List of input variables and measured variables for French data set – Phase 4

Variables in blue are the measrements available for calibration

Column name Where information is repeated for several layers or doses, just one is given here	explanation	Unit
Number	ID	
Site	Name of location → anonymised	
HarvestYear	Harvest year	YYYY
SowingDate	Sowing date	DD/MM/YYYY
Variety	Crop variety	
Station	Anonymised number of related weather station → connection of site to weather station	
Longitude	Longitude → set to NA	
Latitude	Latitude	
Altitude	Altitude	m
Soil_type	Soil type	
Soil_code	Soil code	code
Arvalis_name_for_soil	Arvalis name for soil	
Water_regime	Water regime; 1: rapid drainage: coarse structure or high porosity 2: favorable drainage: no risk of excess water below 90 cm	.
N_Horizons	Number of soil layers	
Thickness_H1	Thickness of layer 1	cm
Field_capacity_H1	Gravimetric field capacity by layer in %	(g/100g)
Wilting_point_H1	Gravimetric Wilting point layer 1 in %	(g/100g) (pF 4.2)
Apparent_density_H1	Apparent density of soil layer 1	kg/dm^3 ($=g/cm^3$)
Available_water_H1	Available water layer 1	See formula below (mm)
Clay_H1	Clay layer 1	% by weight (g/100g)
Fine_silt_H1	Fine silt layer 1	% by weight (g/100g)
Coarse_silt_H1	Coarse silt layer 1	% by weight (g/100g)
Fine_sand_H1	Fine sand layer 1	% by weight (g/100g)

Coarse_sand_H1	Coarse sand layer 1	% by weight (g/100g)
Clay_without_CaCO3_H1	Clay without CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
Fine_silt_without_CaCO3_H1	Fine silt without CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
Coarse_silt_without_CaCO3_H1	Coarse silt without CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
Fine_sand_without_CaCO3_H1	Fine sand without CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
Coarse_sand_without_CaCO3_H1	Coarse sand without CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
CaCO3_total_H1	Total CaCO3 layer 1 0 means missing data.	% by weight (g/100g)
Organic_matter_H1	Organic matter layer 1	% by weight (g/100g)
Stones_H1	Stones layer 1	% vol
Stone_size_H1	Stone size layer 1	cm
Water_pH_H1	Water pH layer 1	
Initial_available_soil_water	Initial available soil water	Ignore this value!
Available_soil_water,_volumetric	Available soil water, volumetric See formula below.	mm
Local_station	Local station	code
Historic_station	Historic station	code
Protocol	Protocol	code
Experiment_code	Experiment code	code
Species	Species	
Sowing_density	Sowing density	Number of grains/m^2
Number_of_fertilizer_doses	Number of fertilizer applications	
Total_amount_of_fertilizer	Total amount of fertilizer	kg N/ha
Date_fertilization_1	Date of first application	DD/MM/YYYY
Amount_fertilization_1	Amount of first application	kg N/ha
Product_fertilization_1	See details below	
Number_of_irrigations	Number of irrigations	
Total_irrigation	Total amount of water for irrigation	mm
Date_irrigation_1	Date of first irrigation	DD/MM/YYYY
Amount_irrigation_1	Amount of first irrigation	mm
%N_in_grain_at_harvest	Nitrogen content in grain	%
Biomass_straw_at_harvest	Biomass of straw at harvest	g/m^2
%_N_in_straw_at_harvest	Nitrogen content in straw	%
Harvest_Index	Biomass of grain devided by biomass of straw at harvest	
HarvestDate	Date of machine harvest	DD/MM/YYYY

Observations	Explanation	Unit
useCat	Category for which dataset is used (training or evaluation)	
Date	Date of observation	DD/MM/YYYY
Date_BBCH10	Date of observed stage BBCH10 (beginning of stem elongation), was not observed in the experiment	DD/MM/YYYY
Date_BBCH30	Date observed stem 1 cm This is stage BBCH30 (beginning of stem elongation)	DD/MM/YYYY
Date_BBCH55	Date of observed stage BBCH55 (50% heading)	DD/MM/YYYY
Date_BBCH90	Date of observed stage BBCH90 (maturity): Maturity data was not measured, but was set to 15 days before harvest. We ask all participants to use this date, to avoid having each team do a different estimation of maturity date and thereby add extra variability to the results.	DD/MM/YYYY
Biomass	Above ground Biomass measured at "Date"	g/m^2
EarsPerSqm	Ears per m^2	$1/m^2$
Grain_Number	Grains per m^2	$Grains/m^2$
ProteinContentGrain	Protein content in grain at harvest 0 means missing data.	%
N_in_biomassHarvest	Airborne nitrogen content at machine harvest	%
Grain_Yield	Dry weight of grain at harvest	g/m^2

Further information

Fertilizer products :

product	Formula	%N	%P	%K	%S	
Ammonitrate	NH_4NO_3	33.5				
Solution azotée (urea)	$CO(NH_2)_2$	46				
18_46 (Di-Ammonium Phosphate DAP)	$(NH_4)_2HPO_2$	18	46			

Sowing depth : About 3 cm

Irrigation method: sprinkler (in French, water canon).

Formula for available water (mm water in each soil layer)

RU = (Hcc tf – HpFp tf) * Da tf * % Vol tf * E)+ (Hcc cx – HpFp cx) * Da cx * % Vol cx * E)

RU : Available water in cm^3 water/ cm^3 soil *100
Hcc tf : Field capacity of fine soil g/100g
HpFp tf : Wilting point of fine soil g/100g
Hcc cx : Field capacity of stones g/100g
HpFp cx : Wilting point of stones g/100g
Da tf : Apparent density of fine soil
Da cx : Apparent density of stones g/cm^3
% Vol tf : Fraction of volume that is fine soil (value between 0 and 1)
% Vol cx : Fraction of volume that is stones (value between 0 and 1))
E : Depth of the layer in cm

Initial values of soil water and Nitrogen

No measurements are available. Please use following approximations:

Soil water: Start on August 1. At that date, soil layer 1 is dry (0 water) and all other layers are at permanent wilting point. That is about harvest time of previous wheat, in summer when soil is dry.

Soil Nitrogen : 35kg/ha at time of sowing

To make the connection between site and weather file :

Use the station numbers used in the sheet names of the weather file and given in the data input file.