**Supplementary Table 1**

Environmental conditions at the seven sampling sites in Northwest China. The soil texture is sand and the soil reaction is alkaline. *Hedysarum scoparium* is the host plant.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ordos | Wuhai | Dengkou | Alxa Left Banner | Shapotou | Minqin | Anxi  |
| Longitude/latitude (E/N) | N 39°49′44″ E 110°19′39″  | N 39°72′74″ E 106°83′19″ | N 40°39′42″ E 107°00′85″ | N 39°02′62″ E 105°87′81″ | N 37°45′29″ E 104°99′31″ | N 38°41′34″ E 103°11′03″ | N 40°20′16″ E 96°50′54″ |
| Altitude (m) | 1269 | 1129 | 1012 | 1706 | 1246 | 1405 | 1514 |
| Precipitation (mm/year) | 348.3 | 162 | 144.5 | 150 | 188 | 113 | 45.3 |
| Annual mean temperature (℃) | 6.2 | 9.55 | 7.6 | 8.3 | 9.6 | 7.8 | 8.8 |
| Soil type | Brown calcic soil  | Sandy grey desert | Sandy grey desert | Subalpine meadow, grey brown soil | Aeolian sandy soil | Aeolian sandy soil | Sandy grey desert |