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Supplementary Materials

Intercropping Practices in Mediterranean Mandarin Orchards from an Environmental and Economic Perspective

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Supplementary Materials

Table S1. Monthly meteorological data during the study period from MU52 weather station (37° 58' 39"; 0° 59' 1"; 125 m a.s.l.) of the Agricultural Information System of Murcia (http://siam.imida.es).

Year	Month	Air Temperature (º C)	Wind Speed (m/s)	Relative Humidity (%)	Solar Radiation (w/m2)	Rainfall (mm)
2018	9	23.87	1.44	69.39	207.57	36.4
	10	18.92	1.53	69.68	154.72	43.4
	11	14.75	1.6	68.55	112.72	137.9
	12	14.42	1.37	66.19	109.52	6.3
2019	1	13.06	1.89	54.49	120.35	1.6
	2	14.17	1.67	61.18	164.38	0.4
	3	16.48	1.61	58.51	204.92	21.5
	4	15.98	1.96	63.15	232.49	137.7
	5	19.48	1.76	61.42	309.08	5.1
	6	23.59	1.96	54.71	344.37	1.9
	7	27.45	2	55.84	309.38	0
	8	26.83	1.59	64.63	277.28	67.5
	9	23.62	1.5	73.81	205.23	226.2
	10	20.91	1.23	66.96	170.06	21.2
	11	15.42	2.28	54.55	128.68	12.7
	12	13.72	1.71	68.67	90.91	45.5
2020	1	11.07	1.04	74.92	108.65	81
	2	15.17	1.29	68.36	161.25	2.6
	3	14.84	1.94	65.6	166.46	136.6
	4	16.13	1.54	75.4	211.89	53.5

	5	21.99	1.69	61.48	301.2	41.1
	6	24.88	1.78	59.44	323.78	6.3
	7	27.89	1.85	65.61	325.7	6.6
	8	29.66	1.61	59.58	290.4	7.9
	9	25.22	1.44	63.75	227.12	4.1
	10	18.97	1.47	55.65	181.89	3.3
	11	15.9	1.13	76.77	120.68	6.8
	12	12.38	1.75	56.01	107.59	1.5
2021	1	11.39	1.81	56.9	112.57	44.3
	2	13.95	1.65	64.21	133.57	0.1
	3	13.18	1.56	71.41	188.12	70
	4	15.25	1.63	74	200.58	52.9
	5	19.84	1.93	60.68	297.45	39.3
	6	23.13	1.78	63.83	306.04	22

Table S2. Sowing and harvesting dates in mandarin monoculture (CTL) and diversification treatments (D1 and D2) during three crop cycles.

Cycle	Item	MC	D1			D2			
		Mandarin	Mandarin	Barley-vetch	Fava bean	Mandarin	Fava bean	Purslane	Cowpea
2018-2019	Sowing date	-	-	13/03/2018	14/09/2018	-	14/09/2018	-	-
	Harvesting date	24/01/2019	24/01/2019	-*	09/01/2019	24/01/2019	09/01/2019	-	-
2019-2020	Sowing	-	-	31/01/2019	04/09/2019	-	-	06/05/2019	-
	Harvesting date	07/01/2020	07/01/2020	13/06/2019	23/12/2019	07/01/2020	-	06/07/2019	-
2020-2021	Sowing date	-	-	18/02/2020	10/09/2020	-	-	-	29/06/2020
	Harvesting date	03/02/2021	03/02/2021	22/06/2020	12/02/2021	03/02/2021	-	-	22/09/2020

* There was no emergence of the seeds.

Table S3. Primary input/output data for mandarin monoculture (CTL) and mandarin with intercrops D1 and D2 during three crop cycles.

Cycle	Item	CTL	D1			D2			
		Mandarin	Mandarin	Barley-vetch	Fava bean	Mandarin	Fava bean	Purslane	Cowpea
2018-2019	Seeds (kg/ha)	-	-	112.5-37.5	50	-	50	-	-
	Water for irrigation (m^3/ha)	3667	2010	[1]-	12	2010	59	-	-
	Electricity for irrigation (kWh/ha)	6124	3357	-	20	3357	99	-	-
	Rainfall (m^3/ha) [2]	3078	3078	-	1801	3078	1801	-	-
	Fertilizers [3]								
	N (kg/ha)	177	177	-	-	177	-	-	-
	P_2O_5 (kg/ha)	36	36	-	-	36	4	-	-
	K_2O (kg/ha)	126	126	-	-	126	2	-	-
	Fungicides and insecticides [4] (kg/ha)	12	12	-	2	12	2	-	-
	Herbicides [5] (kg/ha)	9.5	-	-	-	-	-	-	-
	Diesel for field operations (L/ha)	186	77	-	96	77	99	-	-
	Time to process [6] (h/ha)	17	7	-	9	7	9	-	-
	Yield [7] (kg/ha)	20,922 ± 2509	14,676 ± 869	-	1020 ± 254	8724 ± 6069	380 ± 349	-	-

2019-2020	Seeds (kg/ha)	-	-	112.5-37.5	50	-	-	5000 [7]	-
	Water for irrigation (m^3/ha)	4000	2553	966	817	2553	-	525	-
	Electricity for irrigation (kWh/ha)	6680	4264	1613	1364	4264	-	877	-
	Rainfall (m^3/ha) [2]	5099	5099	2448	3305	5099	-	75	-
	Fertilizers [3]								
	N (kg/ha)	149	149	13	11	149	-	15	-
	P_2O_5 (kg/ha)	65	65	9	18	65	-	14	-
	K_2O (kg/ha)	121	121	8	14	121	-	14	-
	Fungicides and insecticides [4] (kg/ha)	22	22	-	-	22	-	-	-
	Herbicides [5] (kg/ha)	9.5	-	-	-	-	-	-	-
	Diesel for field operations (L/ha)	175	66	120	120	66	-	120	-
	Time to process [6] (h/ha)	16	6	11	11	6	-	11	-
	Yield [7] (kg/ha)	45,436 ± 3221	18,107 ± 3852	4728 ± 447	1344 ± 241	18,211 ± 12,575	-	7682 ± 438	
2020-2021	Seeds (kg/ha)	-	-	112.5-37.5	50	-	-	-	9.2
	Water for irrigation (m^3/ha)	3793	3427	329	954	3427-	-	-	955
	Electricity for irrigation (kWh/ha)	6334	5723	549	1593	5723	-	-	1595
	Rainfall (m^3/ha) [2]	3454	3454	2641	184	3454	-	-	119
	Fertilizers [3]								
	N (kg/ha)	122	122	10	10	122	-	-	43
	P_2O_5 (kg/ha)	18	18	6	-	18	-	-	6
	K_2O (kg/ha)	93	93	9	6	93	-	-	28
	Fungicides and insecticides [4] (kg/ha)	27	27	-	-	27	-	-	-
	Herbicides [5] (kg/ha)	9.5	-	-	-	-	-	-	-
	Diesel for field operations (L/ha)	219	120	120	175	120	-	-	153
	Time to process [6] (h/ha)	20	11	11	16	11	-	-	14
	Yield [7] (kg/ha)	11,979 ± 1517	11,423 ± 5711	1417 ± 245	2692 ± 469	7685 ± 1872	-	-	124 ± 35

[1] The first year there was no emergence of the seeds.

[2] Agricultural Information System of Murcia (www.siam.es).

[3] Commercial fertilizers: Neptuno PK 28, Neptuno Triton, Neptuno Pandora, Neptuno K10 and Urano oxigen (Medifer, Constantino Gutiérrez, SA).

[4] Commercial fungicides and insecticides: Spirodiclofen 24%; Spirotetramat 15%; Delmatetrin 2.5%; Bacilus Sp; Abamectine; Copper oxychloride; Mancozeb 80. To account for these pesticides, the processes of a generic pesticide were used: 'Pesticide, unspecified GLO market for'.

[5] Commercial herbicides: Glyphosate 8 L/ha; Oxifluorfen 1.5 L/ha.

[6] For the machinery subsystem used for field operations, the following was considered: (1) 'Tractor, 4 wheel, agricultural GLO market for' according to weight 2800 kg; lifetime 16000 h; (2) 'Agriculture machinery unspecified GLO market for'.

[7] Mean ± Standard deviation.

Table S4. Primary input data used for the irrigation subsystem for mandarin monoculture (CTL) and mandarin with intercrops D1 and D2.

Item	CTL	D1			D2			
	Mandarin	Mandarin	Barley-vetch	Fava bean	Mandarin	Fava bean	Purslane	Cowpea
Polyethylene, high density, granulate, recycled ROW market for (pipeline) (kg/ha-cycle)	85	85	19	19	85	19	19	19
Polyvinylidenchloride, granulate, ROW production (pipeline) (kg/ha-cycle)	68	68	-	-	68	-	-	-
Extrusion, plastic pipes GLO market for (pipeline) (kg/ha-cycle)	153	153	19	19	153	19	19	19
Polyethylene, high density, granulate, recycled ROW market for PE (tanks fertilizers) (kg/ha-cycle)	36	36	-	-	36	-	-	-
Injection moulding GLO market for (tanks fertilizers) (kg/ha-cycle)	36	36	-	-	36	-	-	-
Steel, chromium steel 18/8 GLO market (pump system) (kg/ha-cycle)	2	2	-	-	2	-	-	-
Agriculture machinery unspecified GLO market for (reservoir) (kg/ha-cycle)	22	22	-	-	22	-	-	-
Polyethylene, high density, granulate, recycled ROW market for PE (kg/ha-cycle)	71	71	-	-	71	-	-	-
Polyvinylidenchloride, granulate, ROW production (reservoir) (kg/ha-cycle)	71	71	-	-	71	-	-	-
Transport of materials (Lorry 3.5-16 t) (tkm/cycle)	13	13	1	1	13	1	1	1
Transport inert materials to Landfill (Lorry 3.5-7.5 t EURO6) (tkm/cycle)	13	13	1	1	13	1	1	1
Shed GLO market for (m^2/cycle)	0.02	0.02	-	-	0.02	-	-	-

Lifespan of materials: reservoir 20 years; head system 20 years; PE 10 years; PVC 20 years.

Table S5. Quality evaluation of the primary input data. Self-evaluation against the ILCD data quality indicators of EC-JRC.

Indicator	Definition	Dataset evaluation	Quality rating	Quality level
Technological representativeness	Degree to which the data set reflects the true population of interest regarding technology	The technology for crops production in Region of Murcia is highly standardized within the population of farms exporting to Europe.	1	very good
Geographical representativeness	Degree to which the data set reflects the true population of interest regarding geography	The data sources used was obtained in the same region that represent (Region of Murcia area)	1	very good
Time-related representativeness	Degree to which the data set reflects the true population of interest regarding time / age of the data	Fully time-representative data, i.e. data for accounting 2018 to 2020 in crop productivity, fertilizer, pesticides, machinery use, irrigation systems and electricity	1	very good
Completeness	Share of (elementary) flows that are quantitatively included in the inventory	All known inventory flows were quantified, included waste flows	1	very good
Precision / uncertainty	Measure of the variability of the data values for each data expressed	Data are based on measurements, and the calculation is based partly on assumptions	2	good
Methodological appropriateness and consistency	The applied LCI methods and methodological choices (e.g. allocation, substitution, etc.) are in line with the goal and scope of the data set	- Allocation choices are in line with the function studied - Best available field emissions estimation methods were selected accounting for the system specificities	1	very good
Overall data quality rating			**≤1.6**	**High quality**

Table S6. Quality evaluation of the input data from ecoinvent database. Self-evaluation against the ILCD data quality indicators of EC-JRC.

Indicator	Definition	Dataset evaluation	Quality rating	Quality level
Technological representativeness	Degree to which the data set reflects the true population of interest regarding technology	The technological characteristics including operating conditions	1	very good
Geographical representativeness	Degree to which the data set reflects the true population of interest regarding geography	All inputs were manufacture in Europe (fertilizers, pesticides, farm machinery, plastics, cast airon, etc.)	1	Very good
Time-related representativeness	Degree to which the data set reflects the true population of interest regarding time / age of the data	Fully time-representative data up-date (Ecoinvent database v 3.7.1)	1	very good
Completeness	Share of (elementary) flows that are quantitatively included in the inventory	All known inventory flows were quantified, included waste flows	1	very good
Precision / uncertainty	Measure of the variability of the data values for each data expressed	A "fair" quality was given as a default because relative standard deviation for the overall environmental impact could not be quantified	3	fair
Methodological appropriateness and consistency	The applied LCI methods and methodological choices (e.g. allocation, substitution, etc.) are in line with the goal and scope of the data set	All data in the Ecoinvent database are reviewed against data quality guidelines in accordance with ILCD handbook	1	very good
Overall data quality rating			**>1.6 to ≤3**	**Basic quality**

Table S7. Mean values of impact categories per unit of area (ha) in mandarin monoculture (CTL), diversification 1 (D1) and diversification 2 (D2).

Impact category	Treatment			Mean
	CTL	D1	D2	
ADe	0.063 a	0.065 a	0.064 a	0.064
ADf	65834 a	64782 a	60342 a	63653
AC	49 a	47 a	46 a	47
EU	15 a	16 a	15 a	16
GW	6893 a	6744 a	6472 a	6703
WU	3820 a	3351 a	3007 a	3393

Impact categories: Abiotic depletion elements (ADe); Abiotic depletion fossil fuels (ADf); Acidification (AC); Eutrophication (EU); Global warming (GW); and Water use (WU). Treatments: mandarin monoculture (CTL); diversification D1 (D1); and diversification D2 (D2).

Treatments with different letters had significant differences according to Tukey's multiple range test at 95.0%. Significance level *P<0.05

Table S8. Mean value and standard deviation for the potential environmental impacts per kg of product harvested in mandarin monoculture (CTL), diversification D1 (D1) and diversification D2 (D2) by crop.

Impact categories	Units	CTL	D1			D2			
		Mandarin	Mandarin	Barley/vetch	Fava bean	Mandarin	Fava bean	Purslane	Cowpea
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
ADe	kg Sb_{eq}/kg	3.26E-06 ± 2.30E-06	4.17E-06 ± 1.28E-06	1.22E-06 ± 7.46E-07	2.08E-06 ± 1.03E-06	4.17E-06 ± 1.28E-06	2.47E-06 ± 4.64E-07	3.67E-07 ± 2.16E-08	4.29E-05 ± 1.41E-05
ADf	MJ/kg	3.34 ± 1.99	3.46 ± 0.61	3.71±2.16	5.23±1.59	3.46 ± 0.61	3.71 ± 0.70	1.08 ± 0.06	106.52 ± 35.01
AC	kg $SO_{2\,eq}$/kg	2.46E-03 ± 1.39E-03	2.63E-03 ± 3.70E-04	2.30E-03 ± 1.22E-03	3.04E-03 ± 1.33E-03	2.63E-03 ± 3.70E-04	1.75E-03 ± 3.28E-04	7.06E-04 ± 4.16E-05	8.03E-02 ± 2.64E-02
EU	kg PO_4^{3-} ^{eq}/kg	7.69E-04 ± 4.15E-04	8.96E-04 ± 1.20E-04	8.73E-04 ± 5.37E-04	9.00E-04 ± 3.82E-04	8.96E-04 ± 1.20E-04	5.65E-04 ± 1.06E-04	2.02E-04 ± 1.19E-05	2.45E-02 ± 8.06E-03
GW	kg $CO_{2\,eq}$/kg	0.35 ± 0.20	0.38 ± 0.06	0.32 ± 0.17	0.42 ± 0.17	0.38 ± 0.06	0.25 ± 0.05	0.11 ± 0.01	10.85 ± 3.57
WU	m^3/kg	0.19±0.12	0.19 ± 0.08	0.15 ± 0.01	0.22 ± 0.20	0.19 ± 0.08	0.03 ± 0.01	0.05 ± 0.00	5.48 ± 1.80

Impact categories: Abiotic depletion elements (ADe); Abiotic depletion fossil fuels (ADf); Acidification (AC); Eutrophication (EU); Global warming (GW); and Water use (WU).

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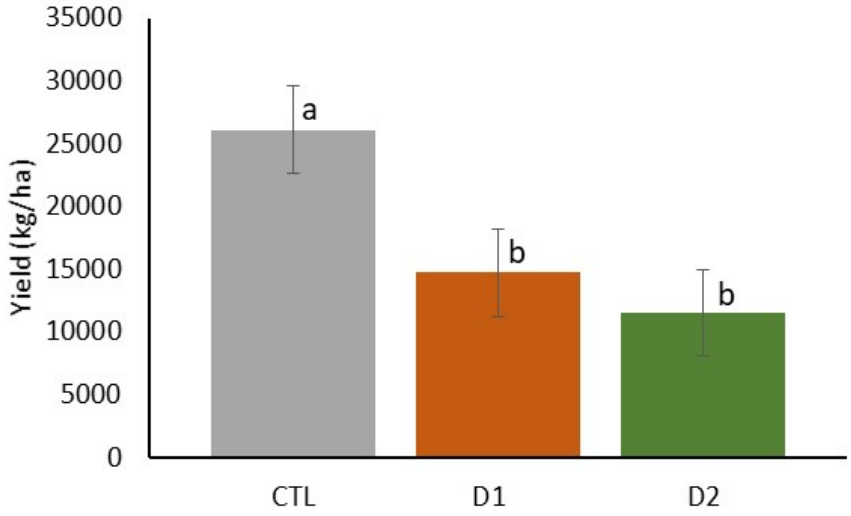

Figure S1. Mandarin fruit yield and standard error.

The values are means of three replicates by three years (n = 9). The error bars denote the standard error of the mean. Treatments with different letters had significant differences according to Fisher (LSD) at 95.0%.

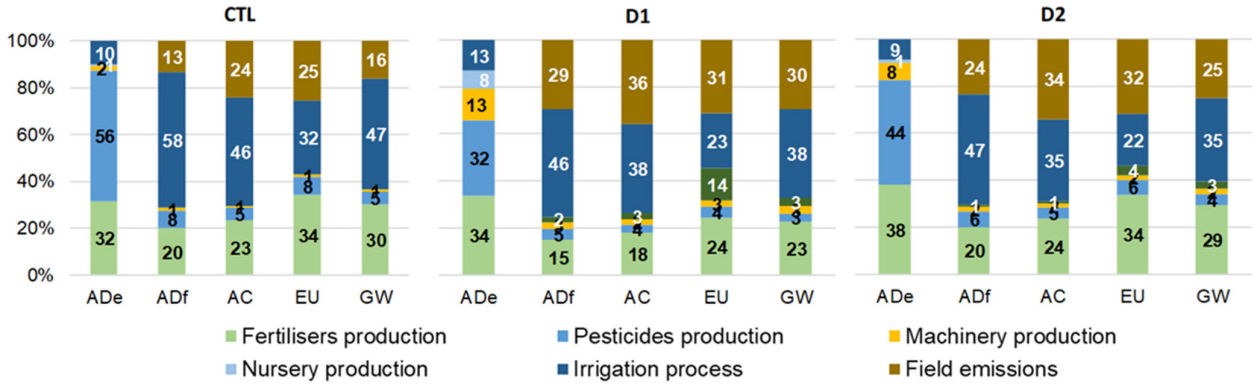

Figure S2. Subsystem contributions to selected impact categories for mandarin monoculture (CTL), diversification 1 (D1) and diversification 2 (D2). Impact categories. Abiotic depletion elements (ADe); Abiotic depletion fossil fuels (ADf); Acidification (AC); Eutrophication (EU); Global warming (GW). Subsystems: Fertilisers production, Pesticides production, Machinery production, Nursery production, Irrigation process, Field emissions.

Table S9. Contributions to reduction of fertilizer doses versus the reference situation by impact category in mandarin monoculture (CTL), diversification 1 (D1) and diversification 2 (D2).

Impact category	Reference	Fertilizer reduction doses					
		10%			20%		
		CTL	D1	D2	CTL	D1	D2
ADe	100	96	96	96	91	91	91
ADf	100	98	98	97	95	95	95
AC	100	97	97	97	94	94	94
EU	100	97	97	97	94	94	94
GW	100	98	98	98	96	96	96

Impact categories: Abiotic depletion elements (ADe); Abiotic depletion fossil fuels (ADf); Acidification (AC); Eutrophication (EU); and Global warming (GW).

Table S10. Average 2018-20 values of costs, revenues and gross margins for the mandarin monoculture (CTL), diversification 1 (D1), and diversification 2 (D2).

€/ha	CTL	D1				D2				
	Mandarin	Mandarin	Barley-vetch	Fava bean	Total	Mandarin	Fava bean	Purslane	Cowpea	Total
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Revenues										
Sales	8,635.73 ± 5,013.68	4,874.21 ± 1,495.68	386.43 ± 231.63	2,520.44 ± 1,229.14	7,652.26 ± 1,534.09	3,816.63 ± 2,861.41	568.32 ± 522.03	7,682.37 ± 437.84	187.52 ± 52.61	6,629.37 ± 5,776.42
CAP Subsides	325.00 ± 0.00	325.00 ± 0.00			325.00 ± 0.00	325.00 ± 0.00				325.00 ± 0.00
TOTAL REVENUES	8,960.73a ± 5,013.68	5,199.21 ± 1,495.68	386.43 ± 231.63	2,520.44 ± 1,229.14	7,977.26a ± 1,534.09	4,141.63 ± 2,861.41	568.32 ± 522.03	7,682.37 ± 437.84	187.52 ± 52.61	6,954.37a ± 5,776.42
Machinery costs										
Ploughing	105.00 ± 0.00		210.00 ± 0.00	227.50 ± 69.45	367.50 ± 163.93		157.50 ± 0.00	210.00 ± 0.00	210.00 ± 0.00	192.50 ± 26.25
Sowing			105.00 ± 0.00		105.00 ± 0.00					

Phytosanitary treatments	135.00 ± 38.97	135.00 ± 38.97			135.00 ± 38.97	135.00 ± 38.97				135.00 ± 38.97
Herbicide treatments	180.00 ± 0.00									
Shredding of pruning/ crop resides	100.00 ± 79.37	100.00 ± 79.37		120.00 ± 22.50	220.00 ± 97.50	100.00 ± 79.37	105.00 ± 0.00	105.00 ± 0.00	105.00 ± 0.00	205.00 ± 79.37
Total machinery	520.00a ± 61.39	235.00 ± 61.39	315.00 ± 0.00	347.50 ± 91.01	792.50a ± 269.87	235.00 ± 61.39	262.50 ± 0.00	315.00 ± 0.00	315.00 ± 0.00	532.50a ± 73.77
Raw material costs										
Plants/seeds			93.75 ± 0.00	443.67 ± 0.00	506.17 ± 46.87		443.67 ± 0.00	2,100.00 ± 0.00	17.70 ± 0.00	853.79 ± 952.68
Phytosanitary products	438.49 ± 71.54	438.49 ± 71.54		5.70 ± 8.55	444.18 ± 74.84	438.49 ± 71.54	17.09 ± 0.00			444.18 ± 74.84
Herbicides	71.85 ± 0.00									
Fertilizers	715.73 ± 183.30	715.73 ± 183.30	45.11 ± 9.31	27.85 ± 24.92	773.65 ± 223.89	715.73 ± 183.30	8.11 ± 0.00	61.35 ± 0.00	7.39 ± 0.00	741.35 ± 210.07
Total raw material	1,226.06a ± 238.53	1,154.22 ± 238.53	138.86 ± 9.31	477.22 ± 18.70	1,724.01a ± 289.00	1,154.22 ± 238.53	468.88 ± 0.00	2,161.35 ± 0.00	25.10 ± 0.00	2,039.33a ± 1,214.19
Irrigation costs										
Irrigation water	840.40 ± 32.06	585.93 ± 136.17	142.46 ± 76.86	130.73 ± 96.98	811.63 ± 277.40	585.93 ± 136.17	13.06 ± 0.00	115.44 ± 0.00	210.07 ± 0.00	698.79 ± 220.86
Electricity	85.66 ± 3.27	59.72 ± 13.88	14.52 ± 7.83	13.32 ± 9.88	82.72 ± 28.27	59.72 ± 13.88	1.33 ± 0.00	11.77 ± 0.00	21.41 ± 0.00	71.22 ± 22.51
Total irrigation	926.06a ± 35.33	645.65 ± 150.05	156.98 ± 84.69	144.05 ± 106.86	894.36a ± 305.68	645.65 ± 150.05	14.39 ± 0.00	127.20 ± 0.00	231.49 ± 0.00	770.01a ± 243.37
Labour costs										
Planting/sowing				260.42 ± 0.00	260.42 ± 0.00		260.42 ± 0.00	1,273.13 ± 0.00	520.83 ± 0.00	684.79 ± 455.43
Phytosanitary treatments	15.00 ± 22.50	15.00 ± 22.50		60.00 ± 90.00	75.00 ± 81.12	15.00 ± 22.50	180.00 ± 0.00			75.00 ± 81.12
Herbicide treatments	90.00 ± 0.00									
Pruning	369.21 ± 281.32	369.21 ± 281.32			369.21 ± 281.32	369.21 ± 281.32				369.21 ± 281.32
Harvesting			998.26 ± 47.55	719.41 ± 328.97	1,384.92 ± 719.23		480.00 ± 0.00	1,087.50 ± 0.00	325.52 ± 0.00	631.01 ± 348.84
Other operations	22.50 ± 0.00	217.81 ± 0.00	45.00 ± 0.00	30.00 ± 22.50	277.81 ± 22.50	152.71 ± 97.66	45.00 ± 0.00	45.00 ± 0.00	45.00 ± 0.00	197.71 ± 97.66
Total labour	496.71a ± 296.33	602.03 ± 296.33	1,043.26 ± 47.55	1,069.83 ± 267.86	2,367.36b ± 720.16	536.92 ± 284.42	965.42 ± 0.00	2,405.63 ± 0.00	891.35 ± 0.00	1,957.72b ± 513.88
TOTAL VARIABLE COSTS	3,168.83a ± 91.73	2,636.90 ± 231.31	1,654.10 ± 141.55	2,038.60 ± 412.61	5,778.23b ± 1,266.55	2,571.79 ± 291.12	1,711.19 ± 0.00	5,009.17 ± 0.00	1,462.94 ± 0.00	5,299.56b ± 1,649.10
GROSS MARGIN[1]	**5,791.89a ± 5,094.18**	**2,562.31 ± 1,635.55**	**-1,267.68 ± 95.54**	**481.84 ± 856.49**	**2,199.03a ± 1,373.43**	**1,569.84 ± 2,931.25**	**-1,142.87 ± 522.03**	**2,673.20 ± 437.84**	**-1,275.42 ± 52.61**	**1,654.81a ± 4,334.91**
Amortization and maint.	717.75 ± 0.00	717.75 ± 0.00	73.98 ± 0.00	98.64 ± 36.99	865.71 ± 0.00	717.75 ± 0.00	147.96 ± 0.00	147.96 ± 0.00	147.96 ± 0.00	865.71 ± 0.00
Insurance and taxes	467.11 ± 257.71	273.77 ± 76.88	0.00 ± 0.00	0.00 ± 0.00	273.77 ± 76.88	219.41 ± 147.08	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	219.41 ± 147.08
TOTAL FIXED COSTS	1,184.86a ± 257.71	991.52 ± 76.88	73.98 ± 0.00	98.64 ± 36.99	1,139.48a ± 76.88	937.15 ± 147.08	147.96 ± 0.00	147.96 ± 0.00	147.96 ± 0.00	1,085.12a ± 147.08
NET MARGIN[2]	**4,607.03a ± 4,836.48**	**1,570.80 ± 1,559.23**	**-1,341.66 ± 95.54**	**383.20 ± 878.05**	**1,059.55a ± 1,302.65**	**632.68 ± 2,784.91**	**-1,290.83 ± 522.03**	**2,525.23 ± 437.84**	**-1,423.38 ± 52.61**	**569.69a ± 4,200.76**
Interest of fixed capital	21.53 ± 0.00	21.53 ± 0.00	2.22 ± 0.00	2.96 ± 1.11	25.97 ± 0.00	21.53 ± 0.00	4.44 ± 0.00	4.44 ± 0.00	4.44 ± 0.00	25.97 ± 0.00

Interest of variable capital	47.53 ± 1.38	39.55 ± 3.47	24.81 ± 2.12	30.58 ± 6.19	86.67 ± 19.00	38.58 ± 4.37	25.67 ± 0.00	75.14 ± 0.00	21.94 ± 0.00	79.49 ± 24.74
Land rental	200.00 ± 0.00	200.00 ± 0.00			200.00 ± 0.00	200.00 ± 0.00				200.00 ± 0.00
TOTAL OPPORTUNITY COSTS	269.06a ± 1.38	261.09 ± 3.47	27.03 ± 2.12	33.54 ± 5.56	312.64b ± 19.00	260.11 ± 4.37	30.11 ± 0.00	79.58 ± 0.00	26.38d ± 0.00	305.46b ± 24.74
PROFIT[3]	**4,337.97a ± 4,837.69**	**1,309.71 ± 1,561.50**	**-1,368.69 ± 93.62**	**349.66 ± 873.37**	**746.91a ± 1,309.09**	**372.57 ± 2,786.18**	**-1,320.94 ± 522.03**	**2,445.66 ± 437.84**	**-1,449.77 ± 52.61**	**264.23a ± 4,180.11**

Note: Different letters indicate significant differences among CTL, D1-Total and D2-Total for each economic indicator, following Tukey´s post-hoc test.

[1] Gross Margin = Revenues – Total Variable Costs

[2] Net Margin = Gross margin – Total Fixed Costs

[3] Profit = Net Margin – Total Opportunity Costs