



*Supplement of*

## **Quantification, spatial distribution and persistence of root-derived carbon for 12 crop species**

**Baptiste Hulin et al.**

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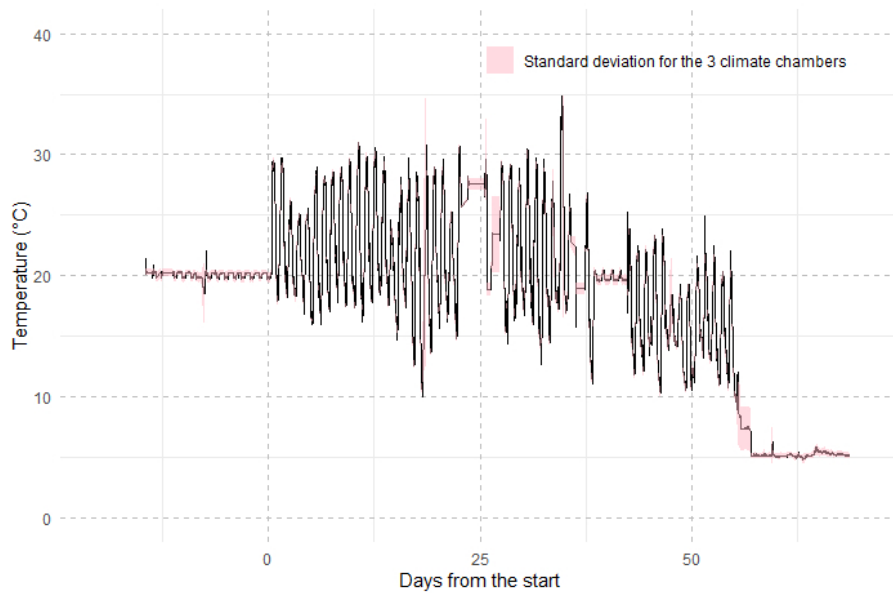
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**Table S1.** Mean root decay rate constants (k) from literature reviews. % at day 524 is the % of dry mass remaining at day 524 calculated with the provided k ( $\% = e^{-k(524/365.25)}$ ).

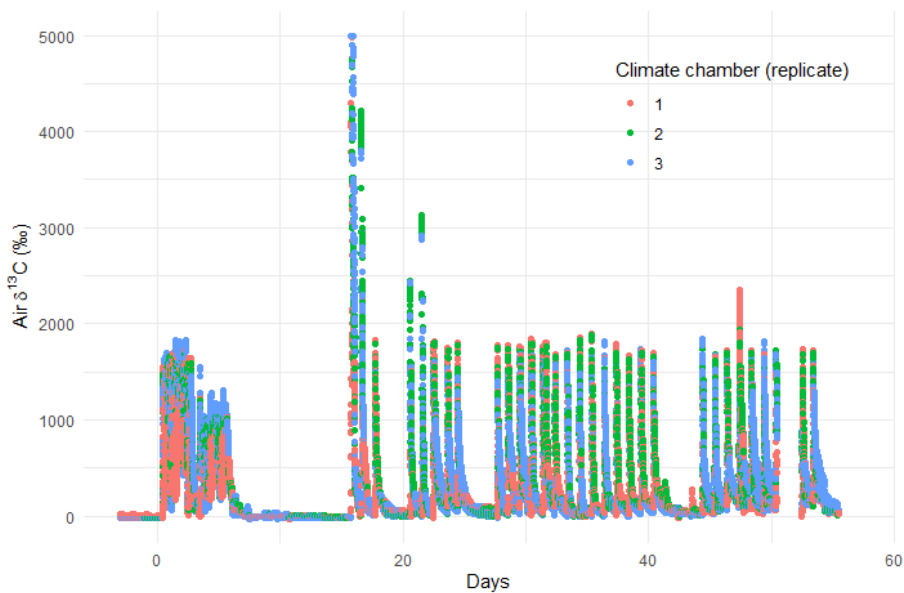
Functional Group	Root Size	k	% at Day 524	Study
Graminoids	All	1.49	12	Silver and Miya, 2001
Graminoids	<5mm	1.27	16	Zhang and Wang, 2015
Annual Graminoids	<2mm	1.24	17	See et al., 2019
Annual Forbs	<2mm	3.5	1	See et al., 2019

**Table S2.** Plant density (number of plants per mesocosm); seeds sown per mesocosm and recommended number of seeds to sow per mesocosm according to technical institutes.

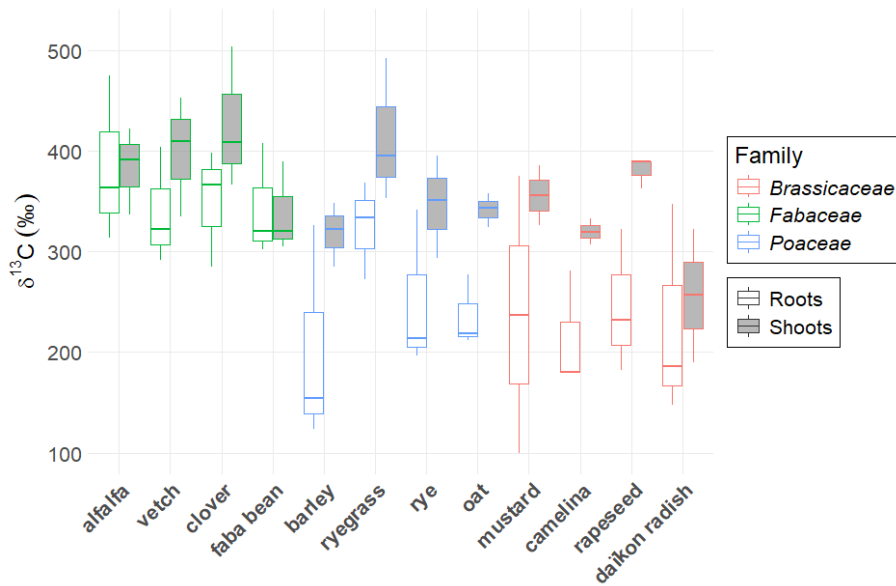
<i>Species</i>	Plant density	Seeds sown	Recommended seed number
<i>Medicago sativa</i>	9,8,1	64	32
<i>Vicia sativa</i>	4,4,4	6	3
<i>Trifolium pratense</i>	4,7,4	43	22
<i>Vicia faba</i>	1,1,1	2	1
<i>Hordeum vulgare</i>	5,5,5	9	5
<i>Lolium multiflorum</i>	11,17,3	45	23
<i>Secale cereale</i>	5,5,5	10	5
<i>Avena sativa</i>	6,6,5	7	4
<i>Sinapis alba</i>	2,1	6	3
<i>Camelina sativa</i>	3,3,3	14	7
<i>Brassica napus</i>	5,4,5	10	5
<i>Raphanus sativus</i>	2,2,2	3	2



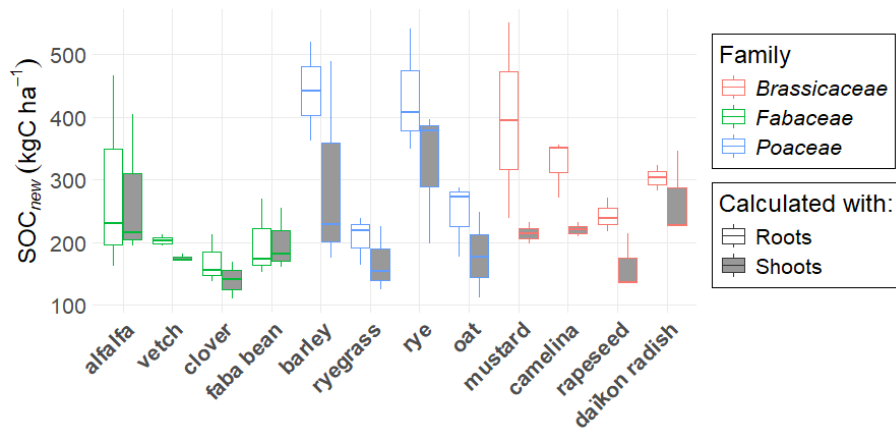
**Figure S1.** Mean temperature of the three climate chambers. Day 0 indicates the start of the climate simulation. Before the start, temperature was set to 20°C to ensure optimal seed emergence conditions. After harvest, temperature was set to 4°C to restrict mesocosms evolution while sampling.



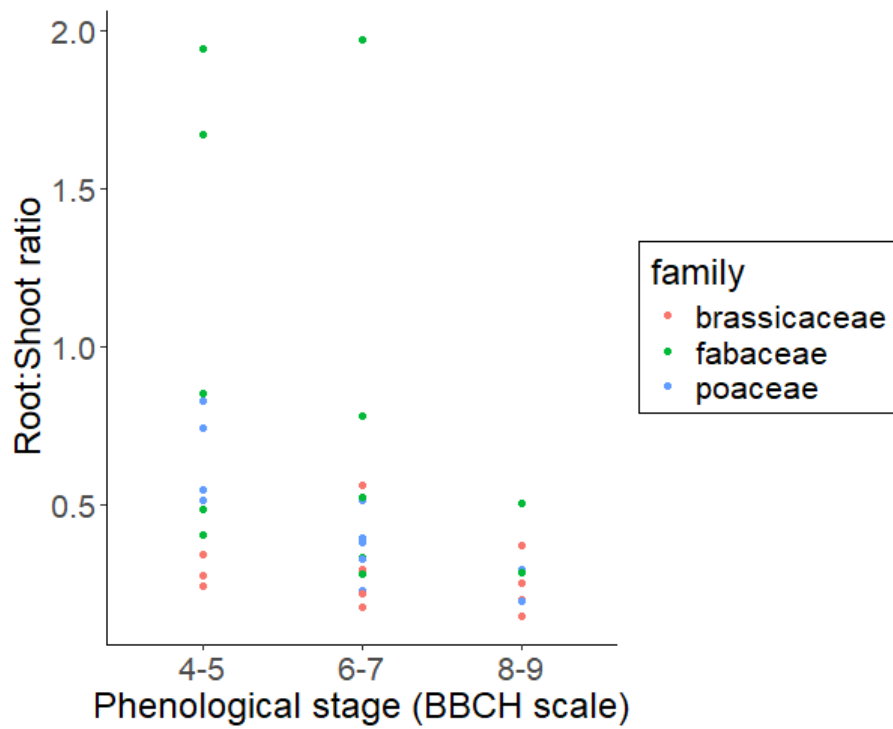
**Figure S2.** Isotopic signature of the  $^{13}\text{C}$ -CO<sub>2</sub> enriched air in the three climate chambers. Day 0 indicates the start of the climate simulation.



**Figure S3.** Isotopic signature of belowground (blank boxes) and aboveground (plain boxes) plant material for the 12 plants. The horizontal lines of the boxes display the 75<sup>th</sup>, the 50<sup>th</sup> and the 25<sup>th</sup> percentiles. The vertical lines in the centre of the boxes display the smallest and largest values within 1.5 times the interquartile range below the 25<sup>th</sup> and the 75<sup>th</sup> percentile respectively.



**Figure S4.** Comparison of  $\text{SOC}_{\text{new}}$  values calculated with the isotopic signature of roots (blank boxes) and shoots (plain boxes) as the plant end-member. The horizontal lines of the boxes display the 75<sup>th</sup>, the 50<sup>th</sup> and the 25<sup>th</sup> percentiles. The vertical lines in the centre of the boxes display the smallest and largest values within 1.5 times the interquartile range below the 25<sup>th</sup> and the 75<sup>th</sup> percentile respectively.



**Figure S5.** Root:Shoot ratio according to the phenological stage in the BBCH scale (Meier, 2003). An anova showed a non significant trend (p-value = 0.08).