



**Figure S1.** The information of pathogen (*Lophodermium piceae*). (a) The ascoma of *L. piceae* on the needle of *Picea asperata*; (b) The transverse section of *L. piceae* ascoma; (c) The ascospore of *L. piceae*; (d) The conidium of *L. piceae*. *L. piceae* characteristic sequence Genbank ID: KX573897.

**Table S1.** The details of the *Picea asperata* collection conditions on a forest farm of Erlang Mountain in Sichuan, China.

Time of collecting	Precipitation/Annual average	Humidity (%)	Altitude	Map coordinates (longitude and latitude)	Percentage of needles infected by <i>Lophodermium piceae</i> (%) / The growth rate of infected needles (%)		
					Healthy <i>P. asperata</i>	Infected <i>P. asperata</i>	<i>P.</i>
2018.05.25	625.18 mm	64	2830.00 m	N:	0/0	45 ± 0.08/0	
2018.07.26		47		25°51'34.66"	0/0	52 ± 0.06/15.56	
2018.09.25		51		E:	0/0	68 ± 0.11/30.77	
2018.11.27		60		102°16'30.96"	0/0	76 ± 0.18/11.76	

1 GAGGAGTTCAGGACAGGAACAAGAATTCAGAATTCAACTGCCCTGCCCTGCTCTGCTCTGATCTTCTAGTTGCTCTGCTCA  
91 ATTCCTGAATAGCTCAGTTTGTCTTTTTGATCGTTGCAAGCACAGAAAT**ATGGTTG**CAGCTGCAGCAGAAATGACACAGACCAATGAAG  
M V A A A A E M T Q T N E  
181 TTCAACAAGTTAAAAGCACTGGGCTGTGCACGGGCTCAGCTCGTCTCCAGCGATCCACTGAACTGGATCCGAGCAGCAAAGGCCATGG  
14 V Q Q V K S T G L C T G F S S S S S D P L N W I R A A K A M  
271 AAGGCAGCCACTTTGAAGAAGTGAACAGATGGTGGATTCATATTTTGAATCCAAGGAGATTTTCATTGAAGGAAAACTCTGACTATTG  
44 E G S H F E E V K T M V D S Y F E S K E I F I E G K T L T I  
361 CTGATGTTACTGCTGTTGCTCGAAGATCGCAGGTGAAAGTGAATGGATGCTGCGGCCCAAACTAGGGTTGAGGAGAGCTCAAAC  
74 A D V T A V A R R S Q V K V K L D A A A A K S R V E E S S N  
451 GGGTCTTACCCAGATGACCAAGGGAACGACACATATGGGTTACAACCGGATTCGAGCCACTTCTCACAGGAGAACCAAGCCAGGGAG  
104 W V L T Q M T K G T D T Y G V T T G F G A T S H R R T N Q G  
541 CCGAGCTTCAGAAGGAGTGATTGTTTCTGAATGCCGGAGTCTTGGCAAATGCCAAGACAATGTTCTGTCGAGGACACCACCCGAG  
134 A E L Q K E L I R F L N A G V L G K C Q D N V L S E D T T R  
631 CTGCCATGCTTGTGCGCAGAACTCTGCTGCAGGGCTACTCGGGATAAGATGGGACATTCTGAAACTGTGGAGAAGCTGTTGAATG  
164 A A M L V R T N T L L Q G Y S G I R W D I L E T V E K L L N  
721 CTGGGCTTACGCCAAGCTGCCTTAAGAGGAACCATCTGCTTCTGGTGATCTGGTGCCCTTATCTTATATGCTGGGCTCTGACTG  
194 A G L T P K L P L R G T I T A S G D L V P L S Y I A G L L T  
811 GGAGACCTAATTCAGAGTCCGATCCAGAGATGGAAACAGAAATGAGCGGAGCTGAAGCGCTCAAGAAAGTCCGGCTGGAGAAGCCATTTG  
224 G R P N S R V R S R D G T E M S G A E A L K K V G L E K P F  
901 AATTGCAGCTAAGGAAGGTCTGGCCATTGCAATGGCACTTCACTGGGAGCAGCACTGGCTCCATTGCTGTTTCGATGCCAATGTC  
254 E L Q P K E G **L A I V** **N G** T S V G A A L A S I V C F D A N V  
991 TTGCTTGTCTCTGAAGTAATCTCGGCCTTGTCTCGAAGTATGAACGGGAAGCCTGAGTTTACAGATCCATTAAGTACCAAGCTGA  
284 L A L L S E V I S A L F C E V M N G K P E F T D P L T H K L  
1081 AGCACCACCCCGCAAATGGAAGCCGAGCGATCGAGTATGCTTGGACGGGAGTCTTATATGAAACATGCTGCTAAGCTTCATG  
314 K H H P G Q M E A A A I M E Y V L D G S S Y M K H A A K L H  
1171 AGATGAATCCTCCAGAAGCCCAAGCAGGATCGCTATGCGCTTCGCACTTCGCCCAATGGCTCGGCCCTCAGGTCGAGGTAATCAGAT  
344 E M N P L Q K P K Q D R Y A L R T S P Q W L G P Q V E V I R  
1261 CTGCAACGCATATGATCGAGAGGGAATCAATCTGTGAACGACAATCCAGTAATGATGTTGCCAGAGACCTAGCTCTGCACGGAGGGA  
374 S A T H M I E R E I N S V **N D N** P V I D V A R D L A L **H** G G  
1351 ATTTCAAGGCACGCTATTGGTGTCTCGATGGATAATCTCGTCTGGCGATTTCAGCAATGGGAGATTGATGTTTCGCTCAATTCGG  
404 N F Q G T P I G V S M D N L R L A I S A I G R L M F A D A N V  
1441 AGCTTGTGAATGATTACTACAATGGAGGCTTGCCTTGAATCTAAGTGGCGGGCTAATCCTAGCCTGGATTATGATTGAAAGGCGCTG  
434 E L V N D Y Y N G G L P S N L S G G P N P S L D Y G L K G A  
1531 AGATCGCCATGGCTTCTTATACTTCTGAGCTTCTTACCTGGCGAATCCGGTACCAGCCATGTACAGAGCCGAGCAGCATAACCAGG  
464 E I A M A S Y T S E L L Y L A N P V T S H V Q S A E Q **H N Q**  
1621 ACGTGAATCTCTGGGCTTATCTCGGCTAGAAAATCTGCCGTGGCTGTGATATTCTGAAGCTTATGCTATCCACATACCTGACAGCGT  
494 **D V** N S L G L I S A R K S A V A V D I L K L M L S T Y L T A  
1711 TGTGCAAGCTGTGGATTTAAGGCATCTGGAGGAAAACATGCTGCCACAGTGAAGCAGATTGTTTCTCAAGTAGCCAAAGAAAACCCGTA  
524 L C Q A V D L R H L E E N M L A T V K Q I V S Q V A K K T L  
1801 GCATGGACTCAACGGGAGCTTTTACCAGGCCGTTTTCGCGAAAAGGATTTGCTTCAGATAGTCGATAACGAGCATGTTTCTCCTACA  
554 S T G L N G E L L P G R F C E K D L L Q I V D N E H V F S Y  
1891 TCGAGATCCCTGCAATGCCAGCTACCCTTGAAGTCTGAGGAACTGAGGAACTGCTTGTGCAACACGCCCTCAAGAACACGGACCGTGAGA  
584 I D D P C N A S Y P L T Q K L R N V L V E H A F K N T D G E  
1981 AAGATCCCAACACTTCCATTTTCAACAAGATCACTCTGTTGCAAGCCGAGCTGAAAACACAGCTTGAATTGCAAGTAACTGTCGAGAG  
614 K D P N T S I F N K I T L F E A E L K T Q L E L Q V N L A R  
2071 AGAGTTATGATAAAGGGATCAGCCCTCTGCCAACAGATCCAGGAATGCAGGTCCTATCCTCTATGAATTCGTGAGAACCCAGCTCG  
644 E S Y D K G I S P L P N R I Q E C R S Y P L Y E F V R T Q L  
2161 GTACTAAGCTTCTGCTGGAAGTCTGGACCACTTCCCTGGTGAAGTATTGAATGGTTTACGACGCCATTAGTGGAGCAAGATCATAG  
674 G T K L L S G T R T T S P G E V I E L V Y D A I S E D K I I  
2251 GCCCTCTTGAATGCGTGGAGGGTGAAGGCAACGCCCTGGTCCATTCTGA  
704 G P L L K C V E G W K A T P G P F \*

**Figure S2.** Nucleotide sequence and the deduced amino acid sequence of the *PaPAL* gene. The start codon and stop codon are indicated by bold font and an asterisk, respectively. The phenylalanine and histidine ammonia-lyase signature sequence is underlined. The deamination sites are shaded in grey. The catalytic active sites are shown in boxes.