

**Table S1.** Agronomic management of the open-field trial and soil characteristics of the upper soil layer (0-40 cm).

	2019	2020
GPS coordinates	41°32'49.0704" N, 15°36'14.1192" E	
Transplanting date	2 May, 2019	18 May, 2020
Plant density (p m <sup>-2</sup> )		2.78
Harvesting date	21 August, 2019	3 September, 2020
DAT harvesting (d)	111	108
GDD harvesting (°C d)	1346	1409
<b>Fertilization</b>		
N (kg ha <sup>-1</sup> )	123	127
P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	92	77
K <sub>2</sub> O (kg ha <sup>-1</sup> )	80	110
<b>Soil characteristics</b>		
Sand (%)	41.00	
Silt (%)	20.00	
Clay (%)	39.00	
Texture	Clay-Loam	
pH	7.52	
EC (mS cm <sup>-1</sup> )	1.19	
Organic carbon (%)	1.33	
Total limestone (g kg <sup>-1</sup> )	19.30	
Organic matter (%)	2.29	
Total N (%)	0.17	
C/N ratio	8.00	
Available P (mg kg <sup>-1</sup> )	10.60	
Exchangeable K (mg kg <sup>-1</sup> )	268.00	
Cation exchange capacity (meq 100 g <sup>-1</sup> )	25.10	
Soil water content at field capacity (m <sup>3</sup> m <sup>-3</sup> )	0.344	
Soil water content at wilting point (m <sup>3</sup> m <sup>-3</sup> )	0.196	

Legend: DAT = days after transplant, GDD = growing degree days.

**Table S2.** Eigenvalues, relative and cumulative proportion of total variance, and correlation coefficients for all data about the processing tomato crop subjected to two irrigation treatments (IRR = full-irrigation, RDI = regulated deficit irrigation), in the Years 2019 and 2020 with respect to the three principal components. FRW = average fruit weight, NFR = number of marketable fruits per plant, TY = total yield, MY = marketable yield, WY = unmarketable fruits, RY = rotten fruits, BERY = fruits affected by blossom-end rot, GY = unripe fruits, HI = harvest index, WPI = irrigation water productivity, EWP = economic water productivity, TDF = total defective fruits, SsF = sunscald fruits, CRACK = cracking fruits, VrF = fruits viral symptoms, pH, TtA = titratable acidity, SSC = soluble solids content, DM = fruit dry matter, SSC/TtA = soluble solids content-to-titratable acidity ratio, BrY = brix yield, Glc = glucose, Fru = fructose, Fru/Glc = fructose-to-glucose ratio, Suc = sucrose, Sta = starch, PP = poly-phenols, Lyc = lycopene, Prot = proteins, Ala = alanine, Arg = arginine, Asn = asparagine, Asp = aspartic acid, GABA =  $\gamma$ -aminobutyric acid, Gln = glutamine, Glu = glutamate, Gly = glycine, His = histidine, Ile = isoleucine, Leu = leucine, Lys = lysine, Met = methionine, MEA = monoethanolamine, Orn = ornithine, Phe = phenylalanine, Pro = proline, Ser = serine, Thr = threonine, Trp = tryptophan, Tyr = tyrosine, Val = valine, TAA = total amino acids, BCAA = branched amino acids, EAA = essential amino acids. Boldface factor loadings are considered highly weighed.

Principal Components	PC1	PC2	PC3
Eigenvalue	36.3	11.7	5.9
Percentage of variance	67.3	21.7	11.0
Cumulative variance	67.3	89.0	100.0
Eigen vectors			
Ala	0.13	<b>0.16</b>	0.12
Arg	0.14	<b>0.17</b>	0.04
Asn	-0.16	-0.08	0.02
Asp	-0.16	0.05	0.00
BCAA	0.09	0.24	0.03
BERY	0.16	-0.03	-0.05
BrY	<b>-0.16</b>	-0.02	0.14
CRACK	0.11	-0.12	-0.27
DM	<b>0.16</b>	-0.06	0.11
EAA	<b>0.16</b>	0.08	-0.02
EWP	-0.13	-0.09	0.22
Fru	0.10	-0.21	0.14
Fru/Glc	<b>-0.15</b>	0.11	-0.11
FRW	0.06	0.22	0.23
GABA	0.12	0.12	-0.22
Glc	0.13	<b>-0.16</b>	0.11
Gln	-0.10	0.23	-0.03
Glu	<b>-0.16</b>	0.05	-0.05
Gly	<b>0.16</b>	-0.01	0.07
GY	-0.16	0.01	-0.06
HI	0.16	0.04	-0.02
His	-0.07	0.14	-0.32
Ile	0.06	0.27	0.08
Leu	0.12	0.20	0.01
Lyc	<b>-0.17</b>	-0.01	0.00
Lys	-0.13	0.18	-0.03
MEA	<b>-0.17</b>	0.01	-0.03
Met	<b>0.16</b>	0.04	-0.01
MY	-0.16	0.01	0.05
NFR	-0.17	-0.02	0.00
Orn	<b>0.15</b>	0.11	-0.06
pH	<b>-0.15</b>	-0.13	0.02
Phe	<b>-0.16</b>	0.07	-0.02
PP	0.12	<b>-0.21</b>	0.00
Pro	0.13	<b>-0.15</b>	0.14
Prot	-0.15	0.04	<b>0.17</b>
RY	0.15	-0.08	-0.12
Ser	0.05	0.22	<b>0.23</b>

SSC	0.14	-0.11	<b>0.15</b>
SSC/TtA	0.08	<b>-0.25</b>	-0.09
SsF	0.12	0.00	0.27
Sta	0.12	-0.03	-0.28
Sucr	-0.06	-0.16	0.30
TAA	-0.14	0.16	-0.03
TDF	<b>0.16</b>	-0.08	-0.08
Thr	<b>-0.15</b>	0.10	-0.08
Trp	0.11	0.22	0.01
TtA	0.05	0.20	<b>0.28</b>
TY	-0.17	0.00	0.02
Tyr	0.15	0.12	-0.09
Val	0.09	0.25	0.01
VrF	<b>0.16</b>	-0.07	-0.09
WPI	-0.14	-0.10	0.18
WY	-0.15	-0.03	-0.16

**Table S3.** Comparison between monthly average temperatures and rainfall totals from 2019-2020 and long-term historical data (1951-2018).

Month	Mean air temperature (°C)			Rainfall totals (mm)		
	1951-2018	2019	2020	1951-2018	2019	2020
May	17.72	14.88	17.78	39.41	64.00	17.20
June	22.43	25.13	22.30	33.29	00.00	33.00
July	25.27	26.25	25.16	24.58	38.00	8.20
August	25.33	26.79	26.88	30.36	00.00	37.20