Table S1 Site characteristics from a global meta-analysis of 59 studies.

Reference	Country	Site	Vegetation type	MAT[a] (°C)	MAP[b] (mm)	Elevation (m asl)
Abid and Lal (2009)	USA	The Waterman Farm of The Ohio State University, Columbus	Maize	11	1016	
Abu and Abubakar (2013)	Nigeria	The experimental field of the Institute for Agricultural Research, Ahmadu Bello University	Soybean		1011 ± 161	686
Afyuni and Wagger (2006)	USA	Lower Coastal Plain Research Station, North Carolina	Corn and Soybean			
Alletto and Coquet (2009)	France	An agricultural field in the large alluvial corridor of the Garonne River	Maize			
Anikwe and Ubochi (2007)	Nigeria	Faculty Research Farm of Faculty of Agriculture and Natural Resources Management, Enugu State University of Science and Technology	Sweet potato		1700~2010	450
Azooz and Arshad (1996)	Canada	Dawson Creek site and Rolla site	Barley and canola	0.9	504	
Azooz et al. (1996)	Canada	Dawson Creek site and Rolla site	Barley and canola	0.9	504	
Blanco-Canqui et al. (2017)	USA	The University of Nebraska’s Rogers Memorial Farm	Corn and soybean		693	368
Blanco-Canqui et al. (2004)	USA	Midwest Research Claypan Farm (McCredie), Kingdom City, MO	Corn and soybean			
Buczko et al. (2006)	Germany	Two agricultural sites in Northern Germany: Lietzen in Brandenburg and Adenstedt in Lower Saxony	Rye and winter wheat	8	550~700	55~185
Busari (2017)	Nigeria	The Federal University of Agriculture, Abeokuta	Maize	30~37	1058	
Cai et al. (2012)	China	An experimental field in the Dingxi County	Wheat and pea	6.4	390.9	2000

Cameira et al. (2003)	Portugal	An Experimental Farm located in the Sorraia River Watershed	Maize			
Celik and Ersahin (2011)	Turkey	A field experiment at the Agricultural Experimental Station of Cukurova University, Adana	Wheat, soybean and corn	20	670	32
Cui et al. (2013)	China	A field experiment in Ningxiang County of Hunan Province	Rice	16.8	1360	80
Curtis and Claassen (2009)	USA	Three research sites in northern California	Grass	2.6~6.3	937~1669	583~1601
Du et al. (2011)	China	Luancheng Agro-Ecosystem Experimental Station of Chinese Academy of Sciences	Wheat and maize	12.5	536	50.1
Fasinmirin (2011)	Brazil	An experimental site of the Department of Soils, Federal University of Santa Maria		22		
Gao and Zhang (2010)	China	Dry farming experimental station of Gansu Agricultural University	Maize	6.4	390.9	2000
Gómez et al. (1999)	Spain	An experimental olive orchard in Santaella	Olive		606	
Haruna et al. (2018)	USA	Lincoln University's Freeman Center	Corn			166
Hati et al. (2015)	India	The research farm of Indian Institute of Soil Science, Bhopal	Soybean and wheat		1130	485
He et al. (2009)	China	A long-term tillage experiment located in the village of Chenghuang	Winter wheat	10.7	555	456
Huang et al. (2015)	China	An experimental site in Beiqiu, the YRD	Wheat and maize	13.5	600	
Iqbal et al. (2005)	Pakistan	The Research Area of Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad	Wheat			
Jabro et al. (2016)	USA	The North Dakota State University Williston Research Extension Center irrigated research farm	Wheat			

Jarecki and Lal (2005)	USA	Ohio Agricultural Research and Development Center Western and North Western Branch Research Farm	Corn and soybean	9.9~10.8	845~1043	
Jemai et al. (2012)	Tunisia	Hamrounia region, near the municipality of Mateur	Wheat	18.2	560	153
Johnson-Maynard et al. (2007)	USA	The University of Idaho's Kambitsch Research Farm	Pea, wheat and barley		695	
Kahlon et al. (2013)	USA	The Waterman Farm of the Ohio State University	Wheat	11	1016	
Kahlon and Chawla (2017)	India	The Research Farm of the Department of Soil Science, Punjab Agricultural University	Wheat and maize			247
Kreiselmeier et al. (2020)	Germany	An experimental field with a Haplic Luvisol in Eastern Germany	Wheat and sugar beet			275
Liebig et al. (2004)	USA	The long-term cropping system experiments in Morton County	Wheat and sunflower	4	409	
Liu et al. (2018)	China	Fengqiu County, Henan Province	Wheat and poplar trees	13.9	615	65~73
Lozano et al. (2016)	Argentina	An experimental field in the Pampas region	Wheat and soybean		1000	
Luo et al. (2005)	China	An experimental field in the Dingxi County	Wheat and pea	6.4	390.9	2000
Mart ńez et al. (2008)	Chile	The Antumapu Experimental Station of the University of Chile	Wheat and maize		330	608
Moebius-Clune et al. (2008)	USA	A long-term controlled experiment located at Chazy	Maize			
Moebius et al. (2007)	USA	Cornell University research farms in Willsboro, Chazy and Aurora in New York	Maize			
Nouri et al. (2018)	USA	An experimental field at the University of Tennessee's West Tennessee Research and Education Center	Wheat and soybean	15.6	1350	
Obalum and Obi (2010)	Nigeria	Three experimental plots at Nsukka	Sorghum and soybean		1600	

Osunbitan et al. (2005)	Nigeria	Teaching and Research Farm of the Obafemi Awolowo University			1350	
Ouellet et al. (2008)	Canada	Agricultural fields located throughout eastern Ontario	Corn and soybean			
Pan et al. (2016)	China	Changwu State Key Loess Plateau Agro-Ecological Experimental Station of the Chinese Academy of Sciences	Maize	9.1	578.5	
Park and Smucker (2005)	USA	Wooster and Hoytville research sites of the Ohio Agricultural Research and Development Center	Corn			
Parvin et al. (2014)	Sweden	An experimental site managed by the Swedish University of Agricultural Sciences, Uppsala	Barley			
Sasal et al. (2006)	Argentina	The Pergamino Experimental Station of the Instituto Nacional de Tecnología Agropecuaria	Soybean		1000	
Schlüter et al. (2020)	Germany	The long-term field in Lüttewitz	Wheat and sugar beet	8.1	643	275
Sharma et al. (2005)	India	A field experiment at Hayathnagar Research Farm	Sorghum and castor	25.7	746	515
Sharma et al. (2009)	India	A field experiment at Hayathnagar Research Farm	Sorghum and mung bean		750	515
Singh et al. (1996)	Canada	The Ellerslie Research Station	Barley		455	694
Singh and Malhi (2006)	Canada	Experiments were located at Innisfail in central Alberta and at Rimbey in north-central Alberta	Spring barley		450~500	912~945
Soracco et al. (2010)	Argentina	An experiment site near the town of San Antonio de Areco	Soybean		1100	
Stone and Schlegel (2010)	USA	An experimental field near Tribune, Kansas	Wheat and sorghum	11.2	425	1108
Tan et al. (2002)	Canada	Two 2-ha field sites	Soybean			

Villarreal et al. (2017)	Argentina	The experiment was carried out near the town of Chascomús	Soybean		1000	
Vogeler et al. (2009)	Germany	The long-term fertilization trial at the Institute for Crop and Soil Science, called Feldversuch 4	Wheat and beans	9	620	
Wu et al. (2014)	China	Dry farming experimental station of Gansu Agricultural University	Wheat and pea	6.4	390.9	2000
Xu and Mermoud (2001)	China	An experimental site in the Xiongxian area	Summer maize		540	

[a] Mean annual temperature; [b] Mean annual precipitation.

Table S2 Experimental conditions from a global meta-analysis of 59 studies.

Reference	N^a	Measurement technique[b]	Measurements IR^c	K_{sat}^d	OMC[e] (%)	Time interval from tillage conversion to measurement (yr)	General descriptions
Abid and Lal (2009)	2	Double ring (15~24)	√		2.59~3.79	13 (1994~2007)	The infiltration measurements were done at the initial soil water content corresponding to approximately field capacity.
Abu and Abubakar (2013)	6	Constant head		√		1 (2010~2011)	Cores were collected at three depths (0–5, 5–15, and 15–30 cm).
Afyuni and Wagger (2006)	18	Constant head		√	0.91~1.40		Cores were collected at three depths (0–15, 15–30, and 30–45 cm).
Alletto and Coquet (2009)	9	Tension disc (8)	√	√	1.38~2.24	5 (2000~2005)	Infiltrations were done at −1.5, −1.0, −0.6, −0.3 and −0.1 kPa matric potentials.
Anikwe and Ubochi (2007)	3	Not provided		√	2.67	1 (2005~2006)	
Azooz and Arshad (1996)	2	Single ring (20)	√	√	1.72~4.31	15 (1978~1993)	The single ring was inserted 0.04 m into the soil.
Azooz et al. (1996)	8	Guelph		√	1.72~4.31	15 (1978~1993)	The K_{sat} to a depth of 300 mm in 75-mm depth increments was determined.
Blanco-Canqui et al. (2017)	2	Constant head		√		34 (1980~2014)	Two intact soil cores (7.5 cm diam. and 7.5 cm long) per plot were collected using a hammer-driven core sampler for depths of: 0–7.5, 7.5–15,15–22.5, and 22.5–30 cm.
Blanco-Canqui et al. (2004)	4	Either constant or falling head		√	1.45~1.63	13 (1982~1995)	Cores were collected vertically from 0 to 100 and 100 to 200 mm from trafficked and nontrafficked

							interrow positions.
Buczko et al. (2006)	4	Hood (16) and single rings (20)	√	√		10 (1990~2000)	Infiltration was recorded consecutively for the three hydraulic heads -5, -3, and 0 cm H_2O in ascending order for hood. Ring Measurements were initiated with a ponded depth of about 20 cm, until all the water in the ring had infiltrated.
Busari (2017)	2	Constant head		√	2.09	2 (2008~2010)	Undisturbed soil samples using cylindrical cores (5 cm in diameter and 5 cm in height) were taken in duplicate from the soil surface.
Cai et al. (2012)	6	Tension disc		√		6 (2001~2007)	
Cameira et al. (2003)	1	Tension disc (20)	√	√	0.47~1.26	5 (1998~2003)	An infiltration sequence was performed corresponding to water tensions of 0, 3, 6 and 15 cm.
Celik and Ersahin (2011)	6	Double ring (30~60)	√	√	1.47~1.54	3 (2006~2009)	Water level in the inner ring was measured at 0, 5, 10, 15, 20, 30, 40, 70, 100, 160, 220 and 280th min during an infiltration test.
Cui et al. (2013)	6	Constant head		√	3.49	6 (2005~2011)	Three replicated cores were randomly collected with a stainless steel cylinder (4 cm long and 6.18 cm in diameter) at the 0- to 5-, 5- to 10-, 10- to 20-, 20- to 40-, 40- to 60-, and 60- to 80-cm depths.
Curtis and Claassen (2009)	4	A drop-forming rainfall simulator		√	0.03~7.00	1 (2003~2004)	
Du et al. (2011)	3	Constant head		√		6 (2001~2007)	Cores were collected at three depths (0–5, 5–10, and 10–20 cm).
Fasinmirin (2011)	4	Falling head		√		16	Soil samples were collected at depths 0–10, 10–20, 20–30, 30–40 and 40–50 cm.
Gao and Zhang	2	Tension disc		√	0.36~0.59	4 (2005~2009)	

(2010)							
Gómez et al. (1999)	2	Tension disc (25)	√	√	1.00~2.50	15 (1982~1997)	The K_{sat} was calculated at four water tensions; -15, -10, -5 and 0 cm of H_2O.
Haruna et al. (2018)	6	Constant head		√	1.65~1.68	4 (2010~2014)	Cores were collected at four depths of 10-cm increments from the soil surface to a depth of 40 cm.
Hati et al. (2015)	4	Falling head		√	0.86~1.79	7 (2000~2007)	Undisturbed core samples of 5 cm height and 5 cm diameter were collected from the 0 to 15 cm soil layer at 7.5 cm intervals.
He et al. (2009)	2	Constant head		√		16 (1991~2007)	Soil samples were collected at depths 0–5, 5–10, 10–20 and 20–30 cm.
Huang et al. (2015)	2	Double ring (30~50)	√		0.52~2.22	9 (2003~2012)	Measurements were conducted over 180 min.
Iqbal et al. (2005)	2	Guelph		√			
Jabro et al. (2016)	2	Single ring and constant head	√	√		4 (2008~2012)	Ring measurements for the surface layer (0- to 10 cm) and constant head measurements for the subsurface layers (10- to 20, 20- to 30, and 30- to 40 cm) were determined.
Jarecki and Lal (2005)	2	Constant head		√	0.67~10.67	16 (1987~2003)	Soil cores from the 0 to 5-cm layer were used to determine K_{sat}.
Jemai et al. (2012)	10	Constant head		√	1.55~3.10	7 (2000~2007)	Soil samples were collected at depths 0–10, 10–20, 20–30, 30–40 and 40–50 cm.
Johnson-Maynard et al. (2007)	2	Constant head		√	3.07	3 (2000~2003)	cores were sampled in 10-cm increments to a depth of 50 cm.
Kahlon et al. (2013)	2	Double ring (30~60) and constant head	√	√	1.64~2.59	21 (1989~2010)	Soil cores were collected at depths 0–10 and 10–20 cm.
Kahlon and Chawla (2017)	4	Constant head		√		1 (2014~2015)	Soil cores were collected at depths 0–7.5 and 7.5–15 cm.

Kreiselmeier et al. (2020)	2	Hood		√	1.95~3.19	25 (1992~2017)	The aim was to set between three to four h in descending order from close to saturation down to the bubbling pressure (BP) of the soil. The BP marks the h-limit until which hood measurements can be done.
Liebig et al. (2004)	1	Single ring	√			17 (1984~2001)	
Liu et al. (2018)	1	Constant head		√	11.35~15.83	5 (2006~2011)	Soil cores were collected at depth 0–10 cm.
Lozano et al. (2016)	1	Tension disc (12.5)	√	√	4.00~5.60	> 5	Infiltration runs were performed at three values of soil water pressure head, h (namely, -0.06, -0.03, and 0.0 m).
Luo et al. (2005)	4	Tension disc		√		3 (2001~2004)	
Mart ńez et al. (2008)	1	Double ring (25)	√	√		7	A two-ring infiltrometer was inserted into the soil to a depth of 15 cm. The quasi-steady water flux was determined when the infiltration rate became constant with time (4 h).
Moebius-Clune et al. (2008)	1	Constant head		√		31 (1973~2004)	Soil cores were collected at depth 5–66 mm.
Moebius et al. (2007)	2	Constant head		√		12 (1992~2004)	Soil cores were collected at depth 5–66 mm.
Nouri et al. (2018)	3	Double ring (15.3~30.5)	√	√		36 (1979~2015)	The infiltrometer was inserted into the soil at a depth of 40 mm, and the constant head of water was maintained at both rings 50 mm above the soil surface.
Obalum and Obi (2010)	3	Constant head		√	1.06~1.48	1 (2006~2007)	Soil cores were collected at depth 0–10 cm.
Osunbitan et al. (2005)	2	Constant head		√	0.30~1.60		Soil cores were collected at depth 0–5 cm.

Ouellet et al. (2008)	1	Single ring (10)	√	√	5.50		Pressure infiltrometers were used to measure K_{sat} at the soil surface and at 0.15 m depth soil benches using 0.10 m diameter by 0.06 m deep rings. Multiple head analyses were performed using 0.10 and 0.40 m heads.
Pan et al. (2016)	3	Constant head		√	1.34~1.59	12 (2002~2014)	Soil cores were collected at depth 0–10 cm.
Park and Smucker (2005)	6	Constant head		√	3.29~7.07		Soil cores were collected at depth 0–5 cm.
Parvin et al. (2014)	3	Constant head		√	3.29~4.48	37 (1974~2011)	Soil samples were collected at depths 15–20, 25–30 and 35–40 cm.
Sasal et al. (2006)	1	Tension disc	√		2.30~4.40	20	Tension disc measurements were performed on the surface at 0.10 m depth for 60 min to reach steady-state conditions.
Schlüter et al. (2020)	2	Hood (24.8) and tension disc (8)		√	2.09~2.21	26 (1992~2018)	For hood, at least half a reservoir had to be infiltrated or 10 min had to pass to move to the next pressure head. Readings were done every 30 s and steady state was assumed after water level decline in the reservoir did not differ by more than 2 mm for three consecutive steps.
Sharma et al. (2005)	1	Constant head		√	0.64	6 (1995~2001)	Soil cores were collected at depth 0–15 cm.
Sharma et al. (2009)	1	Constant head		√	0.97~1.21	7 (1998~2005)	Soil cores were collected at depth 0–20 cm.
Singh et al. (1996)	4	Constant head		√	9.80	9 (1979~1988)	Soil samples were collected at depths 0–7.5 and 7.5–15 cm.
Singh and Malhi (2006)	4	Double ring (30~55)	√		3.10~6.50	5 (1984~1989)	Rings were 25 cm in height and installed to a depth of 10 cm. Tests, using tap water, were continued until a steady-state infiltration rate was achieved or for 1 h,

							whichever occurred later. The longest measurement was 90 min.
Soracco et al. (2010)	6	Constant head		√		7	Soil samples were collected at depths 0–15 and 15–30 cm.
Stone and Schlegel (2010)	2	Double ring (92~124)	√		1.90	11 (1989~2000)	Rings were positioned to avoid vehicle traffic paths, driven 13 cm deep, and filled twice with water. At sunup 2 d later, water was added to the infiltrometers, and ponding was maintained at a depth of ~3 to 10 cm.
Tan et al. (2002)	2	Constant head		√		4 (1995~1999)	Soil cores were collected at depth 0–30 cm.
Villarreal et al. (2017)	1	Tension disc (12.5)	√	√		15 (2000~2015)	Infiltration runs were performed at three values of soil water pressure head, h (namely, -6, -3 and 0 cm, applied in this order and at the same place).
Vogeler et al. (2009)	2	Hood (12.4) and double ring (30~55)	√		2.00~2.50	21 (1985~2006)	A double-ring infiltrometer with a constant head of 100 mm was used. Hood was placed directly onto the soil surface, and a pressure head of zero in the hood was regulated via a Mariotte water supply.
Wu et al. (2014)	6	Tension disc		√		12	
Xu and Mermoud (2001)	3	Guelph		√	0.34~1.10	1	Measurements were performed in holes of diameter 6 cm and of depths 15 or 35 cm.

[a] Number of paired observation for K_{sat}; [b] The parentheses indicate the diameter (cm) of the device. For double ring method, the diameters of inner and outer rings are provided; [c] Infiltration rate; [d] Saturated hydraulic conductivity; [e] Organic matter content. If the literature only provided the organic carbon content, the organic matter content was estimated using the 1.724 conversion factor.

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