Figure S1 Daily rainfall (grey bars), irrigation (blue bars) and mean daily temperature (red line) for the pre-crop + fallow period and during the wheat crop in Experiment I (**A**) and Experiment II (**B**). Meteorological data were obtained from a weather station located on the INRA experimental site of Bretenière. Horizontal dotted arrows indicate the pre-crop + fallow period and the period of the wheat crop in the second year.

Table S1 Soil characteristics in Experiments I and II.

	Experiment I (2014-2015)	Experiment II (2016-2017)
Clay (g kg^{-1})	425	512
Silt (g kg^{-1})	515	428
Sand (g kg^{-1})	60	60
Organic C (g kg^{-1})	19.3	19.6
Organic N (g kg^{-1})	1.69	1.81
C:N ratio	11.4	10.8
pH	7.31	7.8
CaCO$_3$ (g kg^{-1})	<1	4

Table S2 Pre-crops and wheat characteristics and management in Experiments I and II (from [17]).

Pre-crop treatments	Pre-crop sowing period	Pre-crop harvest date	Incorporation of pre-crop residues in the soil	Wheat sowing date	Wheat harvest date
Experiment 1 (2014-2015)					
Fava bean		25 July 2014			
Lupin	March (spring)	1 August 2014	21 August 2014	20 October 2014	6 July 2015
Pea		1 July 2014			
Barley + N		15 July 2014			
Chickpea		16 September 2014			
Common bean	May (summer)	4 September 2014	3 October 2014	20 October 2014	6 July 2015
Soybean		5 September 2014			
Sorghum + N		5 September 2014			
Experiment 2 (2016-2017)					
Fava bean		2 August 2016			
Lupin	March (spring)	12 August 2016	2 September 2016	24 October 2016	6 July 2017
Pea		13 July 2015			
Barley + N		20 July 2016			
Chickpea		12 September 2016			
Common bean	May (summer)	12 September 2016	27 September 2016	24 October 2016	6 July 2017
Soybean		12 September 2016			
Sorghum + N		14 September 2016			

Table S3 Amounts, N contents and C:N ratios of pre-crops residues incorporated in soil before wheat sowing in Experiments I and II (from [17]).

Crop residues	Experiment 1 (2014-2015)				Experiment 2 (2016-2017)			
	t DM ha^{-1}	g N 100 g^{-1}	kg N ha^{-1}	C:N ratio	t DM ha^{-1}	g N 100 g^{-1}	kg N ha^{-1}	C:N ratio
Fava bean	4.06	1.37	55.6	34.2	6.55	1.36	88.9	34.2
Lupin	2.91	0.69	20.0	69.7	3.54	0.72	25.6	65.7
Pea	4.05	0.72	29.2	64.6	3.49	1.73	60.2	26.7
Barley + N	4.79	0.63	30.2	73.2	3.83	0.80	30.6	56.6
Chickpea	7.21	2.03	146.4	23.4	5.13	1.01	51.9	45.0
Common bean	3.11	1.46	45.3	28.8	2.73	1.46	39.8	29.5
Soya bean	5.42	0.93	50.5	47.8	3.31	0.86	28.6	55.8
Sorghum + N	5.47	0.88	48.2	50.0	7.03	0.53	37.6	82.7