

A global dataset gathering 37 field experiments involving cereal-legume intercrops and their corresponding sole crops

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Authors' contributions

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Main features of the global dataset

This global dataset gathers the results of 37 field experiments, which involved cereal-legume intercrops and their corresponding sole crops. The field experiments were carried in 5 European countries (France, Denmark, Italy, Germany and England) from 2001 to 2017 (Figure 1). The global dataset includes 5 legume species (chickpea, faba bean, lentil, lupin and pea), 3 cereal species (barley, durum wheat and soft wheat) and 8 resulting intercrops. In total, the global dataset contains 299 sole crop and 308 intercrop experimental units, one given experimental unit being defined as the unique combination of {site, year, crop management}, with the crop management including species and cultivar choice as well as agricultural interventions (sowing conditions, inputs, ...).

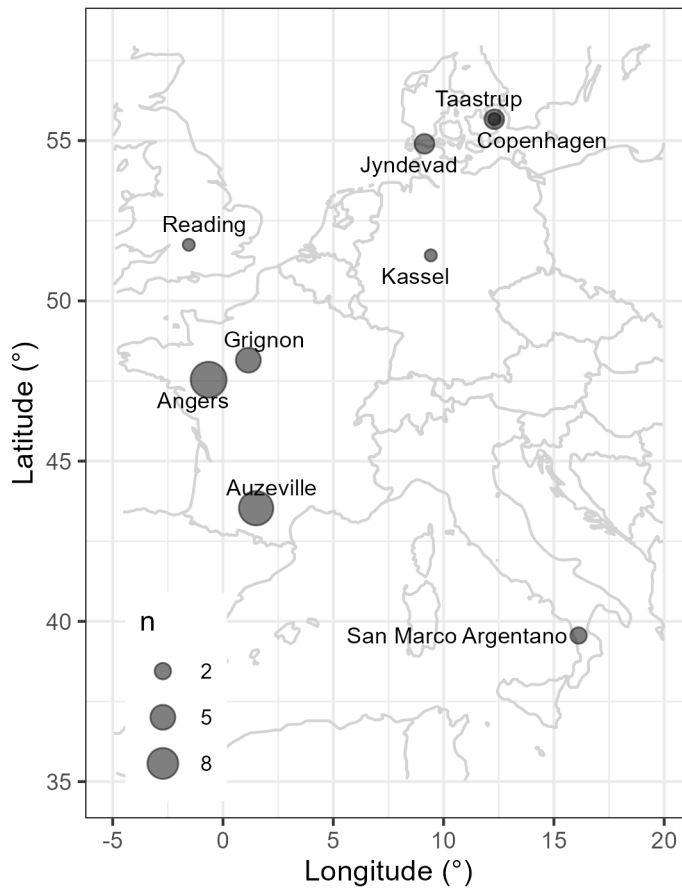


Figure 1. Number of field experiments (size of the circle) conducted at each location.

The global dataset includes four tables, all sharing a common identifier (*experiment_id*):

- *data_trials.csv*: the global features describing the experimental sites,
- *data_management.csv*: the agricultural management actions carried out on each of the experimental sites,
- *data_traits.csv*: measured plant and crop characteristics,

- *data_climate.csv*: climate for the experimental sites, retrieved from NASA POWER API (Sparks, 2018).

Additionally, a metadata file is provided (*metadata.xlsx*), describing the table to which the variables belong (*variable_type*, i.e. trials, management, traits or climate), their name (*variable_name*), their significance (*description*) and their unit (*unit*). Finally, a table including the original references related to experimental files gathered (*references.xlsx*) is also provided, listing the reference publications for 26 of the 37 experiments (Knudsen et al., 2004; Corre-Hellou et al., 2006; Hauggaard-Nielsen et al., 2008; Hauggaard-Nielsen et al., 2009a; b; Launay et al., 2009; Bedoussac and Justes, 2010a; b; Naudin et al., 2010, 2014; Barillot et al., 2014; Pelzer et al., 2016; Tang et al., 2016; Viguier et al., 2018; Kammoun et al., 2021). An overview of the global dataset is presented hereafter, focusing on crop species grown and the plant measurements.

Focus on the crop species cultivated

The global dataset includes 8 crop species (Table 1), among wich 3 cereals (barley, durum and soft wheat) and 5 grain legumes (chickpea, faba bean, lentil, lupin, and pea). Each species can be grown in one or more experiment, with one experiment corresponding to a unique combination of {site, year}, and is represented by 1 or more cultivars.

Table 1. Summary of crop species studied.

Plant family	Cropping season	Species	No. Cultivars	No. Experiments
cereal	spring	barley	3	15
cereal	spring	soft wheat	2	2
cereal	winter	soft wheat	6	12
cereal	winter	durum wheat	7	8
legume	spring	fababean	1	6
legume	spring	lentil	4	2
legume	spring	lupin	1	6
legume	spring	pea	3	15
legume	winter	chickpea	1	1
legume	winter	fababean	4	5
legume	winter	pea	13	17

Each experiment includes at least one cereal-legume species mixture, with the two species sown simultaneously in winter or spring, resulting in 8 types of intercrops (Table 2).

Table 2. Summary of intercrops (cereal_legume) studied.

Cropping season	Intercrop	No. Experiments
spring	barley_fababean	6
spring	barley_lupin	6
spring	barley_pea	15
spring	soft wheat_lentil	2
winter	soft wheat_pea	12

Cropping season	Intercrop	No. Experiments
winter	durum wheat_chickpea	1
winter	durum wheat_fababean	5
winter	durum wheat_pea	5

Focus on the plant characteristics measured

Pooling the 37 field experiments, a total of 26 plant variables were measured, but not systematically in all experiments (Table 3). Some of these variables were measured dynamically during the growth cycle. Finally, the global dataset contains 33351 observations, among which 12896 were measured in sole crops and 20455 in intercrops.

Table 3. Summary of plant variables measured (see metadata file for the precise meaning of each variable).

Plant variable	No. Experiments
biomass seed	37
biomass shoot	37
BBCH	35
height	31
plant density	31
nitrogen abs shoot	30
tkw	30
nitrogen seed	29
nitrogen abs seed	24
nitrogen shoot	22
nitrogen veg	20
lai	18
nitrogen abs veg	15
cover	12
nitrogen abs shoot fixation	11
reproductive organ number	10
biomass stem	9
sla greenleaftendril	9
biomass leaf	8
branching	8
biomass leaftendril	7
carbon nitrogen shoot	7
carbon shoot	7
flower layer	7
leaf layer	6
rie	6

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