Method: phylogenetic analysis

We searched for species of the *Lonicera* genus from the National Center for Biotechnology Information (NCBI), obtaining 199 species in the process. The classification of these species was based on the Chinese flora (<http://www.iplant.cn/frps>). *Lonicera litangensis / Lonicera oresbia*, *Lonicera webbiana / Lonicera tatsienensis / Lonicera heteroloba*, *Lonicera acuminata / Lonicera henryi / Lonicera giraldii / Lonicera alseuosmoides*; these 9 plants belong to the 3 species according to the book, Chinese Flora. Thus, a total of 192 species were obtained (Table S1). There were 42 species whose complete chloroplast genomes were obtained from the NCBI database and used for the phylogenetic analysis, incorporating 4 sequences from *Lonicera Sect. Coeloxylosteum*, 20 sequences from *Lonicera Sect. Isika*, 2 sequences from *Lonicera Sect. Isoxylosteum*, 11 sequences from *Lonicera Sect. Nintooa*, 1 sequence from *Subsect. Lonicera*, while 4 sequences could not linked to any specific subgenus.

We generated alignments via Multiple Alignment using Fast Fourier Transform

(MAFFT) version 7.037. We used Molecular Evolutionary Genetics Analysis (MEGA) software (version 11) for species tree estimation, with Maximum likelihood analysis using Tamura-Nei model with 1000 bootstrap replicates.

Table S1. 192 species of the *Lonicera* genus and GeneBank used for phylogenetic analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| **Gene Bank** | ***Lonicera*** | ***subgenera*** | ***section*** |
| MW242826.1 | *Lonicera chrysantha* | *Chamaecerasus* | *Coeloxylosteum* |
| MW296954.1 | *Lonicera ruprechtiana* | *Chamaecerasus* | *Coeloxylosteum* |
| MW340876.1 | *Lonicera tatarica* | *Chamaecerasus* | *Coeloxylosteum* |
| MW784237.1  | *Lonicera maackii* | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera cf. tatarica* var. morrowii JCR-2019 | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera chrysantha* var. crassipes | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera prostrata* | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera tatarica* var. micrantha | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera tatarica* var. morrowii | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera trichosantha* | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera trichosantha* var. trichosantha | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera deflexicalyx* | *Chamaecerasus* | *Coeloxylosteum* |
| Not retrieved | *Lonicera koehneana* | *Chamaecerasus* | *Coeloxylosteum* |
| MG738668.1 | *Lonicera stephanocarpa* | *Chamaecerasus* | *Isika* |
| MG738669.1 | *Lonicera fragrantissima* var. lancifolia | *Chamaecerasus* | *Isika* |
| MH028740.1 | *Lonicera praeflorens* | *Chamaecerasus* | *Isika* |
| MH028742.1 | *Lonicera sachalinensis* | *Chamaecerasus* | *Isika* |
| MH028743.1 | *Lonicera vesicaria* | *Chamaecerasus* | *Isika* |
| MH681655.1 | *Lonicera oblata* | *Chamaecerasus* | *Isika* |
| MK176510.1 | *Lonicera nervosa* | *Chamaecerasus* | *Isika* |
| MN524603.1 | *Lonicera elisae* | *Chamaecerasus* | *Isika* |
| MN524604.1 | *Lonicera ferdinandi* | *Chamaecerasus* | *Isika* |
| MN524605.1 | *Lonicera hispida* | *Chamaecerasus* | *Isika* |
| MN524606.1 | *Lonicera tatarinowii* | *Chamaecerasus* | *Isika* |
| MN986996.1 | *Lonicera maximowiczii* | *Chamaecerasus* | *Isika* |
| MZ516971.1 | *Lonicera fragrantissima* | *Chamaecerasus* | *Isika* |
| MZ962399.1 | *Lonicera tangutica* | *Chamaecerasus* | *Isika* |
| OL457164.1 | *Lonicera gynochlamydea* | *Chamaecerasus* | *Isika* |
| OM141002.1 | *Lonicera modesta* var. lushanensis | *Chamaecerasus* | *Isika* |
| ON968694.1 | *Lonicera ligustrina* | *Chamaecerasus* | *Isika* |
| OP345475.1 | *Lonicera caerulea* var. edulis | *Chamaecerasus* | *Isika* |
| OP388441.1 | *Lonicera szechuanica* | *Chamaecerasus* | *Isika* |
| OP936076.1 | *Lonicera microphylla* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera altmannii* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* subsp. stenantha | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* var. altaica | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* var. dependens | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* var. emphyllocalyx | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* var. kamtschatica | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera caerulea* var. pallasii | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera cyanocarpa* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera graebneri* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera hemsleyana* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera humilis* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera hypoleuca* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera inconspicua* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera lanceolata* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera ligustrina* var. pileata | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera litangensis / Lonicera oresbia* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera modesta* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera nigra* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera semenovii* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera serreana* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera setifera* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera subhispida* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera sublabiata* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera tatarinowii* var. leptantha | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera webbiana / Lonicera tatsienensis / Lonicera heteroloba* | *Chamaecerasus* | *Isika* |
| Not retrieved | *Lonicera ligustrina* var. yunnanensis / Lonicera nitida | *Chamaecerasus* | *Isika* |
| MK970580.1 | *Lonicera angustifolia* var. myrtillus | *Chamaecerasus* | *Isoxylosteum* |
| OL839915.1 | *Lonicera rupicola* var. syringantha | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera angustifolia* | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera rupicola* | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera rupicola* subsp. rupicola | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera rupicola* subsp. syringantha | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera spinosa* | *Chamaecerasus* | *Isoxylosteum* |
| Not retrieved | *Lonicera tomentella* | *Chamaecerasus* | *Isoxylosteum* |
| MW795592.1 | *Lonicera fulvotomentosa* | *Chamaecerasus* | *Nintooa* |
| MN524602.1 | *Lonicera confusa* | *Chamaecerasus* | *Nintooa* |
| MW186761.1 | *Lonicera hypoglauca* | *Chamaecerasus* | *Nintooa* |
| MW493344.1 | *Lonicera macranthoides* | *Chamaecerasus* | *Nintooa* |
| MW970104.1 | *Lonicera similis* | *Chamaecerasus* | *Nintooa* |
| MZ241298.1 | *Lonicera pampaninii* | *Chamaecerasus* | *Nintooa* |
| MZ779026.1 | *Lonicera japonica* | *Chamaecerasus* | *Nintooa* |
| MZ901373.1 | *Lonicera acuminata / Lonicera henryi / Lonicera giraldii / Lonicera alseuosmoides* | *Chamaecerasus* | *Nintooa* |
| NC\_045064.1 | *Lonicera calcarata* | *Chamaecerasus* | *Nintooa* |
| OK393707.1 | *Lonicera crassifolia* | *Chamaecerasus* | *Nintooa* |
| OR241128.1 | *Lonicera macrantha* | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera bournei* | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera dasystyla* | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera ferruginea* | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera hildebrandiana* | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera japonica* var. chinensis | *Chamaecerasus* | *Nintooa* |
| Not retrieved | *Lonicera reticulata* | *Chamaecerasus* | *Nintooa* |
| MG738667.1 | *Lonicera tragophylla* | *Periclymenum* | *Subsect. Lonicera* |
| Not retrieved | *Lonicera carnosifolia* | *Periclymenum* | *Subsect.* *Phenianthi* |
| Not retrieved | *Lonicera sempervirens* | *Periclymenum* | *Subsect. Phenianthi* |
| Not retrieved | *Lonicera subaequalis* | *Periclymenum* | *Subsect. Phenianthi* |
| MH028739.1 | *Lonicera insularis* | Not retrieved |  |
| MZ522723.1 | *Lonicera x heckrottii* | Not retrieved |  |
| ON641327.1 | *Lonicera periclymenum* | Not retrieved |  |
| OQ434060.1 | *Lonicera harae* | Not retrieved |  |
| Not retrieved | *Lonicera affinis* | Not retrieved |  |
| Not retrieved | *Lonicera albiflora* | Not retrieved |  |
| Not retrieved | *Lonicera albiflora* var. dumosa | Not retrieved |  |
| Not retrieved | *Lonicera alpigena* | Not retrieved |  |
| Not retrieved | *Lonicera alpigena* subsp. glehnii | Not retrieved |  |
| Not retrieved | *Lonicera arborea* | Not retrieved |  |
| Not retrieved | *Lonicera arizonica* | Not retrieved |  |
| Not retrieved | *Lonicera asperifolia* | Not retrieved |  |
| Not retrieved | *Lonicera boczkarnikovae* | Not retrieved |  |
| Not retrieved | *Lonicera bracteolaris* | Not retrieved |  |
| Not retrieved | *Lonicera californica* | Not retrieved |  |
| Not retrieved | *Lonicera canadensis* | Not retrieved |  |
| Not retrieved | *Lonicera caprifolium* | Not retrieved |  |
| Not retrieved | *Lonicera caucasica* | Not retrieved |  |
| Not retrieved | *Lonicera cerasina* | Not retrieved |  |
| Not retrieved | *Lonicera cerviculata* | Not retrieved |  |
| Not retrieved | *Lonicera chamissoi* | Not retrieved |  |
| Not retrieved | *Lonicera ciliosa* | Not retrieved |  |
| Not retrieved | *Lonicera conjugialis* | Not retrieved |  |
| Not retrieved | *Lonicera demissa* | Not retrieved |  |
| Not retrieved | *Lonicera demissa* var. demissa | Not retrieved |  |
| Not retrieved | *Lonicera dioica* | Not retrieved |  |
| Not retrieved | *Lonicera dioica* var. glaucescens | Not retrieved |  |
| Not retrieved | *Lonicera discolor* | Not retrieved |  |
| Not retrieved | *Lonicera etrusca* | Not retrieved |  |
| Not retrieved | *Lonicera flava* | Not retrieved |  |
| Not retrieved | *Lonicera floribunda* | Not retrieved |  |
| Not retrieved | *Lonicera gracilipes* | Not retrieved |  |
| Not retrieved | *Lonicera gracilipes* var. glabra | Not retrieved |  |
| Not retrieved | *Lonicera gracilipes* var. glandulosa | Not retrieved |  |
| Not retrieved | *Lonicera gracilipes* var. gracilipes | Not retrieved |  |
| Not retrieved | *Lonicera hirsuta* | Not retrieved |  |
| Not retrieved | *Lonicera hispidula* | Not retrieved |  |
| Not retrieved | *Lonicera hybrid cultivar* | Not retrieved |  |
| Not retrieved | *Lonicera iberica* | Not retrieved |  |
| Not retrieved | *Lonicera implexa* | Not retrieved |  |
| Not retrieved | *Lonicera interrupta* | Not retrieved |  |
| Not retrieved | *Lonicera involucrata* | Not retrieved |  |
| Not retrieved | *Lonicera korolkowii* | Not retrieved |  |
| Not retrieved | *Lonicera kurobushiensis* | Not retrieved |  |
| Not retrieved | *Lonicera ledebourii* | Not retrieved |  |
| Not retrieved | *Lonicera leschenaultii* | Not retrieved |  |
| Not retrieved | *Lonicera linderifolia* | Not retrieved |  |
| Not retrieved | *Lonicera linderifolia* var. konoi | Not retrieved |  |
| Not retrieved | *Lonicera mexicana* | Not retrieved |  |
| Not retrieved | *Lonicera miyagusukiana* | Not retrieved |  |
| Not retrieved | *Lonicera mochidzukiana* | Not retrieved |  |
| Not retrieved | *Lonicera myrtilloides* | Not retrieved |  |
| Not retrieved | *Lonicera nummulariifolia* | Not retrieved |  |
| Not retrieved | *Lonicera oblongifolia* | Not retrieved |  |
| Not retrieved | *Lonicera oblongifolia* var. altissima | Not retrieved |  |
| Not retrieved | *Lonicera obovata* | Not retrieved |  |
| Not retrieved | *Lonicera odoratissima* | Not retrieved |  |
| Not retrieved | *Lonicera olgae* | Not retrieved |  |
| Not retrieved | *Lonicera orientalis* | Not retrieved |  |
| Not retrieved | *Lonicera orientalis* var. longifolia | Not retrieved |  |
| Not retrieved | *Lonicera persica* | Not retrieved |  |
| Not retrieved | *Lonicera pilosa* | Not retrieved |  |
| Not retrieved | *Lonicera porphyrantha* | Not retrieved |  |
| Not retrieved | *Lonicera purpurascens* | Not retrieved |  |
| Not retrieved | *Lonicera pyrenaica* | Not retrieved |  |
| Not retrieved | *Lonicera quinquelocularis* | Not retrieved |  |
| Not retrieved | *Lonicera ramosissima* | Not retrieved |  |
| Not retrieved | *Lonicera ramosissima* var. ramosissima | Not retrieved |  |
| Not retrieved | *Lonicera sovetkinae* | Not retrieved |  |
| Not retrieved | *Lonicera stabiana* | Not retrieved |  |
| Not retrieved | *Lonicera standishii* | Not retrieved |  |
| Not retrieved | *Lonicera steveniana* | Not retrieved |  |
| Not retrieved | *Lonicera strophiophora* | Not retrieved |  |
| Not retrieved | *Lonicera strophiophora* var. strophiophora | Not retrieved |  |
| Not retrieved | *Lonicera subsessilis* | Not retrieved |  |
| Not retrieved | *Lonicera subspicata* | Not retrieved |  |
| Not retrieved | *Lonicera subspicata* var. denudata | Not retrieved |  |
| Not retrieved | *Lonicera subspicata* var. subspicata | Not retrieved |  |
| Not retrieved | *Lonicera tschonoskii* | Not retrieved |  |
| Not retrieved | *Lonicera utahensis* | Not retrieved |  |
| Not retrieved | *Lonicera uzenensis* | Not retrieved |  |
| Not retrieved | *Lonicera venulosa* | Not retrieved |  |
| Not retrieved | *Lonicera vidalii* | Not retrieved |  |
| Not retrieved | *Lonicera villosa* | Not retrieved |  |
| Not retrieved | *Lonicera x bella* | Not retrieved |  |
| Not retrieved | *Lonicera x brownii* | Not retrieved |  |
| Not retrieved | *Lonicera x minutiflora* | Not retrieved |  |
| Not retrieved | *Lonicera x muscaviensis* | Not retrieved |  |
| Not retrieved | *Lonicera x notha* | Not retrieved |  |
| Not retrieved | *Lonicera x tellmanniana* | Not retrieved |  |
| Not retrieved | *Lonicera xylosteum* | Not retrieved |  |
| Not retrieved | *Lonicera sp.* 1 JA-2016 | Unclassified |  |
| Not retrieved | *Lonicera sp.* Bergthorsson 0301 | Unclassified |  |
| Not retrieved | *Lonicera sp.* BIOUG24049-C09 | Unclassified |  |
| Not retrieved | *Lonicera sp.* BIOUG24049-D05 | Unclassified |  |
| Not retrieved | *Lonicera sp.* BOP010288 | Unclassified |  |
| Not retrieved | *Lonicera sp.* HD-2010 | Unclassified |  |
| Not retrieved | *Lonicera sp.* JCR-2019 | Unclassified |  |
| Not retrieved | *Lonicera sp.* MS-2023a | Unclassified |  |
| Not retrieved | *Lonicera sp.* Oxelman 2331 | Unclassified |  |
| Not retrieved | *Lonicera sp.* Palmer 679 | Unclassified |  |
| Not retrieved | *Lonicera sp.* Qiu 05010 | Unclassified |  |
| Not retrieved | *Lonicera sp.* wh121 | Unclassified |  |

Not retrieved: No corresponding chloroplast genome number or subgenus classification was reached. Unclassified: Shown in NCBI unclassified species.