**APPENDIX 1. Locality information for plant species used in this study.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Species | Population | Location | Latitude (°N) | Longitude (°E)  | *N* | Voucher Noa |
| *Gentiana straminea*  | HZG | Huzhu,Qinghai | 37.001568  | 101.540625  | 26 | Zhou20191013 |
| *G. straminea* | QZG | Yushu,Qinghai | 34.071028  | 100.200972  | 26 | Zhou20190727 |
| *G. straminea* | DRG | Dari,Qinghai | 33.355579  | 99.503465  | 20 | Zhou20190728 |
| *G. straminea* | BMG | Banna,Qinghai | 32.561544  | 100.414529  | 20 | Zhou20190729 |
| *G. macrophylla*  | JSM | Jishishan, Gansu | 35.760695 | 102.806308 | 3 | Zhou2017026 |
| *G. macrophylla* | LTM | Lintan, Gansu |  34.958652 | 103.704285 | 3 | Zhou2017033 |
| *G. macrophylla* | GNM | Gannan, Gansu | 34.631921 | 104.136258 | 3 | Zhou2017037 |
| *G. macrophylla* | HXM | HongXi, Sichuan |  34.095147 |  102.750231 | 3 | Zhou2017038 |
| *G. macrophylla* | ZGM | Zhagana,Sichuan | 34.078113 | 103.182095 | 3 | Zhou2017039 |
| *G. macrophylla* | MXM | Minxian, Gansu | 36.059421 | 103.826308 | 6 | Zhou2017170 |
| *G. macrophylla* | GSM | Guanshan, Gansu |  36.003199 | 103.585591 | 6 | Zhou2017171 |
| *G. macrophylla* | HZM | Huzhu, Qinghai | 37.001568  | 101.540625  | 3 | Zhou2017172 |
| *G. dahurica*  | JSD | Jishishan, Gansu | 35.760695 | 102.806308 | 3 | Zhou2017027 |
| *G. dahurica* | XDD | Xuding, Gansu |  35.985180 |  103.494367 | 3 | Zhou2017173 |
| *G. dahurica* | GSD | Guanshan, Gansu | 36.003199 | 103.585591 | 3 | Zhou2017174 |
| *G. dahurica* | GND | Gannan, Gansu |  34.990047 | 102.583185 | 4 | Zhou2017175 |
| *G. dahurica* | LTD | Lintan, Gansu | 　34.958652 | 　103.704285 | 3 | Zhou2017176 |

Note: N= number of individual sampled.

a Vouchers were deposited at the Herbarium of the Northwest Plateau Institute of Biology (HNWP), Chinese Academy of Sciences, Xining, Qinghai Province, China.