

Supplementary materials

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Section 1 Average weather conditions in the survey area during 2009-2018

Table S1 Average weather conditions in the survey area during 2009-2018

Year	minimum temperature	maximum temperature	mean relative humidity	average wind velocity	sunshine duration	precipitation
	°C		%	km/day	hours	mm
2009	-10.9	29.9	46.5	174.1	6.9	134.7
2010	-9.2	31.3	48.9	181.7	7.1	101.9
2011	-15.8	29.4	52.8	166.5	7.3	288.0
2012	-13.7	29.4	47.0	166.0	7.7	185.3
2013	-10.6	29.3	40.1	164.6	7.7	146.7
2014	-10.0	29.2	47.8	154.5	7.7	229.1
2015	-8.3	29.7	45.0	157.0	7.3	167.2
2016	-11.8	29.5	46.2	163.2	7.8	258.1
2017	-9.8	30.7	44.6	162.2	7.6	250.9
2018	-11.3	29.3	44.7	167.0	7.3	295.1

Section 2 Diagram of the furrow and drip irrigated systems

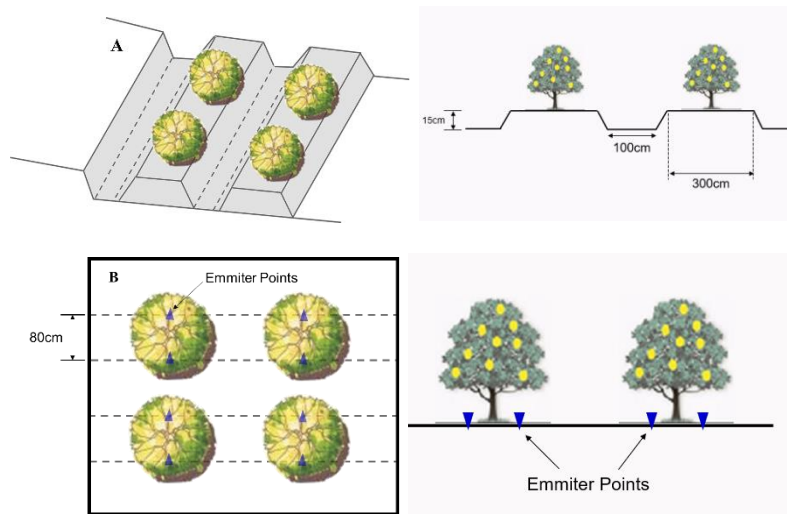


Figure S1 Diagram of the furrow (A) and drip (B) irrigated systems

Section 3 Overview of the investigated information

Table S2 Overview of the investigated information during 2009-2018

	Year	Yield t ha ⁻¹	N	P ₂ O ₅	K ₂ O	Pes.	Pap.	Pruning t ha ⁻¹	Ele. KWh ha ⁻¹	Die. L ha ⁻¹	WD m ³ ha ⁻¹	GWP kg unit ha ⁻¹	AP	EP
			kg ha ⁻¹											
Furrow irrigated system	2009	0	402.9	72.3	182.5	6.1	0	0	815.1	125	5682	4086.8	90.64	45.04
	2010	6	417.3	146.7	182.5	6.3	100	1	975.5	56	6732	4368.7	90.02	46.21
	2011	8	417.3	146.7	182.5	7.3	100	1.4	997.9	56	7693	4410.4	90.06	47.22
	2012	25	527.7	201.9	182.5	11.5	500	2.8	1358.6	75	9740	7133.5	118.73	61.70
	2013	30	527.7	201.9	182.5	13.9	500	3.4	1429.9	75	9468	7242.2	118.79	62.71
	2014	72	830.9	555.2	258.2	18.5	900	5	1550.8	90	12408	13900.1	194.53	99.47
	2015	65	830.9	555.2	258.2	15.6	900	3.5	1776.0	86	12189	13977.4	194.14	100.39
	2016	78	830.9	555.2	258.2	17.2	900	5.5	1643.5	85	12468	13933.4	194.22	101.41
	2017	68	830.9	555.2	258.2	13.9	900	4	1704.5	97	12466	13939.6	194.88	102.52
	2018	79	830.9	555.2	258.2	18.8	900	6	1476.2	92	12693	13871.7	194.74	103.51
Drip irrigated system	2009	0	626	125.1	305.7	4.3	0	0.0	514.8	125.0	3732	6330.8	64.80	42.94
	2010	8	198.0	102.1	21.1	5	100	0.5	608.5	43	4332	2928.4	22.50	14.41
	2011	10	198.0	102.1	21.1	8	100	0.7	721.4	52	5613	3107.4	23.13	14.53
	2012	35	278.4	236.5	71.5	10.6	500	1.6	921.5	50	5765	4914.6	33.08	21.16
	2013	40	278.4	236.5	71.5	13	500	2.2	880.3	55	5498	4956.9	33.48	21.23
	2014	68	362.3	307.5	132.0	14.6	900	2.9	1032.5	70	7774	6789.7	44.85	28.16
	2015	65.5	362.3	307.5	132.0	16	900	2.7	1198.3	55	7480	6882.0	43.86	27.98
	2016	72	362.3	307.5	132.0	18.2	900	3.3	1125.0	62.5	7845	6905.7	44.42	28.09
	2017	62	362.3	307.5	132.0	12.4	900	2.5	1115.4	60	7731	6766.7	44.14	28.03
	2018	70	362.3	307.5	132.0	15.3	900	3.1	1105.8	65	8093	6842.3	44.54	28.11

Section 4 Emissions parameters and conversion of equivalent coefficient

Table S3 Emissions parameters of main agricultural inputs in the pear orchards.

Item	Unit	GWP	AP	EP	References
		(kg CO ₂ eq per unit)	(kg SO ₂ eq per unit)	(kg PO ₄ eq per unit)	
N production and transportation	kg N	8.30	2.52×10^{-2}	3.03×10^{-3}	Zhang et al., 2013; Yue, 2013
P production and transportation	kg P ₂ O ₅	0.79	6×10^{-4}	8×10^{-5}	Zhang et al., 2013; Yue, 2013
K production and transportation	kg K ₂ O	0.55	4.80×10^{-4}	6×10^{-5}	Zhang et al., 2013; Yue, 2013
Pesticides production	kg	19.10	1.05×10^{-2}	1.94×10^{-3}	Clark et al., 2016
Diesel	L	3.75	6.58×10^{-2}	1×10^{-4}	Pishgar-Komleh et al., 2013
Electricity	kWh	0.75	1.45×10^{-2}	8.40×10^{-4}	IPCC, 2007; Yue, 2013
Paper bag production	kg	1.77	5.71×10^{-3}	2.31×10^{-3}	Ren, 2011
PVC supplies production	kg	5.90	1.66×10^{-2}	4.60×10^{-4}	Shi et al., 2019
Transportation of pesticides, PVC and wastepaper bags [§]	t km	0.36	2.07×10^{-3}	6.34×10^{-4}	Ecoinvent v3, 2016
Transportation of waste pruning [§]	t km	0.72	3.41×10^{-3}	8.60×10^{-4}	Ecoinvent v3, 2016

[§] Emission factors represented the transportation of agricultural materials and waste pruning by two kinds of agricultural tractors, expressed as t*km, which were extrapolated from Ecoinvent v3 database in SimaPro 5.2 (2016).

Table S4 The reactive nitrogen losses emission parameters of the furrow and drip irrigated pear production systems at the orchard management stage.

Irrigation pattern	Emission item	Emission parameters	References
Furrow	NH ₃	8.74% of N fertilizer input	Ge et al., 2010; Zhu et al., 2018
	Nitrate leaching	17.21% of N fertilizer input	Chen et al., 2014; Fan et al., 2013
	N ₂ O		
	Direct N ₂ O	0.78% of N fertilizer input	Pang et al., 2019
	Indirect N ₂ O	1%NH ₃ emission + 2.50% NO ₃ emission	Perrin et al., 2014; Nemecek et al., 2008
	NO _x	10% of the N ₂ O emission	Perrin et al., 2014
Drip	NH ₃	3.15% of N fertilizer input	Zhou et al., 2015
	Nitrate leaching	12.50% of N fertilizer input	Lv et al., 2019
	N ₂ O		
	Direct N ₂ O	0.15% of N fertilizer input	Abalos et al., 2019
	Indirect N ₂ O	1%NH ₃ emission + 2.50% NO ₃ emission	Perrin et al., 2014; Nemecek et al., 2008
	NO _x	10% of the N ₂ O emission	Perrin et al., 2014

Table S5. The equivalent coefficient of the emissions inventory for environmental impact potentials.

Emissions inventory	Global warming	Acidification	Aquatic eutrophication
	CO ₂ -equivalent	SO _x -equivalent	PO ₄ -equivalent
CO ₂	1		
CO	2		
CH ₄	28		
N ₂ O	298		0.13
NO _x	298	0.7	0.13
NH ₃		1.88	0.33
SO _x		1	
NO ₃ ⁻			0.42
NH ₃			0.33
P _{tot}			3.06

Huijbregts et al., 2000; Deng and Wang, 2003; IPCC, 2013.

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