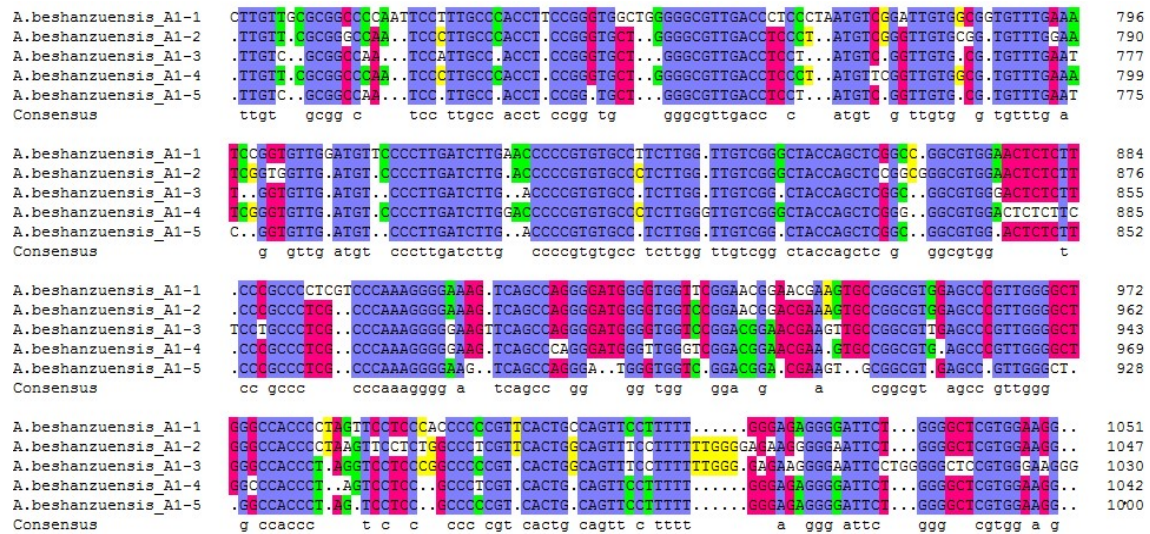
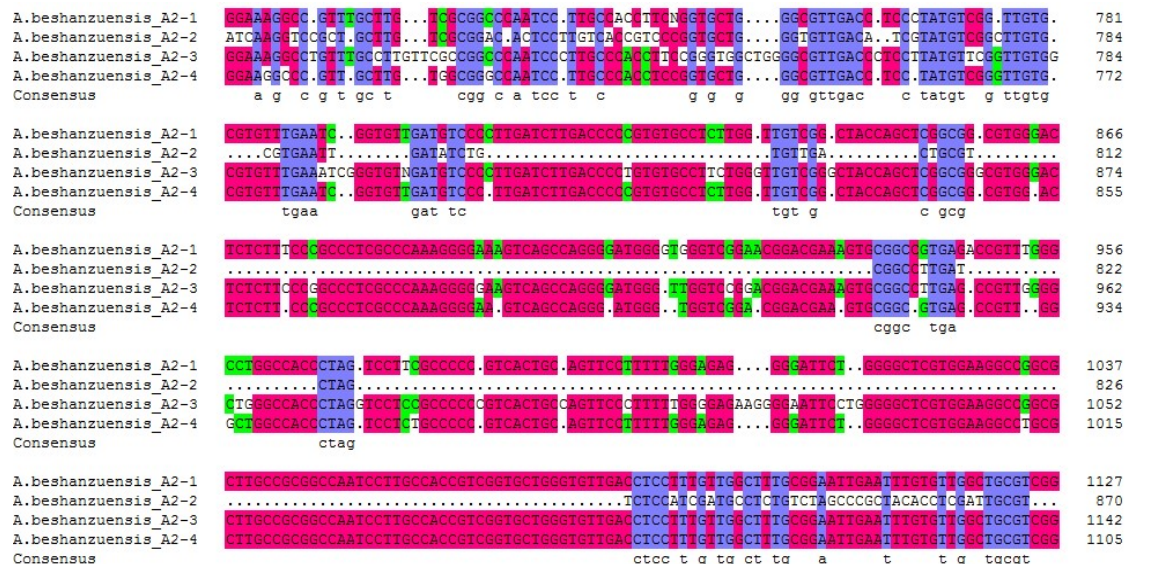


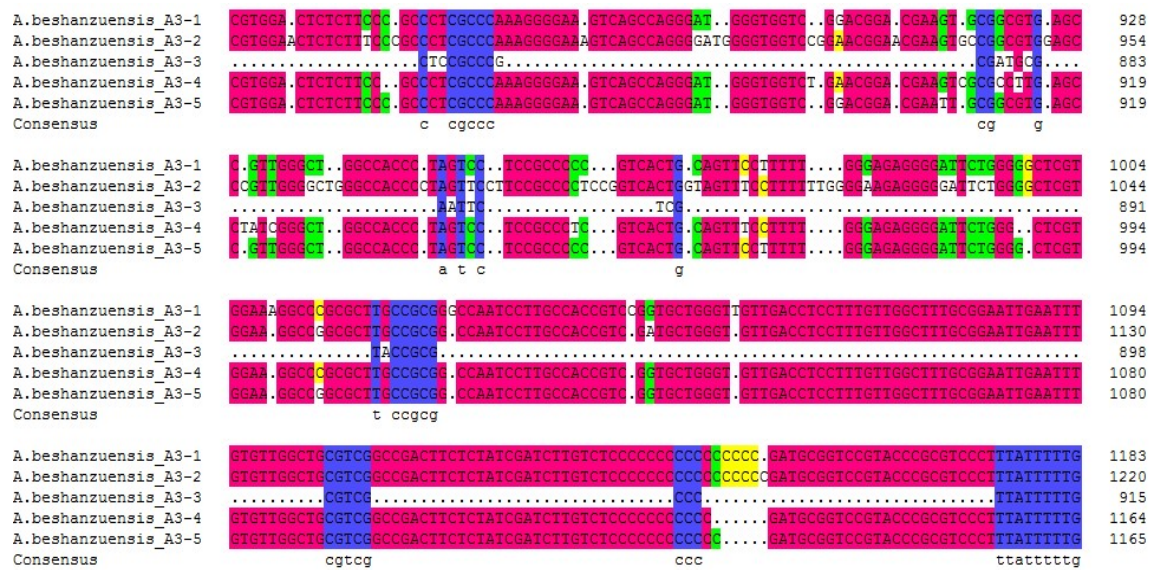
## Supplementary materials for Figures/Table



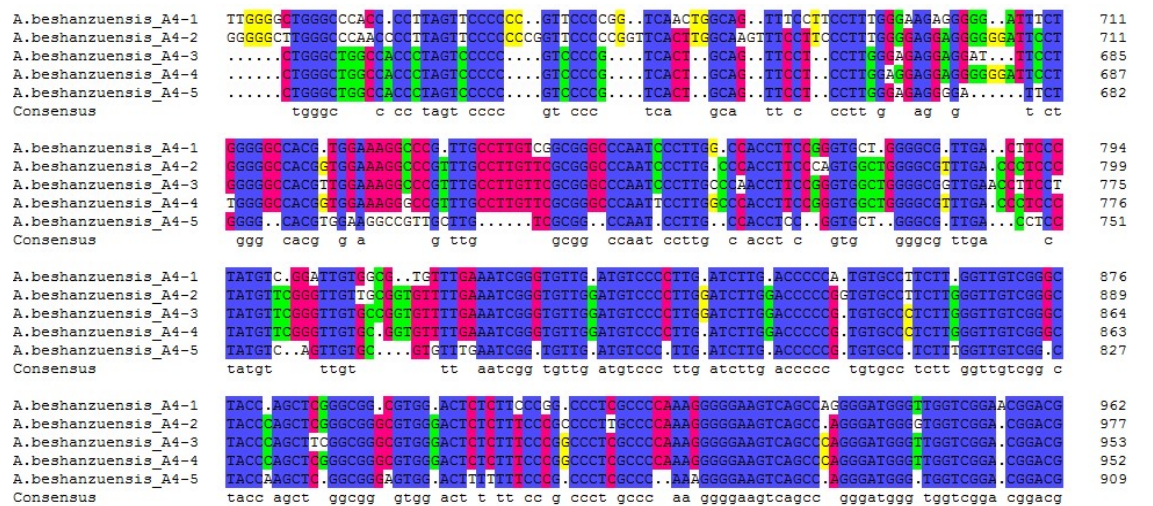
**Figure S1.1** Multiple sequences alignment of ITS1-5.8S-ITS2 from 5 clones from *A.beshanzuensis* A1 (Local representation)



**Figure S1.2** Multiple sequences alignment of ITS1-5.8S-ITS2 from 4 clones from *A.beshanzuensis* A2 (Local representation)



**Figure S1.3** Multiple sequences alignment of ITS1-5.8S-ITS2 from 5 clones from *A. beshanzuensis* A3 (Local representation)



**Figure S1.4** Multiple sequences alignment of ITS1-5.8S-ITS2 from 5 clones from *A. beshanzuensis* A4 (Local representation)



A.fanjingshanensis1. C.ACCCT.AGTCCCCGGTCCCGGTTCACTGGCAGTTTCCTTCCTGSHAGGAGGGGATTCTGGGGCACGTGGAAAGGCCCGTTTG 716  
 A.fanjingshanensis1.2 CCACCCCT.AGTTCCCCCTGTTCCCGTTCACTGGCAGTTCC...TCCTTTGGGAGAGGGGATTCTGGGGCACGTGGAAAGGCCCGTTTG 713  
 A.fanjingshanensis1.3 CCACCCCT.AGTTCCCCCTGTTCCCGTTCACTGGCAGTTCC...TCCTTTGGGAGAGGGGATTCTGGGGCACGTGGAAAGGCCCGTTTG 707  
 A.fanjingshanensis1.4 CCACCCCTAGTCCCCGGTACCGGGCACTGGCAGTTTCCTTTGGGAGAGGGGATTCTGGGGCACGTGGAAAGGCCCGTTTG 715  
 A.fanjingshanensis1.5 C.ACCCT.AGT.CCCCCTGTCGG...TCCTGGGAGAGTTGGGATTCTGGGGCACGTGGAAAGGCCCGTTTG 709  
 Consensus c accct agt cccc gt ccc actg cagtt c c t gg gag gg att ggg caggtg a g cggtt g

A.fanjingshanensis1. CTGTG.CCGGGCCCAATCCCTTGGCC.CCTCCGGGTCCTGGGGCGTTGACCTT.CCTATGTC.CCGTTGTG.CGTGTTT.GAA.TCAG 799  
 A.fanjingshanensis1.2 CTGTG.C.CGGGCCAATCCCTTGGCC.CCTCCGGGTCCTGGGGCGTTGACCTT.CCTATGTC.CG.TTGTG.CGTGTTT.GAA.TCAG 789  
 A.fanjingshanensis1.3 CTGTG...CGGGCCAA...TCCTTGGCA...CCTCCGGTGTCT...GGGCGTTGACCTT.CCTATGTC...CGTTGTG.CGTGTTT.GAA.TCAG 783  
 A.fanjingshanensis1.4 CTGTG.C.CGGGCCAATCCCTTGGCC.CCTCCGGGTCCTGGGGCGTTGACCTT.CCTATGTC.CG.TTGTG.CGTGTTT.GAA.TCAG 792  
 A.fanjingshanensis1.5 CTGTGTGTCGGGCCCAATCCCTTGGCC.CCTCCGGGTCCTGGGGCGTTGACCTT.CCTATGTC.CGTTGTG.CGTGTTT.GAA.TCAG 799  
 Consensus ct g cgg c a c t c c tccgg gg cgttgacc cctatgt g ttgtgc gtgttt gaa tc g

A.fanjingshanensis1. GTGTT.GATGTCCCTTG.ATCTTGACCCCG.GTGTGCCCTCT...GGTTGTC.GGCTACCAGCT.CGG.CGGCGTGGAA...TCTCTTCC 878  
 A.fanjingshanensis1.2 .GTGTT.GATGTCCC.TTG.ATCTTGACCCCG..GTGTGCCCTCT...GGTTGTC.GGCTACCAGCT.CGG.CGGCGTGGAA...TCTCTTCC 865  
 A.fanjingshanensis1.3 GTGTTT.GATGTCCCTTG.ATCTTGACCCCG.GTGTGCCCTCTTG.GGTTGTC.GGCTACCAGCTTGGGGGGCGTGGAACTCTCTTCC 871  
 A.fanjingshanensis1.4 GTGTT.GATGTCCC.CTG.ATCTTGACCCCG..GTGTGCCCTCT...GGTTGTC.GGCTACCAGCT.CGG.CGGCGTGGAA...TCTCTTCC 869  
 A.fanjingshanensis1.5 GTGTTT.GATGTCCCTTG.ATCTTGACCCCG.GTGTGCCCTCTTG.GGTTGTC.GGCTACCAGCTTGGG.CGGCGTGGAA...TCTCTTCC 886  
 Consensus tgtt gatgtccc tg atcttg ccc gtgtgcc ggttgtc ggctaccagct cgg cggcggtgga ttcc

A.fanjingshanensis1. CGCCC...TTTCCCAAGGGGAAGTCAG..CCAGGGAA...GGTGGT...GGACGGAC...GAAGTGC..GGCGTGA...CCGTTGGG. 951  
 A.fanjingshanensis1.2 CGCCC...TTTCCCAAGGGGAAGTCAG..CCAGGGAA...GGTGGT...GGACGGAC...GAAGTGC..GGCGTGA...CCGTTGGG. 939  
 A.fanjingshanensis1.3 CGCCCCCTTTCCCAAGGGGAAGTCAGCCAGGGGAATGGGGTGGTTCGACACGGACGAAAGTGCCGGCGTGAAGCCCGTTTGGG 961  
 A.fanjingshanensis1.4 CGCCC...TTTCCCAAGGGGAAGTCAG..CCAGGGAA...GGTGGT...GGACGGAC...GAAGTGC..GGCGTGA...CCGTTGGG. 942  
 A.fanjingshanensis1.5 CGCCC..TCGCCCAAGGGGAAGTCAG..CCAGGGAA...GGTGGT...GGACGGAC...GAAGTGC..GGCGTGA...CCGTTGGG. 961  
 Consensus cgccc cc aa ggggaagtc ccagggga ggggtgg g acgga aagtg c ggcgtga ccgtt g

**Figure S1.5** Multiple sequences alignment of complete ITS fragment from 5 clones from *A. fanjingshanensis* (Local representation)

## Supplementary materials for Table

**Table S1.** The ITS regions features of *A.beshanzuensis* and other *Abies* species.

| Sample<br>Name                       | ITS1-5.8S-ITS2  |        | ITS1            |        | 5.8S            |        | ITS2            |        | ITS2<br>energy |
|--------------------------------------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|----------------|
|                                      | % GC<br>content | length | % GC<br>content | length | % GC<br>content | length | % GC<br>content | length |                |
| <i>A.beshanzuensis</i> A1-1          | 59.81           | 1717   | 60.37           | 1312   | 51.23           | 162    | 62.55           | 243    | -98.3          |
| <i>A.beshanzuensis</i> A1-2          | 59.95           | 1708   | 60.48           | 1303   | 51.23           | 162    | 62.96           | 243    | -101           |
| <i>A.beshanzuensis</i> A1-3          | 59.31           | 1698   | 59.94           | 1293   | 51.23           | 162    | 61.32           | 243    | -98.3          |
| <i>A.beshanzuensis</i> A1-4          | 60.23           | 1705   | 60.85           | 1300   | 51.23           | 162    | 62.96           | 243    | -103.4         |
| <i>A.beshanzuensis</i> A1-5          | 59.89           | 1668   | 60.57           | 1263   | 51.23           | 162    | 62.14           | 243    | -96.4          |
| <i>A.beshanzuensis</i> A2-1          | 59.39           | 1694   | 59.89           | 1289   | 51.23           | 162    | 62.14           | 243    | -96.4          |
| <u><i>A.beshanzuensis</i> A2-2</u>   | 56.77           | 1411   | 56.86           | 1006   | 49.38           | 162    | 61.32           | 243    | -99.7          |
| <i>A.beshanzuensis</i> A2-3          | 60.04           | 1709   | 60.66           | 1304   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> A2-4          | 59.76           | 1675   | 60.39           | 1270   | 51.23           | 162    | 62.14           | 243    | -101.4         |
| <i>A.beshanzuensis</i> A3-1          | 60.17           | 1682   | 60.85           | 1277   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> A3-2          | 59.80           | 1719   | 60.50           | 1314   | 51.23           | 162    | 61.73           | 243    | -99.4          |
| <u><i>A.beshanzuensis</i> A3-3</u>   | 58.53           | 1418   | 58.97           | 1014   | 50.62           | 162    | 61.98           | 242    | -80.5          |
| <i>A.beshanzuensis</i> A3-4          | 59.41           | 1663   | 59.86           | 1258   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> A3-5          | 59.86           | 1664   | 60.44           | 1259   | 51.23           | 162    | 62.55           | 243    | -96.4          |
| <u><i>A.beshanzuensis</i> A4-1</u>   | 59.73           | 1748   | 60.16           | 1343   | 51.85           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> A4-2          | 60.00           | 1755   | 60.67           | 1350   | 51.23           | 162    | 62.14           | 243    | -96.4          |
| <u><i>A.beshanzuensis</i> A4-3</u>   | 59.87           | 1717   | 60.59           | 1312   | 50.62           | 162    | 62.14           | 243    | -101.4         |
| <i>A.beshanzuensis</i> A4-4          | 60.19           | 1723   | 60.85           | 1318   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> A4-5          | 59.50           | 1669   | 59.97           | 1264   | 51.23           | 162    | 62.55           | 243    | -99.2          |
| <i>A.beshanzuensis</i> B2            | 59.65           | 1663   | 60.25           | 1258   | 51.23           | 162    | 62.14           | 243    | -96.4          |
| <i>A.beshanzuensis</i> C2-1          | 59.93           | 1662   | 60.54           | 1257   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <u><i>A.beshanzuensis</i> C2-2</u>   | 59.50           | 1721   | 59.95           | 1316   | 50.62           | 162    | 62.96           | 243    | -103.4         |
| <i>A.beshanzuensis</i> C4            | 60.11           | 1697   | 59.59           | 1257   | 50.62           | 162    | 62.55           | 243    | -82.7          |
| <u><i>A.beshanzuensis</i> C8</u>     | 56.89           | 1663   | 57.87           | 1258   | 45.06           | 162    | 59.67           | 243    | -82.5          |
| <i>A.beshanzuensis</i> D1-1          | 59.93           | 1662   | 60.76           | 1292   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <u><i>A.beshanzuensis</i> D1-2</u>   | 58.51           | 1427   | 58.74           | 1018   | 51.81           | 166    | 62.14           | 243    | -82.6          |
| <i>A.beshanzuensis</i> D4            | 59.87           | 1677   | 60.38           | 1272   | 51.23           | 162    | 62.96           | 243    | -101           |
| <i>A.beshanzuensis</i> D8-1          | 59.84           | 1703   | 60.40           | 1298   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> D8-2          | 58.23           | 1695   | 58.45           | 1290   | 51.23           | 162    | 61.73           | 243    | -99            |
| <i>A.beshanzuensis</i> D8-3          | 57.78           | 1670   | 57.87           | 1265   | 51.23           | 162    | 61.73           | 243    | -99            |
| <u><i>A.beshanzuensis</i> D8-4</u>   | 58.63           | 1448   | 59.06           | 1043   | 50.62           | 162    | 62.14           | 243    | -96.4          |
| <i>A.beshanzuensis</i> E5            | 58.94           | 1661   | 59.32           | 1256   | 51.23           | 162    | 62.14           | 243    | -101.7         |
| <u><i>A.beshanzuensis</i> E21-1</u>  | 59.93           | 1672   | 60.62           | 1267   | 50.00           | 162    | 62.96           | 244    | -101.3         |
| <i>A.beshanzuensis</i> E21-2         | 59.55           | 1728   | 59.94           | 1323   | 51.85           | 162    | 62.55           | 243    | -101.5         |
| <i>A.beshanzuensis</i> E21-3         | 59.82           | 1695   | 60.39           | 1290   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.firma</i> 1                     | 59.02           | 1669   | 59.41           | 1264   | 51.23           | 162    | 62.14           | 243    | -99.2          |
| <i>A.firma</i> 2                     | 59.33           | 1689   | 59.66           | 1284   | 51.23           | 162    | 62.96           | 243    | -104.2         |
| <i>A.chensiensis</i> a1              | 59.64           | 1665   | 60.08           | 1260   | 51.85           | 162    | 62.55           | 243    | -101.5         |
| <i>A.chensiensis</i> a2              | 59.62           | 1669   | 60.21           | 1264   | 51.23           | 162    | 62.14           | 243    | -96.4          |
| <i>A.chensiensis</i> a3              | 59.04           | 1675   | 59.53           | 1270   | 50.62           | 162    | 62.14           | 243    | -99.9          |
| <i>A.chensiensis</i> b1              | 59.83           | 1678   | 60.41           | 1273   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.chensiensis</i> b2              | 59.77           | 1663   | 60.25           | 1258   | 51.23           | 162    | 62.96           | 243    | -103.4         |
| <i>A.yuanbaoshanensis</i> 1          | 59.50           | 1664   | 60.05           | 1259   | 51.23           | 162    | 62.14           | 243    | -100.3         |
| <i>A.yuanbaoshanensis</i> 2          | 59.81           | 1682   | 60.38           | 1277   | 51.85           | 162    | 62.14           | 243    | -100.3         |
| <i>A.yuanbaoshanensis</i> 3          | 59.39           | 1699   | 59.81           | 1294   | 51.23           | 162    | 62.55           | 243    | -101.5         |
| <i>A.fanjingshanensis</i> 1-1        | 59.92           | 1694   | 60.51           | 1289   | 51.23           | 162    | 62.55           | 243    | -102.2         |
| <i>A.fanjingshanensis</i> 1-2        | 59.76           | 1685   | 60.39           | 1280   | 51.23           | 162    | 62.14           | 243    | -100.3         |
| <i>A.fanjingshanensis</i> 1-3        | 59.38           | 1701   | 59.88           | 1296   | 51.23           | 162    | 62.14           | 243    | -100.3         |
| <i>A.fanjingshanensis</i> 1-4        | 59.55           | 1681   | 60.11           | 1276   | 51.23           | 162    | 62.14           | 243    | -100.3         |
| <u><i>A.fanjingshanensis</i> 1-5</u> | 59.94           | 1705   | 60.54           | 1300   | 51.23           | 162    | 62.55           | 243    | -100.3         |

|                                          |       |      |       |      |       |     |       |     |        |
|------------------------------------------|-------|------|-------|------|-------|-----|-------|-----|--------|
| <i>A.squamata1</i> (JF416983.1)          | 59.14 | 1625 | 60.00 | 1255 | 50.00 | 162 | 61.06 | 208 | -78.8  |
| <i>A.chensiensis</i> (EF057702.1)        | 59.96 | 1661 | 60.59 | 1256 | 51.23 | 162 | 62.55 | 243 | -100.2 |
| <i>A.cilicica</i> (EF057698.1)           | 58.49 | 1660 | 59.12 | 1255 | 51.23 | 162 | 60.08 | 243 | -90    |
| <i>A.cephalonica</i> (EF057697.1)        | 58.76 | 1661 | 59.32 | 1256 | 51.23 | 162 | 60.91 | 243 | -98.2  |
| <i>A.procera</i> (EF057696.1)            | 59.12 | 1656 | 59.63 | 1251 | 51.23 | 162 | 61.32 | 243 | -94.2  |
| <i>A.magnifica</i> (EF057695.1)          | 59.06 | 1656 | 59.63 | 1251 | 51.23 | 162 | 61.32 | 243 | -92    |
| <i>A.concolor</i> (EF057692.1)           | 58.18 | 2212 | 58.38 | 1807 | 51.23 | 162 | 61.32 | 243 | -98.4  |
| <i>A.grandis</i> (EF057690.1)            | 58.15 | 2215 | 58.29 | 1810 | 51.23 | 162 | 61.73 | 243 | -103   |
| <i>A.mariesii</i> (EF057689.1)           | 59.64 | 1655 | 60.40 | 1250 | 51.23 | 162 | 61.32 | 243 | -99    |
| <i>A.amabilis</i> (EF057688.1)           | 59.42 | 1656 | 60.19 | 1251 | 51.23 | 162 | 60.91 | 243 | -92.4  |
| <i>A.ziyuanensis</i> (JF416985.1)        | 59.61 | 1624 | 60.40 | 1255 | 51.85 | 162 | 60.87 | 207 | -79.1  |
| <i>A.squamata2</i> (JF416981.1)          | 58.83 | 1625 | 59.60 | 1255 | 51.23 | 162 | 60.10 | 208 | -78.8  |
| <u><i>A.spectabilis</i></u> (JF416978.1) | 59.57 | 1625 | 60.32 | 1255 | 51.85 | 162 | 61.06 | 208 | -75.6  |
| <i>A.sibirica</i> (JF416977.1)           | 59.14 | 1598 | 60.02 | 1228 | 51.23 | 162 | 60.10 | 208 | -73.8  |
| <i>A.firma</i> (JF416975.1)              | 59.24 | 1624 | 59.89 | 1254 | 51.23 | 162 | 61.06 | 208 | -82.7  |
| <i>A.fargesii</i> (JF416972.1)           | 59.53 | 1626 | 60.43 | 1256 | 51.23 | 162 | 60.58 | 208 | -77.5  |
| <i>A.fanjingshanensis</i> (JF416971.1)   | 59.35 | 1626 | 60.19 | 1256 | 51.23 | 162 | 60.58 | 208 | -80.6  |
| <i>A.fabri</i> (JF416968.1)              | 59.48 | 1624 | 60.32 | 1255 | 50.93 | 161 | 61.54 | 208 | -78.8  |
| <i>A.sachalinensis</i> (JF499945.1)      | 58.89 | 1603 | 59.61 | 1233 | 51.23 | 162 | 60.58 | 208 | -76.3  |
| <i>A.koreana</i> (JF499944.1)            | 58.90 | 1596 | 59.71 | 1226 | 50.62 | 162 | 60.58 | 208 | -76.3  |
| <u><i>A.kawakamii</i></u> (EF063715.1)   | 59.25 | 1659 | 59.81 | 1254 | 50.62 | 162 | 62.14 | 243 | -100.2 |
| <i>A.delavayi</i> (EU196133.1)           | 59.37 | 1654 | 60.05 | 1249 | 51.23 | 162 | 61.32 | 243 | -96.9  |
| <u><i>A.forrestii</i></u> (EF057708.1)   | 59.40 | 1655 | 59.92 | 1250 | 51.23 | 162 | 62.14 | 243 | -97.8  |
| <u><i>A.pindrow</i></u> (EU196130.1)     | 58.88 | 1661 | 59.12 | 1255 | 51.23 | 162 | 62.70 | 244 | -100.7 |
| <i>A.religiosa</i> (EF063714.1)          | 58.47 | 2215 | 58.67 | 1810 | 51.85 | 162 | 61.32 | 243 | -79.7  |
| <i>A.bracteata</i> (EF057713.1)          | 58.67 | 1689 | 59.19 | 1284 | 51.23 | 162 | 60.91 | 243 | -89.4  |

Notes: The bold sample indicated its ITS sequence were retrieved from NCBI database, and the underlined samples indicated its ITS was identified as pseudogenes in this study. The available ITS sequences in this study referred to GenBank MH177277-MH177291.