| Number | Species                  | Family   | Genus       | Accession Number |
|--------|--------------------------|----------|-------------|------------------|
| 1      | *Ulmus parvifolia*       | Ulmaceae | *Ulmus*     | This study       |
| 2      | *Ulmus lamellosa*        | Ulmaceae | *Ulmus*     | This study       |
| 3      | *Ulmus pumila* ‘zhonghuajinye’ | Ulmaceae | *Ulmus*     | This study       |
| 4      | *Ulmus castaneifolia*    | Ulmaceae | *Ulmus*     | This study       |
| 5      | *Hemiptelea davidii*     | Ulmaceae | *Hemiptelea*| This study       |
| 6      | *Ulmus glabra*           | Ulmaceae | *Ulmus*     | Unpublished      |
| 7      | *Ulmus bergmanniana*     | Ulmaceae | *Ulmus*     | NC_032721        |
| 8      | *Ulmus americana*        | Ulmaceae | *Ulmus*     | NC_044473        |
| 9      | *Ulmus elongate*         | Ulmaceae | *Ulmus*     | NC_046061        |
| 10     | *Ulmus gaussenii*        | Ulmaceae | *Ulmus*     | NC_037840        |
| 11     | *Ulmus lacinia*          | Ulmaceae | *Ulmus*     | NC_032719        |
| 12     | *Ulmus macrocarpa*       | Ulmaceae | *Ulmus*     | NC_032720        |
| 13     | *Ulmus crennou*          | Ulmaceae | *Ulmus*     | NC_037758        |
| 14     | *Ulmus davidiana*        | Ulmaceae | *Ulmus*     | NC_032718        |
| 15     | *Ulmus lanceaefolia*     | Ulmaceae | *Ulmus*     | NC_058620        |
| 16     | *Aphananthe aspera*      | Ulmaceae | *Aphananthe*| NC_039726        |
| 17     | *Celtis biondii*         | Ulmaceae | *Celtis*    | NC_039727        |
| 18     | *Gironniera subaequalis* | Ulmaceae | *Gironniera*| NC_039729        |
| 19     | *Pteroceltis tatarinowii*| Ulmaceae | *Pteroceltis*| NC_039733   |
| 20     | *Trema orientalis*       | Ulmaceae | *Trema*     | NC_039734        |
| 21     | *Zelkova schneideriana*  | Ulmaceae | *Zelkova*   | NC_041074        |
| 22     | *Zelkova serrata*        | Ulmaceae | *Zelkova*   | NC_040958        |
Table S2 The potential positive selection test based on the branch-site model

| No. | Genes | Null hypothesis | Alternative hypothesis | Significance test |
|-----|-------|-----------------|------------------------|-------------------|
|     |       | lnL             | df         | omega (w = 1) | lnL             | df         | omega (w > 1) | BEB | LRT_P-value |
| 1   | accD  | -3874.117971    | 48         | 1            | -3874.117952    | 49         | 1            |      | 0.99508154  |
| 2   | atpA  | -3044.791429    | 48         | 1            | -3044.724017    | 49         | 1            |      | 0.713481864 |
| 3   | atpB  | -2864.816249    | 48         | 1            | -2864.816262    | 49         | 2.46714      | 1    |              |
| 4   | atpE  | -844.361015     | 48         | 1            | -844.361015     | 49         | 1.98765      | 1    |              |
| 5   | atpF  | -1356.634249    | 48         | 1            | -1356.634251    | 49         | 1.69819      | 1    |              |
| 6   | atpH  | -475.6739       | 48         | 1            | -475.673884     | 49         | 1            |      | 0.995486507 |
| 7   | atpI  | -1473.108736    | 48         | 1            | -1473.108743    | 49         | 1.60162      | 1    |              |
| 8   | ccsA  | -2544.054903    | 48         | 1            | -2544.054909    | 49         | 1            |      |              |
| 9   | cemA  | -1686.140457    | 48         | 1            | -1686.140477    | 49         | 2.37918      | 1    |              |
| 10  | clpP  | -1252.029962    | 48         | 1            | -1252.029962    | 49         | 1            |      |              |
| 11  | matK  | -4483.327829    | 48         | 1            | -4483.327747    | 49         | 1            |      | 0.989782371 |
| 12  | ndhA  | -2387.920139    | 48         | 1            | -2387.920145    | 49         | 2.34564      | 1    |              |
| 13  | ndhB  | -2137.375866    | 48         | 1            | -2137.37587     | 49         | 2.04795      | 1    |              |
| 14  | ndhD  | -4236.652012    | 48         | 1            | -4236.65216     | 49         | 5.60728      | 1    |              |
| 15  | ndhE  | -586.649861     | 48         | 1            | -586.649861     | 49         | 1            |      |              |
| 16  | ndhF  | -6427.359057    | 48         | 1            | -6427.359057    | 49         | 1            |      |              |
| 17  | ndhG  | -1336.095405    | 48         | 1            | -1336.095396    | 49         | 1            |      | 0.996614873 |
| 18  | ndhH  | -2575.267307    | 48         | 1            | -2575.267323    | 49         | 1.51179      | 1    |              |
| 19  | ndhI  | -1074.541696    | 48         | 1            | -1074.541697    | 49         | 1.97447      | 1    |              |
| 20  | ndhJ  | -983.505982     | 48         | 1            | -983.505986     | 49         | 1.63901      | 1    |              |
| 21  | ndhK  | -1502.513198    | 48         | 1            | -1502.513198    | 49         | 1            |      |              |
| 22  | petA  | -2255.731352    | 48         | 1            | -2255.731342    | 49         | 1            |      | 0.996431764 |
| 23  | petB  | -1233.618713    | 48         | 1            | -1233.61869     | 49         | 1            |      | 0.994588525 |
| 24  | petD  | -943.679775     | 48         | 1            | -943.679775     | 49         | 5.21947      | 1    |              |
| 25  | petG  | -198.330603     | 48         | 1            | -198.330603     | 49         | 2.42736      | 1    |              |
| 26  | petL  | -198.375811     | 48         | 1            | -198.375811     | 49         | 1            |      |              |
| 27  | petN  | -168.959407     | 48         | 1            | -168.959407     | 49         | 1            |      |              |
| 28  | psaA  | -4169.025102    | 48         | 1            | -4169.025137    | 49         | 2.29811      | 1    |              |
| 29  | psaB  | -4010.413208    | 48         | 1            | -4010.413285    | 49         | 1.09444      | 1    |              |
| 30  | psaC  | -423.002257     | 48         | 1            | -423.002257     | 49         | 2.02226      | 1    |              |
| 31  | psaI  | -211.093876     | 48         | 1            | -211.093876     | 49         | 1            |      |              |
| 32  | psaJ  | -277.698808     | 48         | 1            | -277.698808     | 49         | 1.6791       | 1    |              |
| 33  | psbA  | -2282.33528     | 48         | 1            | -2282.335271    | 49         | 1            |      | 0.996614873 |
| 34  | psbB  | -2997.91126     | 48         | 1            | -2997.911283    | 49         | 1            |      |              |
|    | Gene | Value   | Seq | Value | Seq | Value  | Seq | Value  |
|----|------|---------|-----|-------|-----|--------|-----|--------|
| 35 | rps19| -412.644098 | 48  | 1     | -412.644099 | 49  | 1     | 1     |
| 36 | rps2 | -1432.587016 | 48  | 1     | -1432.587046 | 49  | 1.80093 | 1     |
| 37 | rps3 | -1643.233959 | 48  | 1     | -1643.233967 | 49  | 2.26806 | 1     |
| 38 | rps4 | -1316.585727 | 48  | 1     | -1316.585723 | 49  | 1.09787 | 0.997743245 |
| 39 | rps7 | -682.658149  | 48  | 1     | -682.658149  | 49  | 2.21764 | 1     |
| 40 | rps8 | -1022.087003 | 48  | 1     | -1022.087003 | 49  | 1.8015  | 1     |
| 41 | rps18| -597.085368  | 48  | 1     | -597.085367  | 49  | 2.264  | 0.998871621 |
| 42 | ycf1 | -19016.8542  | 48  | 1     | -19016.85486 | 49  | 1     | 1     |
| 43 | ycf2 | -11470.53597 | 48  | 1     | -11470.536  | 49  | 1.75119 | 1     |
| 44 | ycf3 | -1013.486751 | 48  | 1     | -1013.486754 | 49  | 2.08366 | 1     |
| 45 | ycf4 | -1296.721459 | 48  | 1     | -1295.122438 | 49  | 1     | 0.073726488 |
Figure S1. Analysis of repeats in 21 Ulmaceae species chloroplast genomes, (A) Number of Palindromic repeat, Direct repeat, Reverse repeat, Complement repeat; (B) Number of tandem repeats in different lengths.