Dataset on early growth of cover crops in growth chamber

Gaëlle Damour a,*, Chloé Guérin b, Marc Dorel b

a CIRAD, UPR GECO, F-34398 Montpellier, France
b CIRAD, UPR GECO, F-97130 Capesterre-Belle-Eau, France

1. Data description

The dataset presented in this article (doi:10.18167/DVN1/MNMXRZ) provides data on the growth of 17 species of cover crops grown as individuals in growth chamber during one month. It is composed of 17 rows and 18 columns. The first five columns are species names and abbreviation, botanical group and the times of the two plant harvest. The last thirteen columns are aboveground traits: five raw traits (seed mass, leaf area and plant biomass at emergence and after one month) and eight calculated traits. This data set is made available to enable comparisons between dataset, extended analysis and meta-analysis on cover crop traits. The data presented in this article were used on the research article entitled “Leaf area development strategies of cover plants used in banana plantations identified from a set of plant traits” [1].

* Corresponding author.
E-mail address: gaelle.damour@cirad.fr (G. Damour).
calculated traits (aboveground leaf mass fraction, plant-scale specific leaf area, aboveground leaf area ratio), aboveground absolute and relative growth rates on a biomass basis and on a leaf area basis. Table 1 presents the list of the species names along with their taxonomic groups. Table 2 presents the list of traits along with their units. Fig. 1 represents the diversity of the values obtained for two traits (aboveground specific leaf at the leaf scale and aboveground relative growth rate) for the 17 species of the dataset.

2. Experimental design, materials, and methods

The study was conducted in a growth chamber located at the CIRAD experimental station of Neufchateau in Guadeloupe (French West Indies).

Seventeen cover crop species (Table 2) were grown for one month in pots of 2 L. Each species was grown in ten pots, and one individual per pot was maintained after cotyledons emergence. Details on pot filling materials, seed preparation before sowing and sowing are provided in Damour et al. [1]. The pots were conducted in non-limiting conditions for plant growth during the duration of the experiment: the soil was at field capacity, the air temperature was 24 °C/22 °C (day/night), the light intensity was maintained at 512 μmol photons m−2 s−1 of photosynthetic active radiation [see 1].

Seed mass (SM) was determined after seed oven-drying at 70 °C until mass stabilization. When the first leaf was fully developed, five replicates of each species were harvested and pooled [see 1, for details on the harvest method]. The initial leaf area (LA0) was measured with WinRhizo Pro analytical software (Regent Instruments) and the initial aboveground biomass (BMa,0) was determined after oven-drying of the whole aboveground parts (at 70 °C until weight stabilization). After one month, the five remaining replicates of each species were harvested and pooled. Leaves and stems were separated. The total leaf area at one month (LA1) was measured with WinRhizo Pro and the leaves and stems
biomasses were determined after oven-drying (at 70 °C until weight stabilization). The aboveground biomass at one month \((BM_{a,1})\) was calculated as the sum of the leaf and stem biomasses.

Eight functional traits associated to leaf area development were then calculated [1]. The plant-scale leaf specific area \((SLA_{ps})\) was calculated as the ratio of the total leaf area and the total leaf mass. The aboveground leaf mass fraction \((LMF_a)\) was calculated as the ratio between the leaf mass and the total aboveground mass. The aboveground leaf area ratio \((LAR_a)\) was calculated as the product of \(SLA_{ps}\) and \(LMF_a\). The aboveground absolute growth rate was calculated both on a biomass basis and on a leaf area basis \((AGR_a, AGR_{as} \text{ respectively})\), using the equations:

\[
AGR_a = \frac{(BM_{a,1} - BM_{a,0})}{(t_1-t_0)} \tag{1}
\]

\[
AGR_{as} = \frac{(LA_1 - LA_0)}{(t_1-t_0)} \tag{2}
\]

The aboveground relative growth rate was calculated both on a biomass basis and on a leaf area basis \((RGR_a, RGR_{as} \text{ respectively})\), using the equations:

\[
RGR_a = \frac{\ln(BM_{a,1}) - \ln(BM_{a,0})}{(t_1-t_0)} \tag{3}
\]

---

### Table 1
List of the species available in the dataset.

| Abbreviation | Full names                        | Family    | Taxonomic classification |
|--------------|-----------------------------------|-----------|--------------------------|
| BD           | Bracharia decumbens               | Poaceae   | Monocot                  |
| BR           | Bracharia ruzziziensis            | Poaceae   | Monocot                  |
| CC           | Cajanus cajan                     | Fabaceae  | Dicot                    |
| CD           | Cynodon dactylon                  | Poaceae   | Monocot                  |
| CP           | Centrosema pascorum               | Fabaceae  | Dicot                    |
| CPal         | Crotalaria palida                 | Fabaceae  | Dicot                    |
| CS           | Crotalaria spectabilis            | Fabaceae  | Dicot                    |
| CZ           | Crotalaria zanzibarica            | Fabaceae  | Dicot                    |
| EC           | Eleusine coracana                 | Poaceae   | Monocot                  |
| PN           | Paspalum notatum                  | Poaceae   | Monocot                  |
| PP           | Pueraria phaseoloides             | Fabaceae  | Dicot                    |
| NCNC         | Vigna unguiculata var. CNC        | Fabaceae  | Dicot                    |
| NSPLM        | Vigna unguiculata var. splm1      | Fabaceae  | Dicot                    |
| NW           | Neonotonia wightii                | Fabaceae  | Dicot                    |
| RC           | Ricinus communis                  | Euphorbiaceae | Dicot                  |
| SG           | Stylosanthes guanensis           | Fabaceae  | Dicot                    |
| TP           | Tagetes patula                    | Asteracea | Dicot                    |

### Table 2
List of the traits provided in the dataset.

| Abbreviation | Full trait name                        | Unit     | Nature |
|--------------|----------------------------------------|----------|--------|
| SW           | seed weight                            | mg       | raw    |
| LA0          | initial leaf area                      | cm²      | raw    |
| LA1          | total leaf area at one month           | cm²      | raw    |
| BMa,0        | initial aboveground biomass            | g        | raw    |
| BMa,1        | aboveground biomass at one month       | g        | raw    |
| LMFa         | aboveground leaf mass fraction         | g/g      | calculated |
| SLAps        | plant-scale leaf specific area         | m²/kg    | calculated |
| LARa         | aboveground leaf area ratio            | m²/kg    | calculated |
| AGRa         | aboveground absolute growth rate on a biomass basis | mg/j | calculated |
| AGRas        | aboveground absolute growth rate on a leaf area basis | cm²/j | calculated |
| RGRa         | aboveground relative growth rate on a biomass basis | mg/g/j | calculated |
| RGRas        | aboveground relative growth rate on a leaf area basis | cm²/m²/j | calculated |
| NARa         | net assimilation rate                  | g/m³/j   | calculated |
The net assimilation rate (NARₐ) was calculated as the ratio between RGRₐ and LARₐ. All traits, except SLAₚₛ were measured according to the standardized protocols of trait measurements [2].

![Graphs showing SLAₚₛ and RGRₐ](image)

The **net assimilation rate** (NARₐ) was calculated as the ratio between RGRₐ and LARₐ. All traits, except SLAₚₛ were measured according to the standardized protocols of trait measurements [2].

**Author contributions**

Gaëlle Damour: Formal analysis, Data curation, Writing, Funding acquisition. Chloé Guérin: Methodology, Data acquisition, Formal analysis. Marc Dorel: Methodology, Supervision, Funding acquisition.

**Acknowledgments**

This experimental work was supported by the project ‘Plan Banane Durable’ from E.U. FEADER and this valorization by the project “TACOS” (ID 1702-014), which was publicly funded through ANR (the French National Research Agency) under the “Investissements d’avenir” programme with the reference ANR-10-LABX-001-01 Labex Agro and coordinated by Agropolis Fondation under the frame of I-SITE MUSE (ANR-16-IDEX-0006).
Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2020.105262.

References

[1] G. Damour, C. Guérin, M. Dorel, Leaf area development strategies of cover plants used in banana plantations identified from a set of plant traits, Eur. J. Agron. 74 (2016) 103–111, https://doi.org/10.1016/j.eja.2015.12.007.

[2] N. Perez-Harguindeguy, S. Diaz, E. Garnier, S. Lavorel, H. Poore, P. Jauregui-Berry, M.S. Bret-Harte, W.K. Cornwell, J.M. Craine, D.E. Gurvich, C. Urcelay, E.J. Veneklaas, P.B. Reich, L. Poorter, I.J. Wright, P. Ray, L. Enrico, J.G. Pausas, A.C. de Vos, N. Buchmann, G. Funes, F. Quetier, J.G. Hodgson, K. Thompson, H.D. Morgan, H. ter Steege, M.G.A. van der Heijden, L. Sack, B. Blonder, P. Poschlod, M.V. Valeretti, G. Conti, A.C. Staver, S. Aquino, J.H.C. Cornelissen, New handbook for standardised measurement of plant functional traits worldwide, Aust. J. Bot. 61 (2013) 167–234, https://doi.org/10.1071/bt12225.