

Supplementary Materials

Table S1. Mean temperature and humidity of the greenhouse and the first growing season (the data recorded from the 21st of April to the 2nd of August in 2019) of the project areas in Uganda and Kenya.

	Kapchorwa, Uganda	Teso South, Kenya	The greenhouse trial
Mean temperature	19.7 °C	23.8 °C	22 °C
Mean humidity	80.7%	82.1%	50.3%

Table S2: The gravimetric amount of 100% pot capacity (PC), 75% PC, 50% PC, 25% PC, and a single pot with two soil types (fertile soil; cambisol and infertile soil; alisol).

Soil type	100% PC (g pot ⁻¹)	75% PC (g pot ⁻¹)	50% PC (g pot ⁻¹)	25% PC (g pot ⁻¹)	Pot with dried soil (g)
Fertile soil; cambisol	893	670	447	223	8000
Infertile soil; alisol	1395	1046	697	349	8000

Table S3. Summary of chemical properties of collected soil samples in Tauchenweiler and Höwenegg, Germany (Stahr & Böcker, 2014).

	Infertile soil (S)	Fertile soil (L)
	Endostagnic Alisol (Tauchenweiler)	Endoleptic Cambisol (Höwenegg)
S-value* (mol/m ²)	2.38	121
Mg (kg/m ²)	0.93	8.3
Ca (kg/m ²)	0.05	3.7
P (kg/m ²)	<0.002	0.99
K (kg/m ²)	1.3	1.74
N (kg/m ²)	0.49	0.73
Humus (kg/m ²)	9.8	14.6
pH (CaCl ₂)	4.0	5.6
Soil texture**	A mixture of Lt2 and Ls4	A mixture of Ls2, Lu, TI, and Tu2

*S-value: Sum of exchangeable alkaline cations

**Soil texture: Lt2 (weakly clayey loam), Ls2 (weakly sandy loam), Ls4 (strongly sandy loam), Lu (silty loam), TI (loamy clay), and Tu2 (weakly sandy clay) (Bormann, 2007)

Block 1				Block 4			
SW-L-DC2	SW-S-DC2	BN-S-DC	BN-L-DS	CP-S-DM	CP-S-DC2	CP-L-DC	CP-L-DC2
SW-L-DS	BN-S-DS	CP-S-DC	CP-L-DM	CP-L-DM	CP-S-DS	CP-L-DS	SW-L-DC2
BN-L-DC2	BN-S-DM	BN-S-DC2	CP-L-DC	SW-L-DS	SW-S-DS	CP-S-DC	BN-L-DM
CP-S-DC2	CP-S-DM	SW-L-DC	SW-S-DM	BN-L-DC2	BN-S-DS	SW-L-DM	SW-S-DM
CP-L-DC2	CP-S-DS	CP-L-DS	BN-L-DM	BN-S-DC2	SW-S-DC	SW-L-DC	SW-S-DC2
BN-L-DC	SW-S-DS	SW-L-DM	SW-S-DC	BN-S-DC	BN-L-DS	BN-L-DC	BN-S-DM
Block 2				Block 5			
CP-S-DC	SW-S-DC2	SW-L-DS	BN-L-DS	BN-L-DC	CP-L-DC2	SW-S-DC	BN-S-DS
BN-S-DM	BN-L-DC2	BN-S-DC2	SW-L-DC2	BN-L-DM	CP-L-DC	SW-L-DS	BN-S-DC
BN-S-DS	SW-S-DS	CP-L-DM	SW-S-DC	SW-S-DC2	CP-S-DM	CP-S-DC2	BN-S-DC2
CP-L-DC	CP-L-DS	CP-S-DM	BN-L-DC	CP-L-DM	SW-L-DM	BN-S-DM	CP-S-DS
CP-L-DC2	SW-L-DM	SW-L-DC	BN-L-DM	SW-L-DC	CP-L-DS	BN-L-DC2	BN-L-DS
BN-S-DC	CP-S-DS	SW-S-DM	CP-S-DC2	SW-S-DM	CP-S-DC	SW-S-DS	SW-L-DC2
Block 3				Block 6			
BN-S-DS	CP-S-DC	BN-L-DM	BN-L-DC	BN-L-DS	SW-S-DS	SW-L-DC2	BN-L-DC
CP-S-DS	SW-L-DC	BN-S-DM	CP-L-DC2	CP-S-DC2	BN-L-DM	CP-L-DS	CP-S-DM
CP-S-DM	CP-L-DC	SW-S-DS	BN-S-DC	CP-L-DM	CP-S-DC	BN-S-DC	BN-S-DC2
CP-L-DM	SW-L-DM	SW-S-DC2	SW-S-DC	SW-S-DM	SW-L-DS	BN-S-DM	BN-S-DS
CP-S-DC2	SW-L-DC2	BN-L-DS	BN-S-DC2	SW-L-DC	CP-S-DS	CP-L-DC2	SW-S-DC
CP-L-DS	CP-S-DS	SW-S-DM	SW-L-DS	SW-L-DM	SW-S-DC2	BN-L-DC2	CP-L-DC

Figure S1: A sample layout of a 4 * 6 factorial experiment involving three species (SW: *B. oleracea*, CP: *Vigna unguiculata*, and BN: *S. scabrum*), two soil fertility (L: fertile soil and S: unfertile soil), and two drought treatment with a double number of the control (DC: drought control, DM: drought mild, and DS: drought severe) in a randomized complete block design (RCBD) with six replications. The layout was designed using the SAS program.

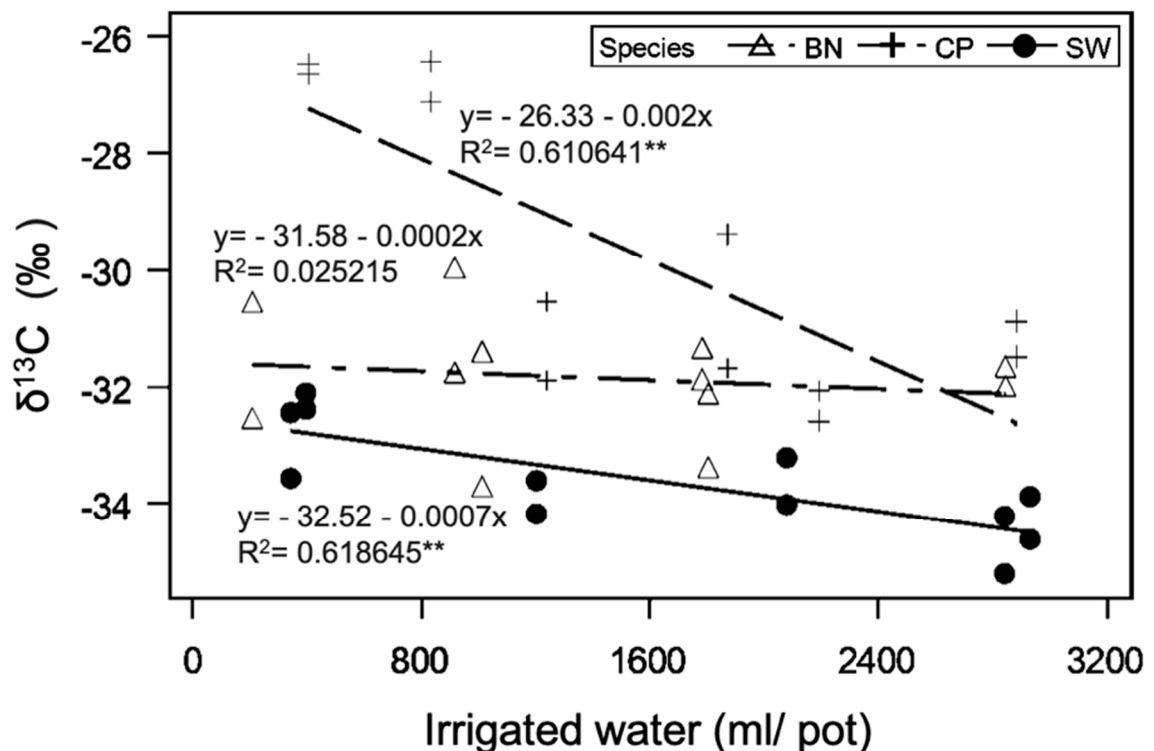


Figure S2. δ¹³C measurements of samples of *B. oleracea* (SW, ●), *V. unguiculata* (CP, +), and *S. scabrum* (BN, Δ) according to the mean of irrigated water amount for each treatment in the greenhouse trial (n=4 per pot capacity of species). Regression respective formula and R² are given. The triple asterisk indicates significance at $p < 0.001$.