

SUPPLEMENTARY INFORMATION

Intraspecific trait variation regulates biodiversity and community productivity of shrublands in drylands

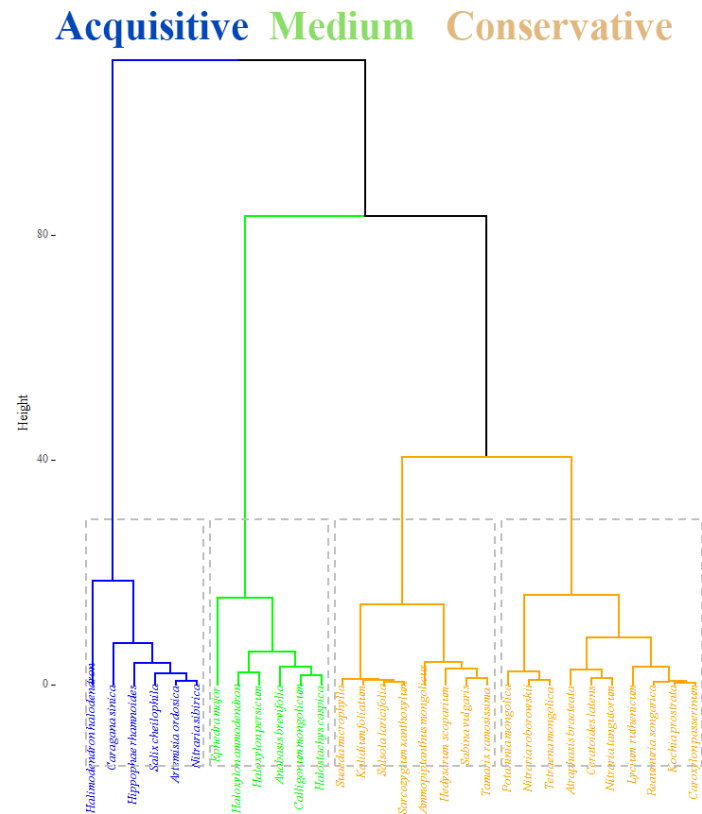


Figure S1. Hierarchical clustering results of shrubland communities in Northwest China. Dissimilarities between the observations were expressed as Euclidean distance.

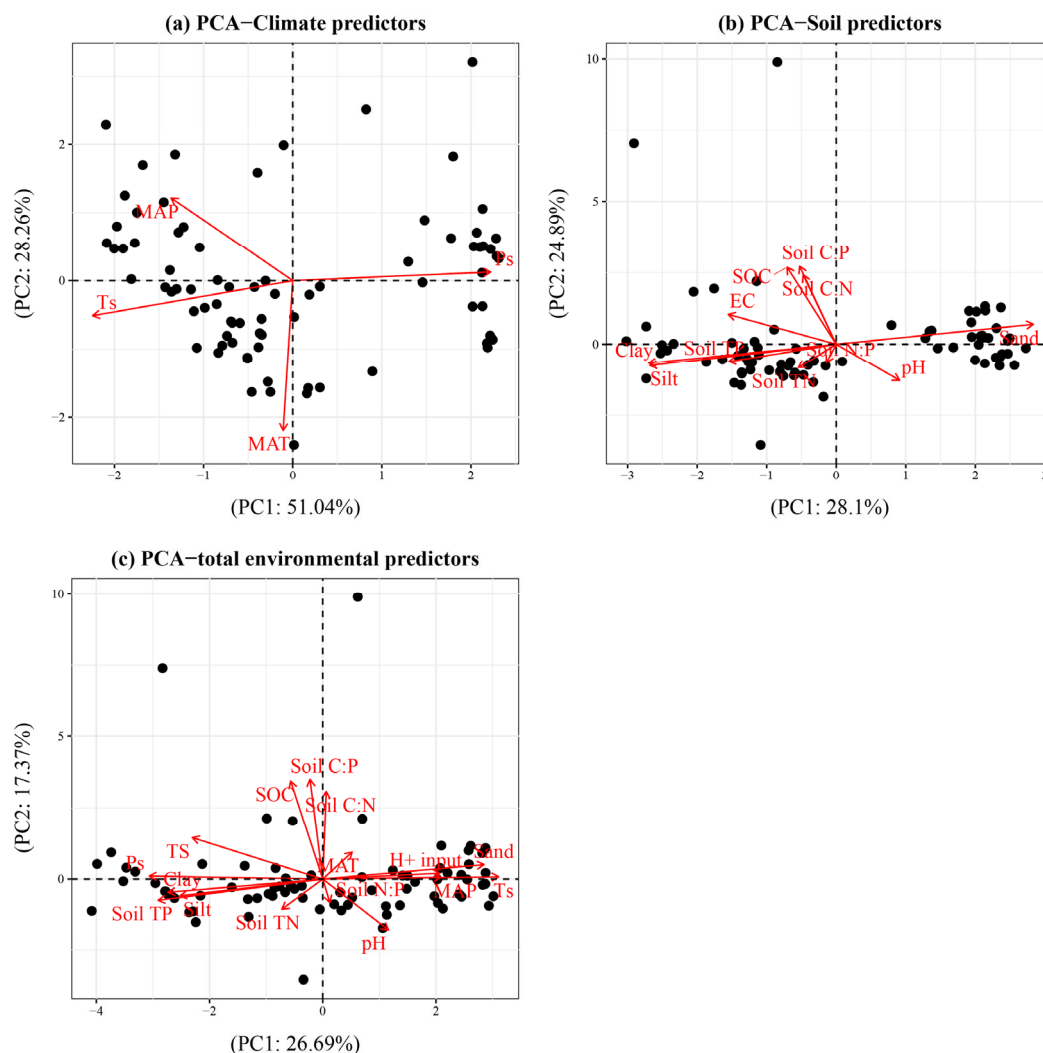


Figure S2. Principal component analysis (PCA) of (a) climate, (b) soil, and (c) total environmental predictors. Percentage of variance explained by each axis are shown in the axis legend. MAP, mean annual precipitation; MAT, mean annual temperature; H⁺ input, atmospheric acid deposition; Ps, precipitation seasonality; Ts, temperature seasonality; Sand, soil sand (%); Silt, soil silt (%); Clay, soil clay (%); SOC, soil organic carbon; Soil TN, soil total nitrogen; Soil TP, soil total phosphorus; EC, soil electric conductivity; pH, soil pH; Soil C:N, soil C:N ratio; Soil C:P, soil C:P ratio; Soil N:P, soil N:P ratio.

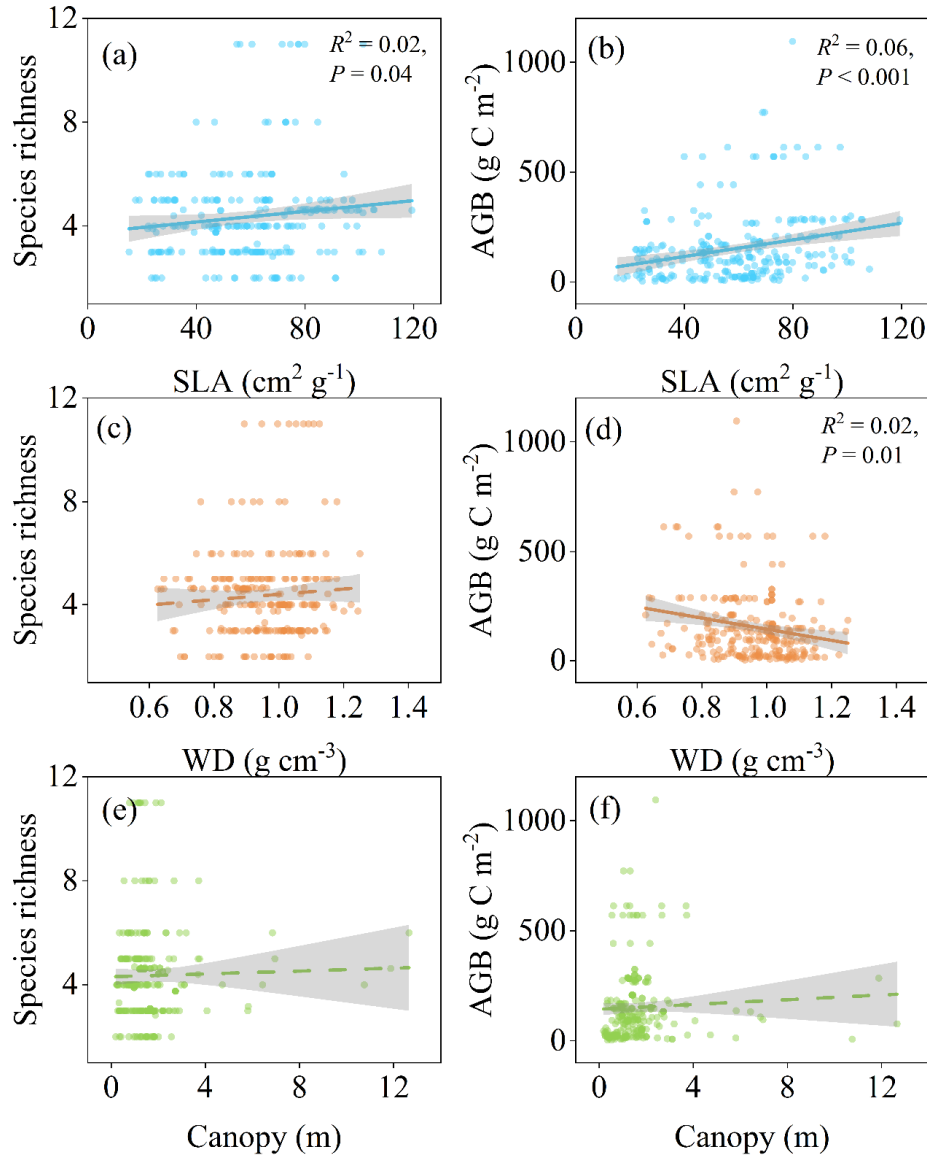


Figure S3. Linear relationships between (a, b) SLA (specific leaf area), (c, d) WD (wood density), and (e, f) Canopy and species richness and AGB (aboveground biomass), respectively. Solid and dashed lines denote significant and in-significant relationships, respectively. Gray areas represent 95% confidence intervals. Only R^2 and P values with significant regression are provided.

Table S1. Summary of the shrub plants communities in Northwest China. Constructive species at each site was indicated in bold font.

Site ID	Site name	Latitude	Longitude	Elevation (m)	Dominant species
A	East of Karamy	45.35556	85.00472	280	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>A.brevifolia</i> ; <i>H.ammmodendron</i>
B	Karamay Xiaoguai Township	45.175	84.98278	290	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>
C	Baijiantan, Karamy	45.49722	85.50667	260	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>A.brevifolia</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>
D	Baijiantan, Karamy	45.50556	85.2075	280	<i>A.brevifolia</i> ; <i>H.ammmodendron</i> ; <i>K.foliatum</i>
E	Mosowan Station	45.12278	86.02806	340	<i>T.ramosissima</i> ; <i>R.songarica</i> ; <i>N.tangutorum</i> ; <i>H.ammmodendron</i>
F	Wucaiwan	44.16333	88.70889	610	<i>T.ramosissima</i> ; <i>A.brevifolia</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i> ; <i>S.microphylla</i> ; <i>K.foliatum</i>
G	Wucaiwan	44.76167	89.21806	540	<i>N.tangutorum</i> ; <i>A.brevifolia</i> ; <i>E.major</i> ; <i>R.songarica</i> ; <i>C.mongolicum</i> ; <i>H.ammmodendron</i>
H	Qitai	44.85222	90.01833	650	<i>H.ammmodendron</i> ; <i>H.caspica</i>
I	Mulei mingsha mountain	44.39583	90.64639	830	<i>A.brevifolia</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i> ; <i>K.foliatum</i>

J	Mulei	44.07444	90.44778	920	<i>N.tangutorum</i> ; <i>C.latens</i>
K	Qitai Zhisha station	44.20028	90.14361	760	<i>H.persicum</i> ; <i>A.bracteata</i> ; <i>A.brevifolia</i> ; <i>C.mongolicum</i> ; <i>A.ordosica</i> ; <i>H.ammmodendron</i> ; <i>C.latens</i>
L	Hongliugou, Altay	45.28722	90.165	1200	<i>A.brevifolia</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>
M	Dure town	46.93167	88.90306	830	<i>A.brevifolia</i> ; <i>H.ammmodendron</i>
N	Fuhai Urungu River	46.72444	87.72556	570	<i>S.laricifolia</i> ; <i>T.ramosissima</i> ; <i>H.halodendron</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i> ; <i>C.latens</i>
O	Valley zone	45.98111	85.84111	280	<i>T.ramosissima</i> ; <i>A.brevifolia</i> <i>R.songarica</i> ; <i>H.ammmodendron</i>
P		46.01194	86.41222	320	<i>T.ramosissima</i> ; <i>N.roborowskii</i> ; <i>N.sibirica</i> ; <i>H.ammmodendron</i> ; <i>K.foliatum</i>
Q	Mazong Mountain	41.81778	97.03611	1740	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i> ; <i>H.caspica</i>
R	Ejin Banner	42.20583	101.1	920	<i>T.ramosissima</i>
S	Ejin Banner	41.8675	100.5478	970	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>L.ruthenicum</i>
T	Ejin Banner	41.81556	100.4681	980	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>R.songarica</i> ; <i>C.mongolicum</i>
U		41.69694	103.1325	1010	<i>R.songarica</i>
V	Su Hongtu	41.29944	104.1436	800	<i>N.tangutorum</i> ; <i>T.ramosissima</i> ; <i>H.ammmodendron</i> ; <i>K.foliatum</i>

W	Urigi	40.73306	104.51	1320	<i>N.tangutorum</i> ; <i>R.songarica</i>
X	Taiyangmiao plantation	40.85806	106.7419	1040	<i>H.ammოდendron</i>
Y	Narin lake	40.56528	106.3758	1040	<i>N.tangutorum</i> ; <i>T.amosissima</i> ; <i>H.ammოდendron</i>
Z	Narin lake	40.57333	106.3667	1050	<i>N.tangutorum</i> ; <i>S.xanthoxylon</i> ; <i>A.mongolicus</i>
A1		40.76139	105.3769	1180	<i>N.tangutorum</i> ; <i>P.mongolica</i> ; <i>R.songarica</i> ; <i>K.foliatum</i>
B1	Yellow River Bridge	40.66389	107.5636	1040	<i>A.ordosica</i> ; <i>S.cheilophila</i>
C1	Erdos	40.43	108.6567	1120	<i>A.ordosica</i> ; <i>S.cheilophila</i>
D1		40.36333	109.4231	1080	<i>H.scoparium</i> ; <i>C.sinica</i> ; <i>A.ordosica</i>
E1	Engebesа Lake	40.37222	109.4431	1070	<i>C.sinica</i> ; <i>A.ordosica</i> ; <i>S.cheilophila</i>
F1		40.20556	110.8397	1040	<i>C.sinica</i> ; <i>A.ordosica</i> ; <i>S.cheilophila</i>
G1		39.36333	111.1156	890	<i>C.sinica</i> ; <i>A.ordosica</i>
H1	Erdos	39.71639	105.9086	1170	<i>C.sinica</i> ; <i>A.ordosica</i>
I1		39.68917	110.1378	1490	<i>C.sinica</i> ; <i>H.rhamnoides</i> ; <i>K.foliatum</i>
J1		39.77139	109.3739	1370	<i>C.sinica</i> ; <i>A.ordosica</i> ; <i>S.cheilophila</i>
K1		39.84111	108.6264	1370	<i>A.bracteata</i> ; <i>H.scoparium</i> ; <i>C.sinica</i> ; <i>A.ordosica</i>
L1		40.12694	107.6139	1200	<i>C.sinica</i> ; <i>C.latens</i>

M1	Balagon	40.25639	107.0706	1140	<i>N.tangutorum</i> ; <i>S.xanthoxylon</i> ; C.sinica ; <i>A.mongolicus</i> ; <i>A.ordosica</i> ; <i>T.mongolica</i> ; <i>R.songarica</i> ; <i>S.vulgaris</i> ; <i>R.songarica</i>
N1		39.87389	106.8825	1230	<i>S.xanthoxylon</i> ; <i>A.mongolicus</i> ; <i>A.ordosica</i> ; <i>T.mongolica</i> ; <i>P.mongolica</i> ; S.vulgaris
O1	Northwest of Mu Us Desert	38.98222	107.3258	1180	<i>N.tangutorum</i> ; <i>R.songarica</i> ; A.mongolicus ; <i>K.foliatum</i> ; <i>R.songarica</i> ; <i>K.prostrata</i>
P1		38.71306	106.8856	1240	A.ordosica
Q1		37.72694	107.4972	1330	C.sinica
R1		37.81778	108.0008	1360	<i>H.scoparium</i> ; <i>C.sinica</i> ; <i>A.ordosica</i> ; S.cheilophila ; <i>A.fruticosa</i>
S1		37.85333	108.3736	1310	<i>C.sinica</i> ; <i>A.ordosica</i> ; S.cheilophila
T1		38.46722	108.7706	1360	C.sinica ; <i>A.ordosica</i>
U1		38.97028	109.3197	1310	S.vulgaris ; <i>C.sinica</i> ; <i>A.ordosica</i> ; <i>S.cheilophila</i>
V1		39.27556	108.9506	1310	<i>H.scoparium</i> ; <i>C.sinica</i> ; <i>A.ordosica</i> ; <i>H.rhamnoides</i> ; S.cheilophila
W1		39.01778	108.0258	1370	A.ordosica
X1		39.4575	106.6436	1230	<i>N.tangutorum</i> ; <i>S.xanthoxylon</i> ; C.sinica ; <i>P.mongolica</i> ; <i>R.songarica</i> ; <i>A.mongolicus</i> ; <i>T.mongolica</i> ; <i>C.latens</i>

Y1	39.1075	105.7017	1660	<i>H.scoparium</i> ; <i>C.mongolicum</i> ; <i>A.ordosica</i>
Z1	37.97639	105.3394	1330	<i>N.tangutorum</i> ; <i>R.songarica</i>
A2	37.43861	104.3678	1640	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>S.passerina</i>
B2	37.57472	103.7125	1750	<i>N.tangutorum</i> ; <i>C.sinica</i> ; <i>A.ordosica</i>
C2	37.72972	103.1478	1660	<i>H.scoparium</i> ; <i>A.ordosica</i>
D2	38.31194	103.26	1470	<i>N.tangutorum</i> ; <i>R.songarica</i>
E2	38.27861	103.9267	1400	<i>N.tangutorum</i>
F2	38.30167	104.4778	1360	<i>N.tangutorum</i> ; <i>K.foliatum</i>
G2	38.72	105.3047	1280	<i>H.scoparium</i> ; <i>A.ordosica</i>
H2	39.55083	105.5978	1050	<i>N.tangutorum</i> ; <i>A.mongolicus</i> ; <i>C.mongolicum</i> ; <i>A.ordosica</i>
I2	39.68528	105.0811	1320	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>K.foliatum</i> ; <i>S.laricifolia</i> ; <i>S.passerina</i>
J2	40.215	104.1806	1440	<i>N.tangutorum</i> ; <i>R.songarica</i>
K2	39.73361	103.2603	1280	<i>N.tangutorum</i> ; <i>A.ordosica</i>
L2	39.41556	102.4797	1340	<i>N.tangutorum</i> ; <i>S.xanthoxylon</i> ; <i>A.ordosica</i>
M2	39.19417	101.5108	1420	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>K.foliatum</i> ; <i>S.passerina</i>
N2	39.58861	100.7969	1510	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>K.foliatum</i> ; <i>S.passerina</i>

O2		40.13861	100.1114	1240	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>C.mongolicum</i>
P2		39.865	98.64944	1400	<i>N.tangutorum</i> ; <i>R.songarica</i> ; <i>C.mongolicum</i>
Q2		40.71806	96.67833	1510	<i>R.songarica</i>
R2		42.14528	95.8775	1820	<i>R.songarica</i> ; <i>H.ammmodendron</i>
S2		43.12028	95.30444	1130	<i>E.major</i>
T2		44.21472	87.86083	490	<i>S.xanthoxylon</i> ; <i>T.amosissima</i> ; <i>R.songarica</i> ; <i>K.foliatum</i>
U2	Cainan highway	44.345	88.135		<i>T.amosissima</i> ; <i>A.brevifolia</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>
V2	Southern edge of Gurbantunggut Desert	44.73333	88.45	465.5	<i>N.robrowskii</i> ; <i>T.amosissima</i> ; <i>R.songarica</i> ; <i>K.foliatum</i> ; <i>H.halodendron</i> ; <i>N.sibirica</i>
W2	Southern edge of Gurbantunggut Desert	44.39778	87.92611	450.8	<i>H.persicum</i> ; <i>T.amosissima</i> ; <i>H.ammmodendron</i>
X2	Southern edge of Gurbantunggut Desert	44.37917	87.94389	470	<i>T.amosissima</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>
Y2	Southern edge of	44.41556	87.91611	453.95	<i>H.persicum</i> ; <i>R.songarica</i> ; <i>H.ammmodendron</i>

	Gurbantunggut				
	Desert				
Z2	Southern edge	44.37278	87.9375	460	<i>H.persicum</i> ; <i>H.ammodendron</i>
	of				
	Gurbantunggut				
	Desert				
