

## Supporting Information

**Table S1.** The SLA values for different plant functional types between the CLM4.5 model and the observation data in China.

Plant functional type (PFT)	SLA parameter value in the CLM4.5 model (m <sup>2</sup> /g)	SLA observed mean value in China (m <sup>2</sup> /g)
temperate needleleaf evergreen tree	0.01	0.007
boreal needleleaf evergreen tree	0.008	0.005
boreal needleleaf deciduous tree	0.024	0.015
tropical broadleaf evergreen tree	0.012	0.014
temperate broadleaf evergreen tree	0.012	0.014
tropical broadleaf deciduous tree	0.030	0.017
temperate broadleaf deciduous tree	0.030	0.022
boreal broadleaf deciduous tree	0.030	0.020
temperate broadleaf evergreen shrub	0.012	0.017
temperate broadleaf deciduous shrub	0.030	0.022
boreal broadleaf deciduous shrub	0.030	0.019
C3 arctic grass	0.030	0.021
C3 grass	0.030	0.021
C4 grass	0.030	0.019
C3 unmanaged rainfed crop	0.030	0.019
<sup>1</sup> C3 unmanaged irrigated crop	0.030	--
<sup>2</sup> Rainfed corn	0.050	--
<sup>2</sup> Irrigated corn	0.050	--
<sup>2</sup> Rainfed temperate cereals	0.070	--
<sup>2</sup> Irrigated temperate cereals	0.070	--
<sup>3</sup> Rainfed winter cereals	0.070	--
<sup>3</sup> Irrigated winter cereals	0.070	--
<sup>2</sup> Rainfed soybean	0.070	--
<sup>2</sup> Irrigated soybean	0.070	--

<sup>1</sup>Only used if irrigation is active. <sup>2</sup>Only used if crop model is active. <sup>3</sup>Reserved for future implementations of crop model.

**Table S2.** Plant SLA information in multiple environmental factor experiments.

Plant functional type	Species name	Impact factor	Reference
broadleaf deciduous tree	<i>Phellodendron amurense</i> Rupr.	light intensity	Li et al. [40]
broadleaf deciduous tree	<i>Fraxinus mandschurica</i> Rupr.	light intensity	Li et al. [40]
broadleaf deciduous tree	<i>Juglans mandshurica</i> Maxim.	light intensity	Li et al. [40]
needleleaf evergreen tree	<i>Picea asperata</i> Mast.	light intensity	Li et al. [40]
needleleaf evergreen tree	<i>Pinus koraiensis</i>	light intensity	Li et al. [40]
broadleaf evergreen tree	<i>Ficus tinctoria</i> G.Forst.	light intensity	Zhang et al. [41]
broadleaf evergreen tree	<i>Taxus. chinensis</i> var. <i>mairei</i>	light intensity	Liu et al. [42]
broadleaf evergreen tree	<i>Serianthes nelsonii</i> Merr.	light intensity	Deloso et al. [43]
crop	<i>Triticum aestivum</i> L. (winter wheat)	growth stages	Wu et al. [53]
crop	<i>Zea mays</i> L.(summer maize)	growth stages	Cao et al. [54]
broadleaf deciduous tree	<i>Bombax ceiba</i> Linnaeus	growth stages	Yang et al. [55]
needleleaf evergreen tree	<i>Pinus yunnanensis</i>	growth stages	Zhang et al. [56]
needleleaf evergreen tree	<i>Cunninghamia lanceolata</i>	growth stages	Peng et al. [57]
broadleaf deciduous tree	<i>Eucalyptus camaldulensis</i> Dehnh	soil moisture	Rad et al. [58]
crop	<i>Zea mays</i> L.(summer maize)	soil moisture	Zhang et al. [59]
broadleaf deciduous shrub	<i>Alhagi sparsifolia</i> Shap.	soil moisture	Huang et al. [60]
broadleaf deciduous shrub	<i>Caragana intermedia</i>	soil moisture	Xiao et al. [61]
broadleaf deciduous shrub	<i>Sophora davidii</i>	soil moisture	Wu et al. [62]
C4 grass	<i>Cleistogenes squarrosa</i>	soil N addition	Huang et al. [63]
broadleaf deciduous shrub	<i>Artemisia frigida</i>	soil N addition	Huang et al. [63]
C3 grass	<i>Leymus chinensis</i>	soil N addition	Sun et al. [64]
C3 grass	<i>Thermopsis lanceolata</i>	soil N addition	Sun et al. [64]
crop	<i>Triticum aestivum</i> L. (winter wheat)	soil N addition	Ratjen et al. [65]