Data in Brief 31 (2020) 105808

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

# A dataset on service crop phenotypic characteristics related to their ability to deliver a set of ecological functions

Gaëlle Damour[a,c,*], Charles Meynard[b,c], Steewy Lakhia[b,c], Mylène Ramassamy[b,c], Kelly Lakhia[b,c], Marc Dorel[b,c]

[a] CIRAD, UPR GECO, F-34398, Montpellier, France
[b] CIRAD, UPR GECO, F-97130, Capesterre-Belle-Eau, Guadeloupe, France
[c] GECO, Univ Montpellier, CIRAD, Montpellier, France

ARTICLE INFO

*Article history:*
Received 9 April 2020
Revised 13 May 2020
Accepted 22 May 2020
Available online 2 June 2020

*Keywords:*
Cover crops
Leaf traits
Plant traits
Biomass
Nutrient concentration
Ecosystem services

ABSTRACT

The dataset presented in this article describe 33 species or varieties of service crops cultivated in population under non-limiting conditions. The description was made at flowering. 41 variables were measured on leaves, stems, roots and seeds. They related to plant phenology (1), morphology (13), physiology (1), biochemistry (18), size (6) and reproduction (2). This dataset is made available to enable comparisons between datasets, extended analysis and meta-analysis on cover crops. The data presented in this article were partly used in the research article entitled "A trait-based characterization of cover plants to assess their potential to provide a set of ecological services in banana cropping systems" (Damour et al., 2014).



* Corresponding author.
*E-mail address:* gaelle.damour@cirad.fr (G. Damour).

https://doi.org/10.1016/j.dib.2020.105808

## Specifications Table

| | |
|---|---|
| **Subject** | Agricultural and Biological Sciences (General) |
| **Specific subject area** | Description of service crops and to be uses in multi-species cropping systems expected to deliver ecosystem services |
| **Type of data** | Table |
| **How data were acquired** | Field measures of plants and populations.<br>Instruments and methods:<br>Scanner and WinRhizo Pro analytical software (Regent Instruments) for leaf area measurements<br>10 cm × 10 cm mesh grid positionned on vertical soil profiles for root impacts observations<br>CHN analyser (Elementar Vario Macro Cube) and Dumas method for total C and N quantification<br>ICP-AES (Agilent 720) for P, K, Mg, Ca quantification |
| **Data format** | Raw<br>Analyzed |
| **Parameters for data collection** | Service crops were grown on andosols, under rain-fed regime and with no fertilization. The field was previously a highly fertilized banana crop; at the beginning of the experiment, the soil contained 65.6 g organic matter $kg^{-1}$, 38.0 g C $kg^{-1}$, 3.84 g N $kg^{-1}$ and 3.8 mg P $kg^{-1}$, with a pH of 5.65. The mean annual rainfall of the site was 3450 mm. Mean air temperature was 24 °C. These conditions were non-limiting for growth. |
| **Description of data collection** | The data were collected at the flowering stage of each species/variety on plant populations or individuals. For each species/variety, the aboveground biomass was collected on three 1$m^2$ and pooled; the organs were separated and weighted; leaf areas were measured. On each plot, three 1m-deep and 1 m-wide trenches were dug perpendicularly to the plantation rows and root impacts on the vertical soil profile were counted. Finally, on each plot, three individual plants were collected and their root system extracted from the soil; aboveground organs and roots were pooled, to describe the "mean plant" of the population, and weighted; chemical analysis were performed on these materials. |
| **Data source location** | City/Town/Region: Experimental station of Neufchateau, Capesterre Belle Eau<br>Country: Guadeloupe, French West Indies<br>Latitude and longitude (and GPS coordinates) for collected samples/data: 16°05′N, 61°35′W |
| **Data accessibility** | Repository name: Cirad Dataverse<br>Data identification number: /<br>Direct URL to data: doi:10.18167/DVN1/EZPGCP |
| **Related research article** | Damour G et al. 2014, A trait-based characterization of cover plants to assess their potential to provide a set of ecological services in banana cropping systems, European Journal of Agronomy, http://dx.doi.org/10.1016/j.eja.2013.09.004. |

## Value of the data

- The data represent plant, leaf and root descriptions of a large range of service crop species. They could be used by other researchers who need data on these species.
- The data enable other researchers to compare their own data with this dataset and to extent their analysis.
- These data could be used in meta-analysis on service crops.

## 1. Data description

The dataset presented in this article (doi:10.18167/DVN1/EZPGCP) is composed of 42 variables measured on 33 species or varieties of service crops at flowering. The length of the growing period is also reported, along with the sowing density and the plant density at the date of measurements. The list of the variables is provided in Table 1. Some of them describe the

**Table 1**
List of the variables provided in the dataset.

| Abbreviation | Variable name | Function | Organ |
|---|---|---|---|
| DAS | number of days after sowing | / | / |
| $d_{Sow}$ | sowing density | / | / |
| $d_{Plant}$ | number of individuals / $m^2$ | / | / |
| cycle | duration of plant life cycle | phenology | plant |
| SRR | shoot/root ratio | morphology | plant |
| QN | quantity of nitrogen in the whole plant | biochemistry | plant |
| $BM_a$ | total aboveground dry biomass | size | aboveground organs |
| H | plant height | size | aboveground organs |
| GH | growth habit | morphology | aboveground organs |
| $DMC_a$ | aboveground dry matter content | biochemistry | aboveground organs |
| $[N]_a$ | aboveground N content | biochemistry | aboveground organs |
| $[C]_a$ | aboveground C content | biochemistry | aboveground organs |
| $CN_a$ | aboveground C/N ratio | biochemistry | aboveground organs |
| $[P]_a$ | aboveground P content | biochemistry | aboveground organs |
| $[K]_a$ | aboveground K content | biochemistry | aboveground organs |
| $[Mg]_a$ | aboveground Mg content | biochemistry | aboveground organs |
| $[Ca]_a$ | aboveground Ca content | biochemistry | aboveground organs |
| $QN_a$ | quantity of nitrogen in the aboveground organs | biochemistry | aboveground organs |
| $BM_l$ | green leaf dry biomass | size | leaf |
| LAI | leaf area index | morphology | leaf |
| $LMF_a$ | aboveground leaf mass fraction | morphology | leaf |
| $SLA_{ps}$ | specific area at the plant scale | morphology | leaf |
| $LAR_a$ | aboveground leaf area ratio | morphology | leaf |
| $DMC_l$ | green leaf dry matter content | biochemistry | leaf |
| $BM_{sl}$ | stem & litter dry biomass | size | stem & litter |
| $DMC_{sl}$ | stem & litter dry matter content | biochemistry | stem & litter |
| $BM_r$ | root dry biomass | size | root |
| RD | mean rooting depth | size | root |
| $RID_{mean}$ | mean root impact density on the whole soil profile | morphology | root |
| $RID_{0\text{-}10}$ | root impact density in the 0–10 soil layer | morphology | root |
| $RID_{010\text{-}20}$ | root impact density in the 10–20 soil layer | morphology | root |
| $RID_{20\text{-}30}$ | root impact density in the 20–30 soil layer | morphology | root |
| $RID_{30\text{-}40}$ | root impact density in the 30–40 soil layer | morphology | root |
| $RID_{40\text{-}50}$ | root impact density in the 40–50 soil layer | morphology | root |
| $RID_{50\text{-}60}$ | root impact density in the 50–60 soil layer | morphology | root |
| Nod | presence of nodules | physiology | root |
| $[N]_r$ | root N content | biochemistry | root |
| $[C]_r$ | root C content | biochemistry | root |
| $CN_r$ | root C/N ratio | biochemistry | root |
| $[P]_r$ | root P content | biochemistry | root |
| $[K]_r$ | root K content | biochemistry | root |
| $[Mg]_r$ | root Mg content | biochemistry | root |
| $[Ca]_r$ | root Ca content | biochemistry | root |
| SM | seed fresh mass | reproduction | seed |
| Veg | capacity of the plant to reproduce from vegetative organs | reproduction | seed |

plant populations (*i.e.* they are on a $m^2$ basis) (22 variables), others the individual plant (20 variables). They related to plant phenology (1 variable), morphology (13 variables), physiology (1 variable), biochemistry (19 variables), size (6 variables) and reproduction (2 variables). They concern different plant organs: leaves (6 variables), stems and litter (2 variables), roots (17 variables), seeds (2 variables). Three other variables concern the whole plant, and 12 the aboveground parts of the plants. Most of variables are quantitative but four are qualitative. The list of the species and varieties is provided in Table 2, along with their taxonomic groups and families. The dataset is composed of 26 different species that belong to seven taxonomic families. Two species are represented by several varieties: *Sorghum bicolor* (3 varieties) and *Vigna unguiculata* (6 varieties). Table 3 presents a selection of 18 variables and 33 species/variety from the dataset. For one variable (height, H), the mean over 1 individuals and the associated standard deviation

**Table 2**
List of the species/cultivars included in the dataset.

| Abbreviation | Species name | Botanical classification | Family |
|---|---|---|---|
| ArachPin | *Arachis pintoi* | dicot | Fabaceae |
| BrachDec | *Brachiaria decumbens* | monocot | Poaceae |
| BrachRuz | *Brachiaria ruziziensis* | monocot | Poaceae |
| CajCaj | *Cajanus cajan* var. *Guadeloupe* | dicot | Fabaceae |
| CentPas | *Centrosema pascuorum* | dicot | Fabaceae |
| CrotalPal | *Crotalaria pallida* | dicot | Fabaceae |
| CrotJunc | *Crotalaria juncea* | dicot | Fabaceae |
| CrotRet | *Crotalaria retusa* | dicot | Fabaceae |
| CrotSpec | *Crotalaria spectabilis* | dicot | Fabaceae |
| CrotZanz | *Crotalaria zanzibarica* | dicot | Fabaceae |
| CynDact | *Cynodon dactylon* | monocot | Poaceae |
| DolLab | *Dolichos lablab* | dicot | Fabaceae |
| ElCor | *Eleusine coracana* | monocot | Poaceae |
| FagEsc | *Fagopyrum esculentum* | dicot | Polygonaceae |
| GlirSep | *Gliricidia sepium* | dicot | Fabaceae |
| ImpWal | *Impatiens waleriana* | dicot | Balsaminaceae |
| NeoWigh | *Neonotonia wightii* | dicot | Fabaceae |
| PaspNot | *Paspalum notatum* | monocot | Poaceae |
| PuerPhas | *Pueraria phaseolides* | dicot | Fabaceae |
| RicCom | *Ricinus communis* | dicot | Euphorbiaceae |
| SesbCer | *Sesbania cericea* | dicot | Fabaceae |
| SesInd | *Sesamum indicum* | dicot | Pedaliaceae |
| SorgBF80 | *Sorghum bicolor* var. *BF80* | monocot | Poaceae |
| SorgPap | *Sorghum bicolor* var. *papetier* | monocot | Poaceae |
| SorgWal | *Sorghum bicolor* var. *walagana* | monocot | Poaceae |
| StylGua | *Stylosanthes guianensis* | dicot | Fabaceae |
| TagPat | *Tagetes patula* | dicot | Asteraceae |
| VignCNC | *Vigna unguiculata* var. *CNC* | dicot | Fabaceae |
| VignDav | *Vigna unguiculata* var. *David* | dicot | Fabaceae |
| VignMor | *Vigna unguiculata* var. *Morondava* | dicot | Fabaceae |
| VignSPLM1 | *Vigna unguiculata* var. *SPLM1* | dicot | Fabaceae |
| VignSPLM2 | *Vigna unguiculata* var. *SPLM2* | dicot | Fabaceae |
| VignU462 | *Vigna unguiculata* var. *U462* | dicot | Fabaceae |

are presented. These variables were chosen because of their high relevance for ecology and/or agronomy studies. They include the variables used in the related research article Damour et al. [1].

## 2. Experimental design, materials, and methods

The experiment was conducted at the CIRAD experimental station of Neufchâteau in Guadeloupe (French West Indies) on andosols [2]. Mean annual rainfall and temperature provide favourable conditions for plant growth all year round (3450 mm and 24 °C respectively, means calculated over the 2009–2013 period). The field was previously a highly fertilized banana crop. At the beginning of the experiment, the soil contained 65.6 g organic matter $kg^{-1}$, 38.0 g C $kg^{-1}$, 3.84 g N $kg^{-1}$ and 3.8 mg P $kg^{-1}$, with a pH of 5.65. 33 species or varieties of services crops were studied (Table 2). Among them, 32 were manually sown, each on a 200 $m^2$ plot along 30-cm spaced rows. The sowing density ($\mathbf{d_{Sow}}$) was determined according to seed size. Three densities were used: 0.2, 0.5, 2 g of seeds/$m^2$. The last species (*Impatiens* sp), a shade-tolerant pluri-annual plant that easily grow from cuttings, was naturally growing in banana field on the experimental station. This species was observed on a plot where the few other spontaneous species were removed. The plots were rain-fed and no fertilization was applied as the previous crop was a highly fertilized banana crop that has provided high amounts of nutrients for the following crops.

**Table 3**
Selection of variables and species/variety from the dataset. For H, the mean value over 10 individuals is followed by the standard deviation in brackets.

| Species | cycle | Bma | H | GH | DMCa | [N]a | CNa |
|---|---|---|---|---|---|---|---|
| ArachPin | perennial | 1.477 | NA | creeping | 16.96 | 2.091 | 17.575 |
| BrachDec | perennial | 2.583 | NA | erected | 29.47 | 0.500 | 90.000 |
| BrachRuz | perennial | 1.074 | NA | erected | 27.94 | 0.410 | 108.268 |
| CajCaj | perennial | 1.393 | NA | erected | 38.44 | 2.070 | 23.464 |
| CentPas | annual | 0.085 | NA | erected | 22.55 | 2.700 | 16.959 |
| CrotalPal | annual | 0.548 | 1.44 (0.07) | erected | 20.62 | 1.256 | 36.903 |
| CrotJunc | annual | 0.321 | 3.24 (0.21) | erected | 23.85 | 1.513 | 29.551 |
| CrotRet | annual | 0.655 | NA | erected | 20.64 | 2.380 | 19.046 |
| CrotSpec | annual | 0.278 | 1.15 (0.08) | erected | 12.15 | 1.502 | 28.522 |
| CrotZanz | annual | 0.816 | NA | erected | 28.88 | 2.634 | 18.265 |
| CynDact | perennial | 1.243 | NA | creeping | 42.95 | 1.880 | 23.553 |
| DolLab | pluri-annual | 0.444 | 0.70 (0.09) | twining | 18.06 | 2.997 | 14.755 |
| ElCor | short annual | 0.407 | NA | erected | 20.96 | 2.660 | 16.297 |
| FagEsc | short annual | 0.063 | NA | erected | 9.50 | 4.353 | 9.026 |
| GlirSep | perennial | 1.526 | NA | erected | 25.71 | 1.390 | 34.496 |
| ImpWal | pluri-annual | 0.194 | NA | semi-erected | 6.91 | 2.930 | 13.713 |
| NeoWigh | perennial | 0.742 | NA | twining | 19.09 | 3.349 | 14.124 |
| PaspNot | perennial | 0.128 | 0.38 (0.04) | creeping | 23.41 | 1.269 | 32.569 |
| PuerPhas | perennial | 0.807 | 0.67 (0.05) | twining | 13.87 | 2.405 | 18.079 |
| RicCom | perennial | 0.524 | NA | erected | 22.50 | 2.140 | 20.542 |
| SesbCer | annual | 1.202 | 3.52 (0.39) | erected | 27.15 | 1.668 | 27.152 |
| SesInd | short annual | 0.646 | 1.52 (0.20) | erected | 24.30 | 2.406 | 21.047 |
| SorgBF80 | short annual | 0.611 | 2.79 (0.53) | erected | 18.40 | 1.611 | 27.337 |
| SorgPap | short annual | 1.020 | 5.54 (0.40) | erected | 15.05 | 1.573 | 25.671 |
| SorgWal | annual | 2.932 | 4.94 (0.33) | erected | 22.83 | 1.450 | 30.028 |
| StylGua | pluri-annual | 0.216 | 0.79 (0.06) | erected | 20.27 | 2.607 | 16.494 |
| TagPat | short annual | 0.085 | NA | erected | 13.55 | 1.860 | 23.640 |
| VignCNC | short annual | 0.148 | NA | semi-erected | 12.96 | 3.295 | 12.992 |
| VignDav | short annual | 0.098 | NA | semi-erected | 11.05 | 4.497 | 9.875 |
| VignMor | short annual | 0.259 | 0.55 (0.06) | semi-erected | 13.02 | 2.753 | 15.950 |
| VignSPLM1 | annual | 0.245 | 0.40 (0.04) | semi-erected | 12.66 | 2.142 | 20.761 |
| VignSPLM2 | short annual | 0.195 | NA | semi-erected | 11.62 | 2.893 | 14.452 |
| VignU462 | short annual | 0.126 | NA | semi-erected | 12.80 | 3.314 | 12.993 |

| Species | LAI | LMFa | SLAps | LARa | QNa | RD | RIDmean | Nod | CNr | SM |
|---|---|---|---|---|---|---|---|---|---|---|
| ArachPin | 12.59 | 0.11 | 42.71 | 4.79 | 30.90 | 24.91 | 2.6 | yes | 22.259 | 155.0 |
| BrachDec | 44.65 | 0.99 | 19.96 | 19.69 | 12.92 | 21.57 | 15.5 | no | 128.861 | 5.8 |
| BrachRuz | 17.48 | 0.91 | 23.00 | 21.01 | 4.66 | 21.52 | 19.4 | no | 120.605 | 16.0 |
| CajCaj | 1.49 | 0.07 | 16.13 | 1.09 | 29.89 | 24.48 | 3.3 | yes | 58.142 | 105.0 |
| CentPas | 3.30 | 0.47 | 18.62 | 8.74 | 2.42 | 21.62 | 5.4 | yes | 16.325 | 20.0 |
| CrotalPal | 5.30 | 0.32 | 30.47 | 9.76 | 8.83 | 23.47 | 6.9 | yes | 13.137 | 6.0 |
| CrotJunc | 2.77 | 0.36 | 23.27 | 8.43 | 5.43 | 25.02 | 10.1 | yes | 33.638 | 45.2 |
| CrotRet | 6.44 | 0.35 | 28.31 | 9.98 | 16.03 | 30.55 | 2.5 | yes | 46.470 | 22.0 |
| CrotSpec | 4.52 | 0.56 | 29.33 | 16.29 | 4.66 | 20.76 | 11.7 | yes | 36.103 | 6.0 |
| CrotZanz | 6.60 | 0.24 | 33.33 | 8.04 | 22.34 | 19.97 | 5.0 | yes | 41.945 | 4.0 |
| CynDact | 15.83 | 1.00 | 14.85 | 14.85 | 23.39 | 20.85 | 8.7 | no | 61.400 | 1.5 |
| DolLab | 2.55 | 0.27 | 21.05 | 5.72 | 13.60 | 18.85 | 4.5 | yes | 34.268 | 245.0 |
| ElCor | 1.43 | 0.26 | 14.03 | 3.67 | 12.02 | 10.48 | 0.8 | no | 28.447 | 3.0 |
| FagEsc | 1.36 | 0.51 | 38.50 | 19.44 | 3.04 | 18.00 | NA | no | 23.018 | 22.8 |
| GlirSep | 5.21 | 0.16 | 21.52 | 3.48 | 25.31 | 19.56 | 1.9 | yes | 35.162 | 109.7 |
| ImpWal | 11.97 | 0.88 | 8.57 | 7.54 | 6.40 | 5.32 | 1.9 | no | 13.889 | NA |
| NeoWigh | 4.17 | 0.96 | 38.54 | 36.87 | 25.47 | 19.23 | 2.9 | yes | 22.861 | 14.0 |
| PaspNot | 1.49 | 1.00 | 11.93 | 11.93 | 1.97 | 16.67 | 13.1 | no | 87.134 | 4.0 |
| PuerPhas | 3.50 | 0.14 | 31.27 | 4.34 | NA | 22.53 | 7.1 | yes | 33.603 | 14.0 |
| RicCom | 1.96 | 0.24 | 16.22 | 3.84 | 11.73 | 33.72 | 2.6 | no | 57.705 | 170.0 |
| SesbCer | 6.17 | 0.22 | 23.68 | 5.13 | 23.44 | 22.18 | 9.0 | yes | 23.376 | 8.0 |
| SesInd | 2.36 | 0.16 | 23.18 | 3.69 | 15.77 | 24.15 | 3.6 | no | 90.845 | 1.3 |
| SorgBF80 | 3.38 | 0.21 | 26.03 | 5.58 | 10.22 | 31.86 | 4.5 | no | 68.193 | 19.6 |
| SorgPap | 4.25 | 0.23 | 18.18 | 4.18 | 16.47 | 35.12 | 4.5 | no | 53.867 | 23.0 |
| SorgWal | 13.33 | 0.21 | 21.14 | 4.42 | 43.93 | 21.47 | 15.7 | no | 100.329 | 28.4 |
| StylGua | 2.63 | 0.45 | 27.34 | 12.22 | 6.11 | 22.45 | 6.0 | yes | 22.997 | 5.0 |
| TagPat | 1.06 | 0.45 | 27.59 | 12.35 | 1.65 | 23.95 | 6.9 | no | 63.771 | 4.0 |
| VignCNC | 1.80 | 0.44 | 28.62 | 12.53 | 5.01 | 27.42 | 4.1 | yes | 27.211 | 135.0 |
| VignDav | 1.27 | 0.43 | 30.60 | 13.22 | 4.62 | 32.19 | 3.0 | yes | 20.730 | 155.68 |
| VignMor | 2.73 | 0.31 | 34.33 | 10.56 | 7.30 | 33.54 | 2.7 | yes | 40.446 | 155.68 |
| VignSPLM1 | 2.33 | 0.28 | 34.48 | 9.49 | 5.41 | 26.81 | 2.6 | yes | 32.384 | 170.0 |
| VignSPLM2 | 1.73 | 0.29 | 30.42 | 8.89 | 5.89 | 36.36 | 2.9 | yes | 28.316 | 162.0 |
| VignU462 | 1.31 | 0.38 | 27.03 | 10.16 | 4.26 | 36.34 | 4.3 | yes | 24.942 | 155.68 |

Plant measurements were done at the flowering stage of each species/variety (when flowers were observed on 50% of the individuals) (**DAS**, the number of day between sowing and measurements). 41 variables related to plant phenology, morphology, size, physiology, biochemistry and reproduction were selected. They were chosen because of i) their complementarity to describe the different facets of plant functioning, ii) their high relevance for ecology and/or agronomy studies, ii) and their assumed relationship with the functions underlying the delivery of ecosystem services, particularly in banana agrosystems [1,3,4,5].

The duration of the plant life cycle (**cycle**) was scored according to four classes: short annual (< 3 months), annual, pluri-annual, and perennial. The growth habit (**GH**) was qualified as twining, creeping, semi-erected, or erected. The capacity of the plant to reproduce from vegetative organs (**Veg**) was determined from field observations (observation of vegetative multiplying organs - rhizome or stolons – or the ability of plants to grow from cuttings).

The density of plants at the time of measurements ($\mathbf{d_{Plant}}$) was counted within a 1m² frame.

Plant height (**H**) was measured as the distance between the ground level and the upper boundary of the vegetative tissues [5]. It was measured on 10 individuals within the population and averaged.

On each plot, plants' aboveground organs were collected on three 1 m² squares randomly chosen in the experimental plot and pooled. The green leaves were separated from the stems and dead leaves (called hereafter "litter"). All plant parts were stored in a cooler, which was kept moist using wet paper towel, until measurements. Just after collection, the cooler was brought to the laboratory. Green leaves on the one hand and stems and litter on the other hand were weighted. Immediately after, the total leaf area was determined from a sub-sample of leaves using a scanner and WinRhizo pro (Regent Instruments). The leaf area index (**LAI**) was then calculated as the total leaf area divided by the soil area from which the plants were collected (*i.e.*$3 \times 1\text{m}^2$). Green leaves on the one hand and stems and litter on the other hand were then oven-dried at 70 °C for 72 h and weighted to determine their dry biomasses on a soil area basis (green leaf dry biomass, $\mathbf{BM_l}$, and stem and litter dry biomass, $\mathbf{BM_{sl}}$). The total aboveground dry biomass on a soil area basis ($\mathbf{BM_a}$) was then calculated as the sum of $BM_l$ and $BM_{sl}$. The aboveground leaf mass fraction ($\mathbf{LMF_a}$) was calculated as the ratio between $BM_l$ and $BM_a$. The specific leaf area on a plant scale ($\mathbf{SLA_{ps}}$) was calculated as the ratio between the total leaf area and $BM_l$. The aboveground leaf area ratio ($\mathbf{LAR_a}$) was calculated as the product of $SLA_{ps}$ and $LMF_a$. Green leaf dry matter content ($\mathbf{DMC_l}$) and stem and litter dry matter content ($\mathbf{DMC_{sl}}$) were determined as the ratio between their dry weights and their fresh weights. Aboveground dry matter content ($\mathbf{DMC_a}$) was calculated as the ratio between $BM_a$ and the aboveground fresh biomass (the sum of the fresh biomasses of the green leaves and stems and litter).

On each plot, three 1m-deep and 1 m-wide trenches were dug perpendicularly to the plantation rows. Root impacts on the vertical soil profile were counted on a 10 cm × 10 cm mesh grid. The root impact density in each 10 cm soil layer from 0 to 60 cm ($\mathbf{RID_{i\text{-}i+10}}$, with i in {0, 10, 20, 30, 40, 50}) was calculated as the number of root impacts /dm² in this layer, averaged over the three profiles. The mean root impact density on the whole soil profile ($\mathbf{RID_{mean}}$) was calculated as mean of all $RID_{i\text{-}i+10}$. The mean rooting depth (**RD**) was calculated as the mean of the soil layer depths weighted by the $RID_{i\text{-}i+10}$:

$$RD = \frac{\sum_i (i+5).RID_{i-i+10}}{\sum_i RID_{i-i+10}} \text{ withiin } \{0, 10, 20, 30, 40, 50\})$$

RD was averaged over the three soil profiles.

Three individuals well-developed and free of pest or disease damage were chosen within the plot population. Their aboveground organs were collected and pooled to describe the "mean plant" of the population. Their root systems were carefully extracted from the soil and similarly pooled. The presence of nodules (**Nod**) was observed before washing above a 2 mm sieve to eliminate soil particles. The aboveground organs and the roots were oven-dried separately at 70 °C for 72 h, and weighted. The plant root dry biomass ($\mathbf{BM_r}$) was calculated as the mean dry biomass for one individual (harvested roots dry biomass divided by 3). The shoot/root ratio (**SRR**)

was calculated as the ratio between the plant aboveground dry biomass and the plant root dry biomass.

Samples of aboveground organs and roots were then taken for chemical analysis. Total carbon and nitrogen contents on a mass basis ($\mathbf{[C]_a}$ and $\mathbf{[N]_a}$ for the aboveground organs, $\mathbf{[C]_r}$ and $\mathbf{[N]_r}$ for the roots) were determined according to Dumas method, using a CHN analyser (Elementar Vario Macro Cube). Phosphorus, potassium, magnesium and calcium contents on a mass basis ($\mathbf{[P]_a}$, $\mathbf{[K]_a}$, $\mathbf{[Mg]_a}$ and $\mathbf{[Ca]_a}$ for the aboveground organs, $\mathbf{[P]_r}$, $\mathbf{[K]_r}$, $\mathbf{[Mg]_r}$ and $\mathbf{[Ca]_r}$ for the roots) were determined by inductively coupled plasma atomic emission spectroscopy (ICP-AES) (Agilent 720) after sample mineralization by double calcination and HF addition for $SiO_2$ removal. The C/N ratio of the aboveground organs and of the roots (respectively $\mathbf{CN_a}$ and $\mathbf{CN_r}$) were calculated.

The quantity of nitrogen in the aboveground organs ($\mathbf{QN_a}$) and in the whole plant (QN) were calculated:

$$QN_a = BM_a.[N]_a/100$$
$$QN = QN_a + d_{Plant}.(BM_r.[N]_r)/100$$

Seed fresh mass (**SM**) was determined after counting the number of seeds present in a 500 mg - 1 g sample.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

## CRediT authorship contribution statement

**Gaëlle Damour:** Formal analysis, Funding acquisition, Data curation, Writing - review & editing. **Charles Meynard:** Funding acquisition, Data curation, Formal analysis. **Steewy Lakhia:** Funding acquisition, Data curation, Formal analysis. **Mylène Ramassamy:** Funding acquisition, Data curation, Formal analysis. **Kelly Lakhia:** Funding acquisition, Data curation, Formal analysis. **Marc Dorel:** Methodology, Funding acquisition, Data curation, Supervision.

## Acknowledgments

This experimental work was supported by the projects “AGROECOTROP” from E.U. FEDER and “Plan Banane Durable” from E.U. FEADER. This valorization was supported by the project “TACOS” (ID 1702-014), which was publicly funded through ANR (the French National Research Agency) under the "Investissements d’avenir" program 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). The authors thank the laboratory “CIRAD US 49″ for chemical analysis and Raphaël Achard for a critical appraisal of the data acquired.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.105808.

## References

[1] G. Damour, M. Dorel, H. Tran Quoc, C. Meynard, J.M. Risede, A trait-based characterization of cover plants to assess their potential to provide a set of ecological services in banana cropping systems, Eur. J. Agron. 52 (2014) 218–228, doi:10.1016/j.eja.2013.09.004.

[2] FAO, World Reference Base For Soil Resources 2014: International Soil Classification System for Naming Soils and Creating Legends For Soil Maps, FAO, Rome, 2014.

[3] G. Damour, E. Garnier, M.L. Navas, M. Dorel, J.M. Risede, Using functional traits to assess the services provided by cover plants: a review of potentialities in banana cropping systems, in: D.L. Sparks (Ed.), Advances in Agronomy, 34, Elsevier Academic Press Inc, San Diego, USA, 2015, pp. 81–133.

[4] F. de Bello, S. Lavorel, S. Diaz, R. Harrington, J.H.C. Cornelissen, R.D. Bardgett, M.P. Berg, P. Cipriotti, C.K. Feld, D. Hering, P.M. da Silva, S.G. Potts, L. Sandin, J.P. Sousa, J. Storkey, D.A. Wardle, P.A. Harrison, Towards an assessment of multiple ecosystem processes and services via functional traits, Biodivers. Conserv. 19 (2010) 2873–2893, doi:10.1007/s10531-010-9850-9.

[5] N. Perez-Harguindeguy, S. Diaz, E. Garnier, S. Lavorel, H. Poorter, P. Jaureguiberry, 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. Vaieretti, 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, doi:10.1071/bt12225.