cytometry setting the genome of *Solanum lycopersicum* (genome size: 2.07 Gb; 2C = 2.12) as the reference.

Sample	Fluorescence intensity	CV error (%)	2C (pg)	Genome size (Gb)	Ploidy
<i>Hopea chinensis</i>	18.20	4.30	0.81	0.79	2X
<i>Solanum lycopersicum</i>	47.40	1.76	2.12	2.07	
<i>Hopea hainanensis</i>	29.20	4.71	1.60	1.56	4X
<i>Solanum lycopersicum</i>	38.80	3.61	2.12	2.07	
<i>Hopea reticulata</i>	26.90	4.88	1.64	1.60	4X
<i>Solanum lycopersicum</i>	34.70	3.29	2.12	2.07	

Supplementary Table 2. Statistics of clean sequencing data. Pacbio CLR (continuous long-read) reads were generated for *H. hainanensis*, *H. reticulata*, *H. chinensis* and *P. chinensis*, and Pacbio HiFi (high fidelity) reads were generated for *S. robusta*, *D. turbinatus* and *V. mangachapoi*. Depth of sequencing was calculated via clean sequencing data divided by the genome size estimated by *k*-mer analysis (see Table 1).

Species	Abbreviation	Illumina reads		Pacbio reads		Hi-C reads	
		Data (Gb)	Depth (X)	Data (Gb)	Depth (X)	Data (Gb)	Depth (X)
<i>H. hainanensis</i>	Hhai	263.53	168.53	97.17	62.14	77.32	49.45
<i>H. reticulata</i>	Hret	77.13	51.40	87.34	58.21	100.29	66.84
<i>H. chinensis</i>	Hchi	51.16	147.66	42.63	123.04	45.19	130.43
<i>P. chinensis</i>	Pchi	79.65	254.36	124.88	398.80	47.11	136.00
<i>S. robusta</i>	Srob	80.59	244.98	6.64	20.18	50.29	152.87
<i>D. turbinatus</i>	Dtur	82.38	220.76	20.72	55.52	57.42	153.88
<i>V. mangachapoi</i>	Vman	69.98	154.55	8.38	18.51	47.56	105.01

Supplementary Table 3. Proportions of highly homologous regions in each chromosome of *H. hainanensis* and *H. reticulata* according to the coverage depth of Illumina pair-end reads for k-mer analysis. The overall sequencing depth was 144X (223.69 Gb/1.56 Gb) for *H. hainanensis* and 51X (77.13 Gb/1.50 Gb) for *H. reticulata*. Regions with coverage depths of 216X – 360X, 360X – 504X and larger than 504X for *H. hainanensis* and of 75.5X – 127.5X, 127.5X – 178.5X and larger than 178.5X for *H. reticulata* (i.e., 1.5 – 2.5, 2.5 – 3.5 and larger than 3.5 folds of overall coverage depth) were thought to be the overlaps of two, three and four sets chromosomes, respectively. The total length of overlapped region was estimated to be 361.86 Mb for *H. hainanensis* and 245.66 Mb for *H. reticulata*, accounting for most (77.9% for *H. hainanensis* and 93.6% for *H. reticulata*) of the difference between the assembled and the estimated genome size (see Methods).

Chromosome_ID	<i>H. hainanensis</i>			<i>H. reticulata</i>				
	Chromosome length (bp)	216X–360X	360X–504X	>504X	Chromosome length (bp)	76.5X–127.5X	127.5X–178.5X	>178.5X
Chr1	56,060,860	0.2368	0.0389	0.0296	66,518,347	0.2481	0.0207	0.0054
Chr2	50,862,877	0.2322	0.0083	0.0022	62,617,095	0.2431	0.0179	0.0040
Chr3	47,502,918	0.1823	0.0187	0.0120	52,787,304	0.2071	0.0125	0.0030
Chr4	25,558,352	0.0630	0.0055	0.0000	29,144,642	0.3376	0.0477	0.0079
Chr5	52,060,348	0.2239	0.0035	0.0012	69,171,435	0.1840	0.0250	0.0039
Chr6	51,918,603	0.2779	0.0270	0.0252	61,919,302	0.1649	0.0241	0.0058
Chr7	45,882,048	0.2183	0.0179	0.0111	44,322,556	0.1633	0.0244	0.0020
Chr8	29,356,050	0.0651	0.0020	0.0003	26,589,551	0.1835	0.0267	0.0034
Chr9	53,961,569	0.3009	0.0445	0.0752	61,289,770	0.2457	0.0238	0.0073
Chr10	52,201,287	0.2773	0.0063	0.0019	54,261,871	0.2230	0.0140	0.0024
Chr11	38,126,576	0.1828	0.0121	0.0100	46,031,668	0.1853	0.0130	0.0059
Chr12	24,842,783	0.0535	0.0008	0.0000	25,649,789	0.1930	0.0304	0.0062
Chr13	44,572,804	0.3358	0.0121	0.0011	54,107,632	0.2173	0.0181	0.0031
Chr14	44,276,399	0.3243	0.0486	0.0788	46,457,576	0.2561	0.0198	0.0045
Chr15	36,124,573	0.2729	0.0246	0.0075	44,011,096	0.2493	0.0195	0.0052
Chr16	22,986,945	0.0622	0.0004	0.0000	41,307,522	0.2041	0.0136	0.0019
Chr17	51,368,458	0.3222	0.0444	0.0779	49,638,002	0.2877	0.0234	0.0068

Chr18	43,707,180	0.3276	0.0078	0.0014	48,129,990	0.3171	0.0322	0.0087
Chr19	28,019,024	0.2591	0.0300	0.0232	44,406,130	0.3137	0.0277	0.0068
Chr20	22,359,377	0.0894	0.0009	0.0009	31,106,232	0.2845	0.0267	0.0045
Chr21	42,884,734	0.2733	0.0581	0.0212	50,897,133	0.1819	0.0173	0.0067
Chr22	41,336,008	0.2288	0.0068	0.0010	46,730,095	0.2382	0.0201	0.0077
Chr23	33,386,394	0.1836	0.0210	0.0099	43,902,429	0.2237	0.0141	0.0023
Chr24	22,647,172	0.0645	0.0013	0.0000	16,233,104	0.1694	0.0074	0.0031
Chr25	30,718,104	0.3955	0.0557	0.1045	34,780,442	0.3108	0.0210	0.0052
Chr26	27,906,433	0.3973	0.0097	0.0018	31,998,611	0.3194	0.0441	0.0181
Chr27	17,551,768	0.2813	0.0177	0.0188	25,311,145	0.2947	0.0245	0.0008
Chr28	14,580,805	0.1385	0.0014	0.0007	20,671,113	0.3952	0.0556	0.0227
Total	1,052,760,449	-	-	-	1,299,991,582	-	-	-

Supplementary Table 4. Lengths of assembled chromosomes for each focal species. Note that only monoploid genome was assembled for all species except the two autotetraploid species *H. hainanensis* and *H. reticulata*.

Chromosome ID	Chromosome length (bp)						
	<i>H. hainanensis</i>	<i>H. reticulata</i>	<i>H. chinensis</i>	<i>P. chinensis</i>	<i>S. robusta</i>	<i>D. turbinatus</i>	<i>V. mangachapoi</i>
Chr1	56,060,860	66,518,347	58,999,814	47,060,898	52,458,056	40,721,971	35,234,553
Chr2	50,862,877	62,617,095	50,750,874	43,239,849	50,588,708	26,050,962	56,851,045
Chr3	47,502,918	52,787,304	53,466,247	51,893,975	54,130,500	35,475,413	39,502,375
Chr4	25,558,352	29,144,642	51,441,790	46,059,081	48,473,062	32,353,911	37,717,841
Chr5	52,060,348	69,171,435	44,472,741	39,227,045	42,867,569	45,090,292	40,985,457
Chr6	51,918,603	61,919,302	46,293,359	29,970,300	46,457,883	29,150,171	49,753,518
Chr7	45,882,048	44,322,556	32,845,991	51,556,864	31,767,639	26,610,888	43,556,076
Chr8	29,356,050	26,589,551	-	-	-	29,516,284	36,579,020
Chr9	53,961,569	61,289,770	-	-	-	42,617,143	33,201,765
Chr10	52,201,287	54,261,871	-	-	-	28,594,060	29,296,269
Chr11	38,126,576	46,031,668	-	-	-	32,794,201	36,846,320
Chr12	24,842,783	25,649,789	-	-	-	-	-
Chr13	44,572,804	54,107,632	-	-	-	-	-
Chr14	44,276,399	46,457,576	-	-	-	-	-
Chr15	36,124,573	44,011,096	-	-	-	-	-
Chr16	22,986,945	41,307,522	-	-	-	-	-
Chr17	51,368,458	49,638,002	-	-	-	-	-
Chr18	43,707,180	48,129,990	-	-	-	-	-
Chr19	28,019,024	44,406,130	-	-	-	-	-
Chr20	22,359,377	31,106,232	-	-	-	-	-
Chr21	42,884,734	50,897,133	-	-	-	-	-
Chr22	41,336,008	46,730,095	-	-	-	-	-
Chr23	33,386,394	43,902,429	-	-	-	-	-

Chr24	22,647,172	16,233,104	-	-	-	-	-
Chr25	30,718,104	34,780,442	-	-	-	-	-
Chr26	27,906,433	31,998,611	-	-	-	-	-
Chr27	17,551,768	25,311,145	-	-	-	-	-
Chr28	14,580,805	20,671,113	-	-	-	-	-
Total (bp)	1,052,760,449	1,229,991,582	338,270,816	309,008,012	326,743,417	368,975,296	439,524,239

Supplementary Table 5. Genome completeness assessments using CEGMA, BUSCO and Illumina sequencing data for *k*-mer analysis (see Supplementary Table 2). A total of 248 core eukaryotic genes (CEGs) and 1,614 conserved embryophyta proteins (CEPs) were used in CEGMA and BUSCO assessments, respectively. LMG: the longest monoploid genome.

Species	CEGMA			BUSCO			Illumina sequencing data	
	Type	Number of CEGs	Percentage (%)	Type	Number of CEPs	Percentage (%)	Mapping ratio (%)	Genome coverage (%)
<i>H. hainanensis</i> (four sets chromosomes)	Fully mapped CEGs	244	96.77	Complete	1,598	99.0	97.38	98.42
	Fully + partially mapped CEGs	245	98.79	Fragmented	6	0.4		
<i>H. hainanensis</i> (LMG)	Fully mapped CEGs	226	91.13	Complete	1,398	86.6	86.21	99.81
	Fully + partially mapped CEGs	232	93.55	Fragmented	26	1.6		
<i>H. reticulata</i> (four sets chromosomes)	Fully mapped CEGs	236	95.16	Complete	1,580	97.9	96.08	92.38
	Fully + partially mapped CEGs	242	97.58	Fragmented	3	0.2		
<i>H. reticulata</i> (LMG)	Fully mapped CEGs	223	89.92	Complete	1,319	81.7	84.21	97.12
	Fully + partially mapped CEGs	227	91.53	Fragmented	34	2.1		
<i>H. chinensis</i>	Fully mapped CEGs	236	95.16	Complete	1,533	95.0	94.45	99.91
	Fully + partially mapped CEGs	240	98.39	Fragmented	10	0.6		
<i>P. chinensis</i>	Fully mapped CEGs	236	95.16	Complete	1,583	98.1	95.41	99.84
	Fully + partially mapped CEGs	239	96.37	Fragmented	7	0.4		
<i>S. robusta</i>	Fully mapped CEGs	236	95.16	Complete	1,590	98.5	96.44	99.99
	Fully + partially mapped CEGs	239	96.37	Fragmented	7	0.4		
				Missing	17	1.1		

<i>D. turbinatus</i>	Fully mapped CEGs	245	98.79	Complete	1,598	99.0	98.69	99.85
	Fully + partially mapped CEGs	248	100.00	Fragmented	3	0.2		
				Missing	13	0.8		
<i>V. mangachapoi</i>	Fully mapped CEGs	229	92.34	Complete	1,567	97.1	96.86	99.90
	Fully + partially mapped CEGs	234	94.35	Fragmented	3	0.2		
				Missing	44	2.7		

Supplementary Table 6. Allele annotation among homologous chromosomes in *H. hainanensis* and *H. reticulata* genomes. Number of allele-identified genes was calculated as four times of the total number of genes with four alleles across all the seven chromosome sets, three times of the total number of genes with three alleles, two times of the total number of genes with two alleles, and the total number of genes with one allele. Chromosome set: a group of clustered chromosomes containing four homologous chromosomes.

	<i>H. hainanensis</i>				<i>H. reticulata</i>			
	Genes with four alleles	Genes with three alleles	Genes with two alleles	Genes with one allele	Genes with four alleles	Genes with three alleles	Genes with two alleles	Genes with one allele
Chromosome set 1	612	1,681	1,762	3,007	345	1,630	2,211	4,341
Chromosome set 2	503	1,712	1,663	2,613	248	1,418	1,954	3,903
Chromosome set 3	498	1,985	1,939	2,806	371	1,356	2,005	3,865
Chromosome set 4	391	1,649	1,809	2,158	336	1,386	1,855	3,485
Chromosome set 5	365	1,690	1,822	2,370	165	1,178	2,200	3,079
Chromosome set 6	440	1,517	1,478	2,231	193	1,203	1,719	3,467
Chromosome set 7	169	964	1,207	1,467	245	749	1,216	1,918
Allele-identified genes	2,978	11,198	11,680	16,652	1,903	8,920	13,160	24,058

Supplementary Table 7. Annotation results of protein-coding genes and BUSCO assessments. A total of 1,614 conserved embryophyta proteins (CEPs) were used in BUSCO assessments. CDS: coding sequence.

		<i>H. hainanensis</i>	<i>H. reticulata</i>	<i>H. chinensis</i>	<i>P. chinensis</i>	<i>S. robusta</i>	<i>D. turbinatus</i>	<i>V. mangachapoi</i>
Gene structure	Gene number	88,703	85,031	29,372	29,651	29,104	31,744	31,006
	Average gene length (bp)	2,690	2,781	2,773	2,872	2,974	2,824	2,910
	Average CDS length (bp)	1,127	1,171	1,132	1,163	1,184	1,181	1,163
	Average exons per gene	5.1	5.3	5.2	5.3	5.4	5.2	5.2
	Average exon length (bp)	221	220	217	219	220	229	226
	Average intron length (bp)	382	373	389	397	409	395	421
BUSCO assessment	Complete CEPs	1,512 (93.7%)	1,513 (93.7%)	1,515 (93.9%)	1,483 (91.9%)	1,500 (92.9%)	1,513 (93.7%)	1,473 (91.3%)
	Single-copy CEPs	175 (10.9%)	162 (10.0%)	1,306 (80.9%)	1,293 (80.1%)	1,330 (82.4%)	1,286 (79.7%)	1,306 (80.9%)
	Duplicated CEPs	1,337 (82.8%)	1,351 (83.7%)	209 (13.0%)	190 (11.8%)	170 (10.5%)	227 (14.0%)	167 (10.4%)
	Fragmented CEPs	39 (2.4%)	34 (2.1%)	45 (2.8%)	54 (3.3%)	47 (2.9%)	34 (2.1%)	75 (4.6%)
	Missing CEPs	63 (3.9%)	67 (4.2%)	54 (3.3%)	77 (4.8%)	67 (4.2%)	67 (4.2%)	66 (4.1%)
Functional annotation	Swiss-Prot	70,086 (79.0%)	69,960 (82.3%)	23,213 (79.0%)	23,148 (78.1%)	22,747 (78.2%)	24,173 (76.2%)	23,833 (76.9%)
	NR	85,925 (97.9%)	84,422 (99.3%)	28,391 (96.7%)	28,427 (95.9%)	27,821 (95.6%)	30,641 (96.5%)	29,436 (94.9%)
	KEGG	65,391 (73.7%)	65,126 (76.6%)	21,789 (74.2%)	21,638 (73.0%)	21,295 (73.2%)	22,092 (69.6%)	22,475 (72.5%)
	GO	80,762 (91.0%)	77,970 (91.7%)	26,742 (91.1%)	27,022 (91.1%)	26,564 (91.3%)	28,531 (89.9%)	28,206 (91.0%)
Pfam								
Overall		88,341 (99.6%)	84,932 (99.9%)	29,234 (99.5%)	29,498 (99.5%)	28,950 (99.5%)	31,604 (99.6%)	30,807 (99.4%)

Supplementary Table 8. Annotation results of repeat sequences (using Tandem Repeats Finder (TRF), RepeatMasker and RepeatProteinMask) and non-coding RNAs. LTR-RT: long terminal repeat retrotransposon.

Species	Repeat sequences			Non-coding RNA				
	Type	Size (bp)	% of genome	Type	Number	Average length (bp)	Total length (bp)	% of genome
<i>H. hainanensis</i>	TRF	43,630,344	3.97	miRNA	786	120.48	94,696	0.0086
	RepeatMasker	524,298,168	47.70	tRNA	1,857	74.94	139,162	0.0127
	RepeatProteinMask	81,936,177	7.45	rRNA	300	196.98	59,093	0.0054
	Total	542,963,148	49.39	snRNA	1,526	107.82	164,529	0.0150
	LTR-RT	345,420,890	31.42					
<i>H. reticulata</i>	TRF	50,220,382	4.06	miRNA	1,149	115.33	132,512	0.0107
	RepeatMasker	560,712,793	45.29	tRNA	2,213	75.10	166,187	0.0134
	RepeatProteinMask	107,112,585	8.65	rRNA	550	236.08	129,845	0.0105
	Total	587,772,479	47.48	snRNA	1,772	110.15	195,182	0.0158
	LTR-RT	401,299,478	32.42					
<i>H. chinensis</i>	TRF	12,880,263	3.79	miRNA	381	121.51	46,296	0.0136
	RepeatMasker	143,083,785	42.15	tRNA	655	74.99	49,118	0.0145
	RepeatProteinMask	30,960,981	9.12	rRNA	336	240.52	80,814	0.0238
	Total	150,108,579	44.22	snRNA	528	108.33	57,198	0.0169
	LTR-RT	90,401,075	26.63					
<i>P. chinensis</i>	TRF	10,767,710	3.43	miRNA	338	115.04	38,882	0.0124
	RepeatMasker	132,085,261	42.08	tRNA	623	75.25	46,880	0.0149
	RepeatProteinMask	20,963,852	6.68	rRNA	125	380.54	47,567	0.0152
	Total	136,971,552	43.64	snRNA	471	109.80	51,715	0.0165
	LTR-RT	62,301,462	19.85					
<i>S. robusta</i>	TRF	11,405,760	3.49	miRNA	419	119.87	50,227	0.0153
	RepeatMasker	143,206,917	43.76	tRNA	631	75.36	47,551	0.0145
	RepeatProteinMask	25,266,318	7.72	rRNA	136	187.62	25,517	0.0078

	Total	148,596,107	45.40	snRNA	427	107.40	45,858	0.0140
<i>D. turbinatus</i>	LTR-RT	79,262,279	24.22					
	TRF	15,795,432	4.08	miRNA	1,052	141.58	148,939	0.0385
	RepeatMasker	188,535,626	48.69	tRNA	2,187	75.52	165,168	0.0427
	RepeatProteinMask	27,975,591	7.22	rRNA	7,057	400.77	2,828,206	0.7300
	Total	195,643,900	50.53	snRNA	660	112.92	74,529	0.0192
<i>V. mangachapoi</i>	LTR-RT	108,354,887	27.98					
	TRF	23,606,357	5.27	miRNA	445	114.46	50,936	0.0114
	RepeatMasker	216,261,711	48.29	tRNA	583	75.10	43,783	0.0098
	RepeatProteinMask	57,223,275	12.78	rRNA	3,447	175.89	606,284	0.1400
	Total	230,664,898	51.51	snRNA	460	115.99	53,357	0.0119
	LTR-RT	178,277,869	39.81					

Supplementary Table 9. Results of gene family clustering by comparing genomes of our focal species with those of additional 12 Dipterocarpoideae species and other six species, five temperate tree species.

Species	Gene number	Genes in families	Family number	Unique families	Reference
<i>Dipterocarpus alatus</i>	29,203	37,119	24,002	215	13
<i>Dipterocarpus gracilis</i>	27,310	34,063	23,009	106	13
<i>Dipterocarpus intricatus</i>	26,797	33,843	22,753	86	13
<i>Dipterocarpus turbinatus</i>	42,423	29,587	18,183	45	This study
<i>Dipterocarpus zeylanicus</i>	38,375	33,869	23,062	93	13
<i>Gossypium raimondii</i>	37,824	30,040	14,976	371	14
<i>Hopea chinensis</i>	31,744	26,501	17,976	23	This study
<i>Hopea reticulata</i>	37,356	41,351	18,619	432	This study
<i>Hopea hainanensis</i>	33,724	35,651	19,643	342	This study
<i>Hopea mollissima</i>	29,296	31,750	21,327	129	13
<i>Hopea odorata</i>	48,040	36,665	21,647	417	13
<i>Parashorea chinensis</i>	42,508	26,348	17,757	60	This study
<i>Shorea henryana</i>	35,939	29,946	20,042	89	13
<i>Shorea leprosula</i>	44,078	30,259	19,965	188	5
<i>Shorea robusta</i>	35,359	26,475	18,046	51	This study
<i>Shorea roxburghii</i>	29,650	30,441	20,048	99	13
<i>Theobroma cacao</i>	33,950	20,170	14,531	119	15
<i>Vatica mangachapoi</i>	34,469	27,774	18,593	54	This study
<i>Vatica odorata</i>	29,104	32,945	21,821	179	13
<i>Vatica rassak</i>	34,473	32,266	21,637	276	13
<i>Vatica xishuangbannaensis</i>	21,109	31,889	21,692	103	13
<i>Oryza sativa</i>	31,006	23,717	12,779	1,818	16
<i>Arabidopsis thaliana</i>	39,825	23,561	13,131	801	17
<i>Aquilaria sinensis</i>	39,603	22,261	13,899	799	18
<i>Amborella trichopoda</i>	36,861	19,088	12,084	1,034	19
Clustered with 5 temperate tree species					
<i>Betula pendula</i>	24,629	19,530	13,776	395	9
<i>Dipterocarpus turbinatus</i>	31,744	27,801	16,529	143	This study
<i>Fraxinus excelsior</i>	38,948	31,146	14,180	974	20
<i>Fagus sylvatica</i>	61,548	55,954	16,355	2,168	21
<i>Hopea chinensis</i>	29,296	25,584	17,351	54	This study
<i>Hopea exalata</i>	48,040	40,630	18,170	611	This study
<i>Hopea hainanensis</i>	42,508	34,501	18,765	484	This study
<i>Ostrya rehderiana</i>	27,767	22,146	15,060	700	6
<i>Parashorea chinensis</i>	29,650	25,634	17,191	87	This study
<i>Quercus robur</i>	25,808	21,616	12,218	585	22
<i>Shorea robusta</i>	29,104	25,378	17,148	83	This study
<i>Vatica mangachapoi</i>	31,006	25,745	16,651	205	This study

Supplementary Table 10. Results of quota tests by comparing the genomes of our focal species with that of *Vitis vinifera*. The genome coverage reached to a plateau when the quota statistic was 2: 1 (in bold). Vvin = *Vitis vinifera*; and other abbreviations of species are shown in Supplementary Table 2.

Supplementary Table 11. KEGG categories for the positively selected genes detected in the genomes of our focal species compared with those of the five temperate tree species.

KEGG ID	Map title	N genes	KEGG ID	Map title	N genes
map03440	Homologous recombination	2	map00565	Ether lipid metabolism	1
map00053	Ascorbate and aldarate metabolism	2	map00220	Arginine biosynthesis	1
map00740	Riboflavin metabolism	1	map00073	Cutin, suberine and wax biosynthesis	1
map00232	Caffeine metabolism	1	map00400	Phenylalanine, tyrosine and tryptophan biosynthesis	1
map03018	RNA degradation	3	map00195	Photosynthesis	1
map00902	Monoterpeneoid biosynthesis	1	map00010	Glycolysis / Gluconeogenesis	2
map00920	Sulfur metabolism	1	map00350	Tyrosine metabolism	1
map00071	Fatty acid degradation	1	map00240	Pyrimidine metabolism	2
map00900	Terpenoid backbone biosynthesis	1	map00360	Phenylalanine metabolism	1
map03030	DNA replication	1	map03050	Proteasome	1
map00860	Porphyrin and chlorophyll metabolism	1	map02010	ABC transporters	1
map04141	Protein processing in endoplasmic reticulum	3	map01212	Fatty acid metabolism	1
map03015	mRNA surveillance pathway	2	map01210	2-Oxocarboxylic acid metabolism	1
map00230	Purine metabolism	2	map00630	Glyoxylate and dicarboxylate metabolism	1
map03420	Nucleotide excision repair	1	map00260	Glycine, serine and threonine metabolism	1
map00760	Nicotinate and nicotinamide metabolism	1	map01230	Biosynthesis of amino acids	3
map00480	Glutathione metabolism	1	map00030	Pentose phosphate pathway	1
map00130	Ubiquinone and other terpenoid-quinone biosynthesis	2	map04146	Peroxisome	1
map00564	Glycerophospholipid metabolism	3	map00052	Galactose metabolism	1
map00730	Thiamine metabolism	1	map03008	Ribosome biogenesis in eukaryotes	1
map00650	Butanoate metabolism	1	map03040	Spliceosome	2
map00062	Fatty acid elongation	1	map00500	Starch and sucrose metabolism	3

Supplementary Table 12. Genes for *in vitro* functional assays from the genome of *H. chinensis* with substrates and expected reaction products.

Gene ID	Gene name	Substrate(s)	Expected product(s)
evm.model.000015F.76	UDP-sugar pyrophosphorylase (<i>USP</i>)	Glucose 1-phosphate, uridine triphosphate (UTP)	Diphosphate, (uridine diphosphate) UDP-glucose
evm.model.000011F.38	Pyridoxine 4-dehydrogenase (<i>PLR1</i>)	NADPH, pyridoxal	Pyridoxine, NADPH+

Supplementary Table 13. KEGG categories for the contracted gene families detected in the genomes of our focal species compared with those of the five temperate tree species.

KEGG ID	Map title	N gene families
map04626	Plant-pathogen interaction	5
map00903	Limonene and pinene degradation	1
map00909	Sesquiterpenoid and triterpenoid biosynthesis	1
map00730	Thiamine metabolism	1
map04122	Sulfur relay system	1
map00945	Stilbenoid, diarylheptanoid and gingerol biosynthesis	1
map00460	Cyanoamino acid metabolism	2
map00966	Glucosinolate biosynthesis	1
map00950	Isoquinoline alkaloid biosynthesis	2
map00960	Tropane, piperidine and pyridine alkaloid biosynthesis	2
map00360	Phenylalanine metabolism	2
map00350	Tyrosine metabolism	1
map00410	beta-Alanine metabolism	2
map00260	Glycine, serine and threonine metabolism	2
map00380	Tryptophan metabolism	1
map01210	2-Oxocarboxylic acid metabolism	1
map00940	Phenylpropanoid biosynthesis	2
map00040	Pentose and glucuronate interconversions	1

Supplementary Table 14. The significantly expanded/contracted gene families in the genomes of our focal species compared with those of five temperate tree species. NA: not available.

Gene family ID	Encoded protein	KEGG pathway/GO term	Functional category	Reference
30 (expanded)	Disease resistance proteins	GO:0006952 Defense response	Plant immunity	NA
29, 39, 65, 74, 245, 246, 257 (contracted)	Leucine-rich repeat receptor-like kinases (LRR-RLKs)	map04626 Plant-pathogen interaction	Plant immunity	23
22, 68 (contracted)	CC-NBS-LRR (NBS-LRR: nucleotide binding site-leucine rich repeat)	map04626 Plant-pathogen interaction	Plant immunity	24
5 (contracted)	TIR-NBS-LRR	map04627 Plant-pathogen interaction	Plant immunity	24

Supplementary Table 15. Expanded and contracted gene families related to plant immunity in the genomes of our focal Dipterocarpoideae species compared with those of the five temperate tree species. Abbreviations of annotated function of gene families are shown in Supplementary Table 14.

Family ID	<i>H. chinensis</i>	<i>P. chinensis</i>	<i>S. robusta</i>	<i>D. turbinatus</i>	<i>V. mangachapoi</i>	<i>B. pendula</i>	<i>F. excelsior</i>	<i>F. sylvatica</i>	<i>O. rehderiana</i>	<i>Q. robur</i>	Encoded protein
Expanded gene families											
30	0	13	3	256	73	0	0	0	0	0	Disease resistance proteins
Contracted gene families											
29	7	4	9	5	11	30	52	89	26	114	LRR-RLK-1
39	3	2	3	2	6	2	11	102	0	128	LRR-RLK-2
65	3	2	1	4	10	0	12	56	4	97	LRR-RLK-3
74	6	3	2	3	6	29	18	42	16	44	LRR-RLK-4
245	3	2	1	1	3	15	7	26	1	6	LRR-RLK-5
246	3	0	2	3	0	27	5	19	0	6	LRR-RLK-6
257	1	0	2	2	5	13	7	9	0	25	LRR-RLK-7
22	6	2	1	2	16	2	23	149	12	193	CC-NBS-LRR-1
68	1	2	0	2	0	11	9	54	25	73	CC-NBS-LRR-2
5	0	1	1	1	1	73	10	158	4	361	TIR-NBS-LRR-1

Supplementary Table 16. Statistics of re-sequencing data (using Illumina NovaSeq 6000 platform) for *H. hainanensis* and *H. reticulata*.

Species	Sample	Sampling site	Total data (Gb)	The longest monoploid genome (LMG)		The longest two monoploid genomes	
				Mapping rate (%)	Average depth (X)	Mapping rate (%)	Average depth (X)
<i>H. hainanensis</i>	BW1	Bawangling	25.00	85.95	55.57	94.60	33.28
	BW2	Bawangling	27.02	87.10	60.81	95.79	36.19
	BW3	Bawangling	29.31	84.13	61.82	92.64	36.86
	BW4	Bawangling	26.79	86.10	58.90	94.51	34.93
	BW5	Bawangling	26.28	76.57	49.62	84.49	29.76
	BW6	Bawangling	30.58	60.06	47.29	66.16	28.23
	BW7	Bawangling	24.61	73.76	45.23	81.40	27.09
	BW8	Bawangling	21.28	79.04	44.54	86.78	26.41
	BW9	Bawangling	24.21	84.91	54.15	93.36	32.17
	BW10	Bawangling	26.34	81.40	54.34	89.87	32.50
	BW11	Bawangling	25.30	71.53	47.34	78.71	28.29
	BW12	Bawangling	36.09	63.08	59.62	69.28	36.75
	BW13	Bawangling	25.70	66.40	44.45	73.04	26.71
	BW14	Bawangling	36.06	81.14	75.24	89.02	46.30
	BW15	Bawangling	27.22	85.75	59.35	92.82	34.70
	BW16	Bawangling	36.76	87.14	79.51	95.68	47.30
	BW17	Bawangling	27.22	84.14	58.40	94.32	37.24
	BW18	Bawangling	22.85	84.25	48.11	92.70	29.09
	BW19	Bawangling	29.27	84.90	64.70	93.44	38.34
	BW20	Bawangling	25.91	84.34	55.44	92.68	33.62
	BW21	Bawangling	27.79	79.03	55.90	86.87	33.28
	BW22	Bawangling	26.37	85.71	57.78	94.23	34.41
	BW23	Bawangling	22.80	85.57	50.94	93.82	30.20

DZ1	Danzhou	26.71	85.31	58.42	93.65	34.68	
JF1	Jianfengling	26.25	86.31	56.46	94.74	35.05	
JF2	Jianfengling	29.80	68.13	52.58	74.79	32.57	
JF3	Jianfengling	30.61	85.05	64.52	93.64	39.72	
JF4	Jianfengling	33.99	60.47	53.32	66.40	33.02	
JF5	Jianfengling	26.73	76.68	52.78	84.53	31.42	
WZ1	Wuzhi	25.35	63.56	41.86	69.87	25.05	
<hr/>							
<i>H. reticulata</i>	GS1	Ganshiling	27.19	0.81	47.95	89.81	30.36
	GS2	Ganshiling	43.68	0.82	80.63	90.81	50.61
	GS3	Ganshiling	38.15	0.83	66.90	91.66	41.99
	GS4	Ganshiling	33.22	0.78	56.43	85.81	35.70
	GS5	Ganshiling	28.25	0.73	45.49	80.72	28.79
	GS6	Ganshiling	26.84	0.84	49.34	93.25	31.24
	GS7	Ganshiling	35.30	0.83	62.42	92.14	39.39
	GS8	Ganshiling	30.05	0.85	55.68	93.40	35.13
	GS9	Ganshiling	31.42	0.83	55.94	91.27	35.35
	GS10	Ganshiling	30.09	0.84	54.71	92.39	34.49
	GS11	Ganshiling	28.64	0.84	51.09	92.55	32.40
	GS12	Ganshiling	26.96	0.84	49.77	92.68	31.49
	GS13	Ganshiling	29.85	0.82	53.06	90.98	33.52
	GS14	Ganshiling	27.72	0.80	48.44	87.96	30.94
	GS15	Ganshiling	29.33	0.80	50.09	88.73	31.54
	GS16	Ganshiling	30.27	0.84	55.23	92.84	35.05
	GS17	Ganshiling	26.92	0.80	46.91	88.56	29.79
	GS18	Ganshiling	31.38	0.83	55.45	91.93	35.12
	GS19	Ganshiling	26.47	0.82	47.31	90.96	30.05
	GS20	Ganshiling	28.18	0.73	44.93	81.05	28.72

GS21	Ganshiling	44.62	0.82	77.39	90.66	48.58
GS22	Ganshiling	36.48	0.76	58.45	84.21	36.91
GS23	Ganshiling	25.22	0.79	44.50	87.57	28.32
GS24	Ganshiling	26.04	0.81	45.80	89.36	29.20
GS25	Ganshiling	27.35	0.78	44.52	85.90	28.50
GS26	Ganshiling	25.55	0.77	44.09	85.57	28.07
GS27	Ganshiling	26.06	0.66	37.87	73.10	24.34
GS28	Ganshiling	28.91	0.84	52.65	92.91	33.36
GS29	Ganshiling	29.15	0.80	50.70	88.88	32.23
GS30	Ganshiling	25.65	0.84	46.43	92.56	29.45
GS31	Ganshiling	26.03	0.80	45.47	88.65	28.84
GS32	Ganshiling	27.82	0.69	42.22	76.14	26.95

Supplementary Table 17. Categories of SNPs based on genome annotation. Upstream: SNP located within the 1Kb upstream region of a gene. Exonic: SNP located in an exon. Synonymous: SNP that did not caused change of encoded amino acid. Stop gain: SNP that caused encoded amino acid to become a stop codon. Stop loss: SNP that caused loss of a stop codon. Start loss: SNP that caused loss of a start codon. Non-synonymous: SNP that caused change of encoded amino acid. Intronic: SNP located in an intron. Splicing: SNP located in an alternative splicing site. Downstream: SNP located within the 1Kb downstream region of a gene. Upstream/Downstream: SNP that located within the 1Kb upstream region of a gene, at the same time, located within the 1Kb downstream region of another gene. Intergenic: SNP located in an intergenic region. Total: total number of SNPs.

Category		Number of SNPs in <i>H. hainanensis</i>	Number of SNPs in <i>H. reticulata</i>
The longest monoploid genome			
Upstream		207,657	299,880
Exonic	Stop gain	1,672	2,346
Exonic	Stop loss	351	361
Exonic	Start loss	272	332
Exonic	Non-synonymous	109,666	168,449
Intronic		362,658	563,231
Splicing		838	1,372
Downstream		186,002	274,106
Upstream/Downstream		22,165	27,259
Intergenic		1,942,417	2,995,481
Total		2,922,653	4,477,756
The longest two monoploid genomes			
	Upstream	102,324	179,170
Exonic	Stop gain	959	1,601
Exonic	Stop loss	198	235
Exonic	Synonymous	48,434	89,220
Exonic	Non-synonymous	60,174	107,962
Intronic		214,885	369,200
Splicing		518	944
Downstream		92,121	166,974
upstream/downstream		15,342	17,970
Intergenic		1,006,070	2,076,211
Total		1,582,562	3,028,610

Supplementary Table 18. Estimation of mutation rate for the genomes of *H. hainanensis* and *H. reticulata*.

	<i>H. hainanensis</i> vs. <i>H. reticulata</i>	<i>H. hainanensis</i> vs. <i>H. chinensis</i>	<i>H. reticulata</i> vs. <i>H. chinensis</i>
All fourfold degenerate sites	562034	920297	710925
Diverged fourfold degenerate sites	21841	33788	17475
Mutation rate (/site/generation)	1.06×10^{-8} (generation time setting as 15 years) 1.41×10^{-8} (generation time setting as 20 years) 2.11×10^{-8} (generation time setting as 30 years)		

Supplementary Table 19. Results of KEGG enrichment analysis for the 647 (in *H. hainanensis*) and 581 genes (in *H. reticulata*) with derived deleterious mutations (DDMs) and for the 407 (in *H. hainanensis*) and 300 genes (in *H. reticulata*) with derived major-effect mutations (DMEMs). Fisher's Chi-Square test was used to identify pathways with significant enrichment results. We only present the pathways with significant results in KEGG enrichment analysis.

Genes with DDMs				Genes with DMEMs			
KEGG pathway	Description	Gene number	P value	KEGG pathway	Description	Gene number	P value
<i>H. hainanensis</i>							
map00592	alpha-Linolenic acid metabolism	8	0.0035	map04145	Phagosome	6	0.0297
map00944	Flavone and flavonol biosynthesis	3	0.0097	map03410	Base excision repair	4	0.0397
map00020	Citrate cycle (TCA cycle)	6	0.0322	map00730	Thiamine metabolism	2	0.0484
map00591	Linoleic acid metabolism	3	0.0365				
map00051	Fructose and mannose metabolism	9	0.0457				
map00564	Glycerophospholipid metabolism	12	0.0484				
<i>H. reticulata</i>							
map01502	Vancomycin resistance	2	0.0015	map00944	Flavone and flavonol biosynthesis	2	0.0078
map00052	Galactose metabolism	10	0.0047	map03008	Ribosome biogenesis in eukaryotes	6	0.0203
map00970	Aminoacyl-tRNA biosynthesis	10	0.0063	map01502	Vancomycin resistance	1	0.0335
map01210	2-Oxocarboxylic acid metabolism	7	0.0196	map00052	Galactose metabolism	5	0.0419
map00053	Ascorbate and aldarate metabolism	5	0.0242				
map00565	Ether lipid metabolism	4	0.0350				

Supplementary Table 20. Results of KEGG enrichment analysis for the 195 (in *H. hainanensis*) and 195 genes (in *H. reticulata*) with the DDMs that were homozygous in at least one sampled tree and for the 175 (in *H. hainanensis*) and 150 genes (in *H. reticulata*) with DMEMs that were homozygous in at least one sampled tree. Fisher's Chi-Square test was used to identify pathways with significant enrichment results. We only present the pathways with significant results in KEGG enrichment analysis.

Genes with homozygous DDMs				Genes with homozygous DMEMs			
KEGG pathway	Description	Gene number	P value	KEGG pathway	Description	Gene number	P value
<i>H. hainanensis</i>							
map00500	Starch and sucrose metabolism	11	0.0044	map00950	Isoquinoline alkaloid biosynthesis	2	0.0307
map00591	Linoleic acid metabolism	2	0.0181	map00960	Tropane, piperidine and pyridine alkaloid biosynthesis	2	0.0370
map00592	alpha-Linolenic acid metabolism	3	0.0332	map00260	Glycine, serine and threonine metabolism	3	0.0395
map00940	Phenylpropanoid biosynthesis	5	0.0374	map00565	Ether lipid metabolism	2	0.0464
				map00562	Inositol phosphate metabolism	3	0.0476
<i>H. reticulata</i>							
map00052	Galactose metabolism	6	0.0012	map00944	Flavone and flavonol biosynthesis	2	0.0019
map00500	Starch and sucrose metabolism	10	0.0044	map00230	Purine metabolism	5	0.0228
map01502	Vancomycin resistance	1	0.0210	map00232	Caffeine metabolism	1	0.0375
map00942	Anthocyanin biosynthesis	1	0.0484				
map00460	Cyanoamino acid metabolism	3	0.0486				

Supplementary Table 21. Sampled tissues and types and data size of transcriptome sequencing for the prediction of gene models.

Species	Sampled tissue	Sequencing type	Sequencing data (Gb)
<i>H. hainanensis</i>	Roots, stems, leaves from seedlings; leaves, flowers of 3 different development stages and fruits of 5 different development stages from mature trees	Pacbio Iso-seq	46.26
	Flowers of 3 different development stages and fruits of 4 different development stages	Illumina RNA-seq	63.19
<i>H. reticulata</i>	Roots, stems, leaves from seedlings	Pacbio Iso-seq	34.54
<i>H. chinensis</i>	Leaves from one mature individual	Illumina RNA-seq	6.80
<i>P. chinensis</i>	Stems and leaves from one sapling	Illumina RNA-seq	20.76
<i>S. robusta</i>	Stems and leaves from one mature individual; stems and Leaves from several seedlings	Illumina RNA-seq	42.73
<i>D. turbinatus</i>	Leaves from one sapling	Illumina RNA-seq	10.62
<i>V. mangachapoi</i>	Stems and leaves from one mature individual	Illumina RNA-seq	21.47

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