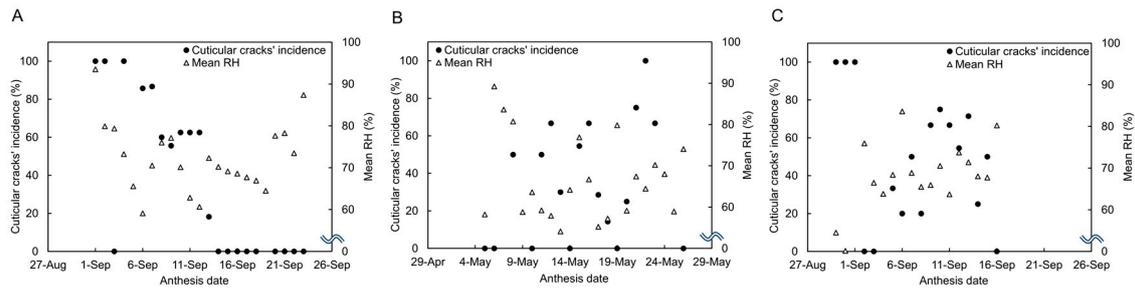
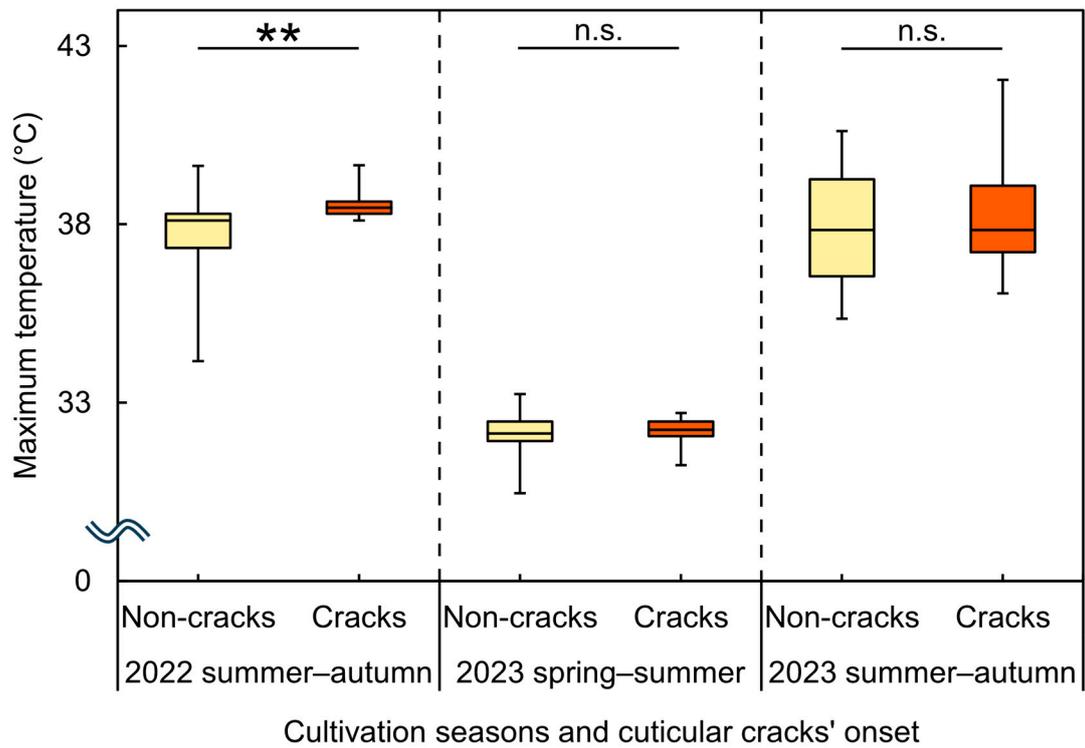


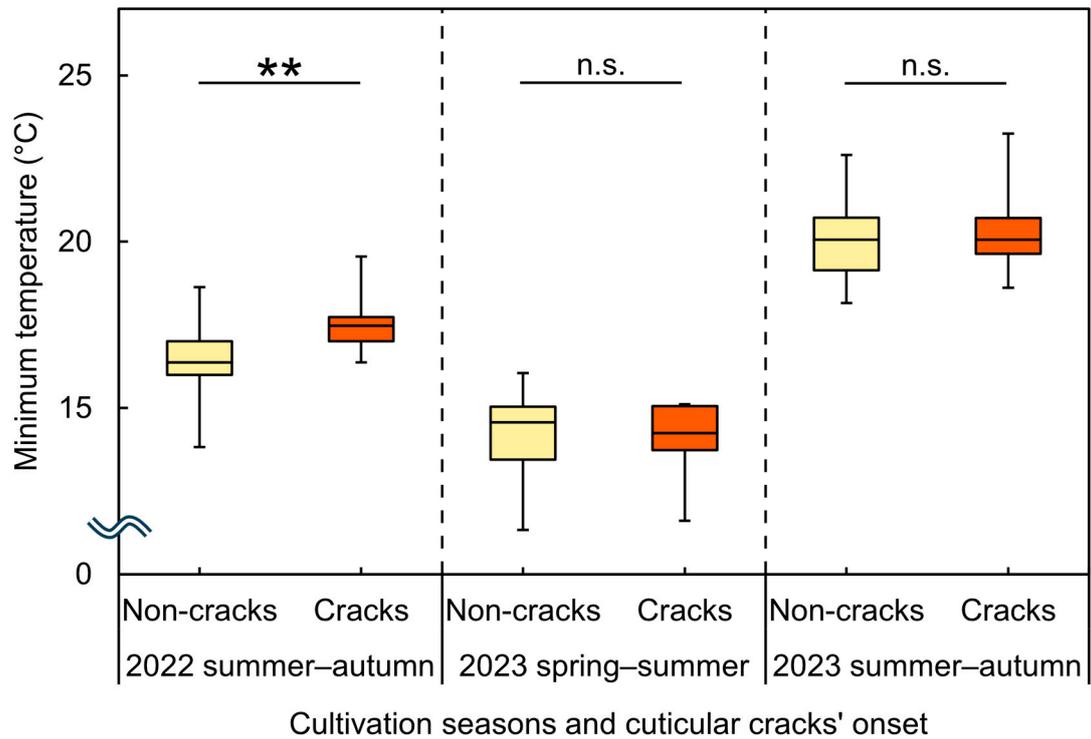
Supplementary Figure S1. Daily mean relative humidity during the cultivation period. (A): 2023 spring–summer cultivation. (B): 2022 (Solid line) and 2023 (Dotted line) summer–autumn cultivations.



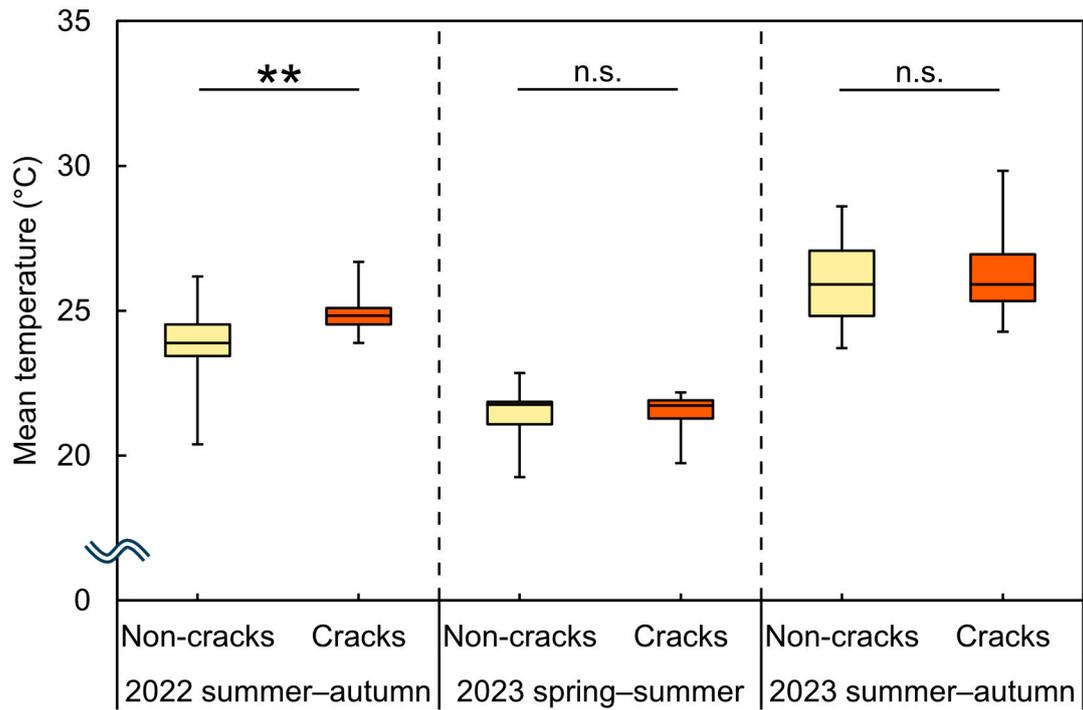
Supplementary Figure S2. Relationship between the cuticular cracks' incidence and daily mean relative humidity (RH) from anthesis to the onset of cuticular cracks. Filled circles indicate the incidence of cuticular cracks and open triangles indicate the daily mean RH. The incidence of cuticular cracks was calculated as the sum of fruits with grade 1, grade 2, grade 3, and grade 4 divided by the total number of fruits on the anthesis date. **(A):** 2022 summer–autumn cultivation ($n = 106$). Daily mean RH was calculated over 20 days following anthesis. The Incidence of cuticular cracks on 5 and 19 September was not recorded due to the absence of blooming flowers. **(B):** 2023 spring–summer cultivation ($n = 79$). Daily mean RH was calculated over 30 days following anthesis. The incidence of cuticular cracks on 7, 9, 24, and 25 May was not recorded due to the absence of blooming flowers. **(C):** 2023 summer–autumn cultivation ($n = 67$). Daily mean RH was calculated over 20 days following anthesis. The incidence of cuticular cracks on September 4 was not recorded due to the absence of blooming flowers.



Supplementary Figure S3. Comparison of mean daily maximum temperature between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. The maximum temperature was calculated as the mean of the daily maximum temperatures over 20 (2022 and 2023 summer–autumn cultivations) or 30 (2023 spring–summer cultivation) days following anthesis. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by t -test. $n = 27$ –53.

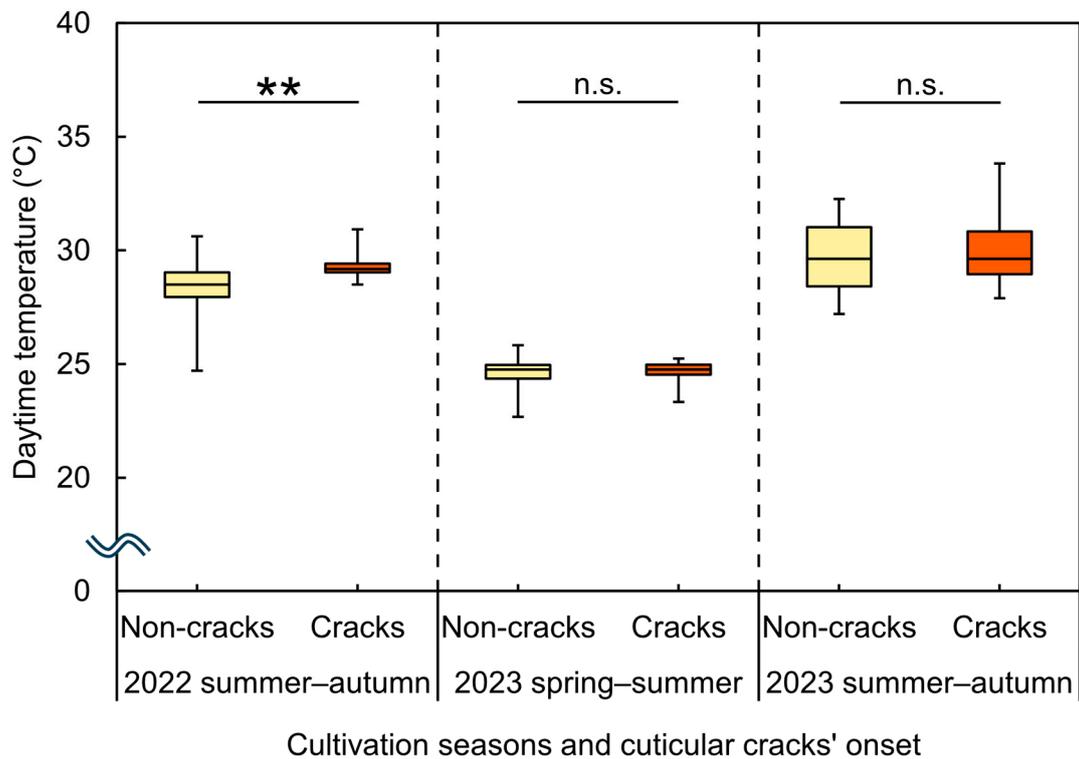


Supplementary Figure S4. Comparison of daily minimum temperature between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. The minimum temperature was calculated as the mean of the daily minimum temperatures over 20 (2022 and 2023 summer–autumn cultivations) or 30 (2023 spring–summer cultivation) days following anthesis. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by t -test. $n = 27$ – 53 .

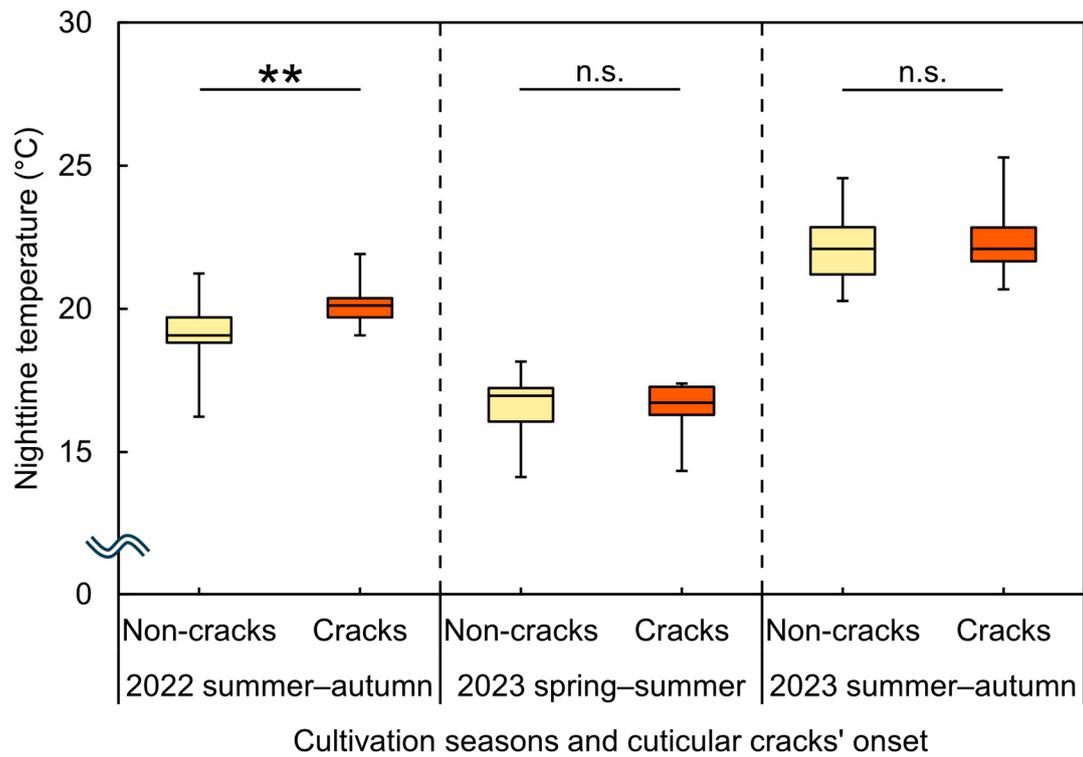


Cultivation seasons and cuticular cracks' onset

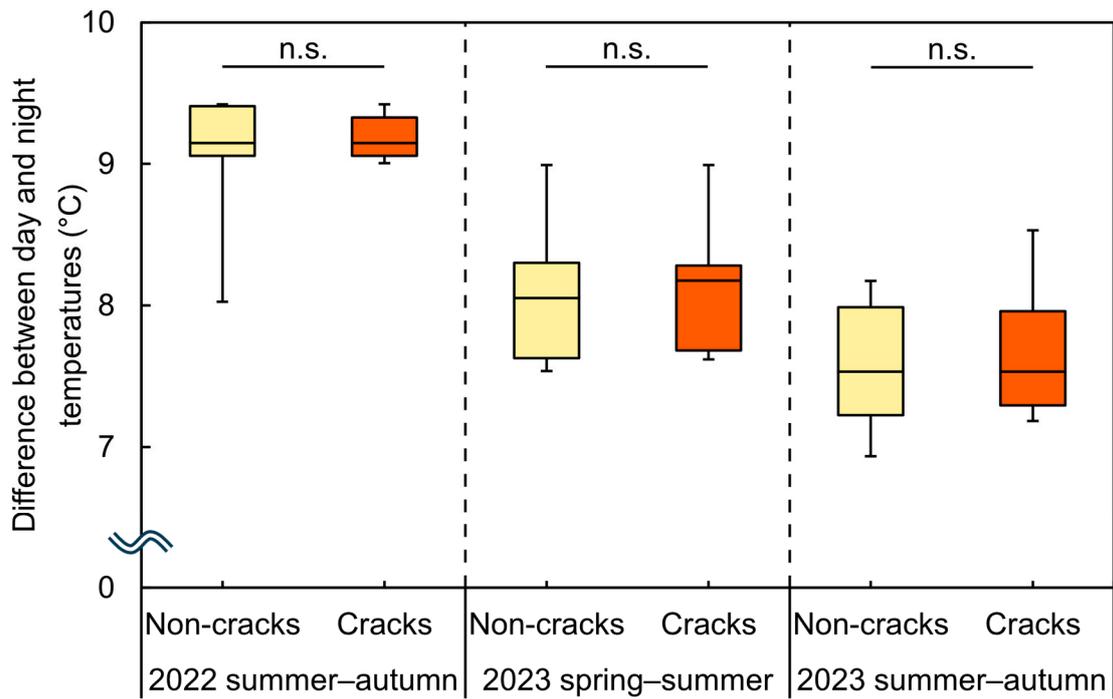
Supplementary Figure S5. Comparison of daily mean temperature between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. The mean temperature was calculated as the mean of the daily mean temperatures over 20 (2022 and 2023 summer–autumn cultivations) or 30 (2023 spring–summer cultivation) days following anthesis. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by t -test. $n = 27$ –53.



Supplementary Figure S6. Comparison of mean daytime temperature between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. The mean daytime temperature was calculated as the mean of the daily daytime temperatures over 20 (2022 and 2023 summer-autumn cultivations) or 30 (2023 spring-summer cultivation) days following anthesis. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by t -test. $n = 27-53$. Daytime was considered from sunrise to sunset.

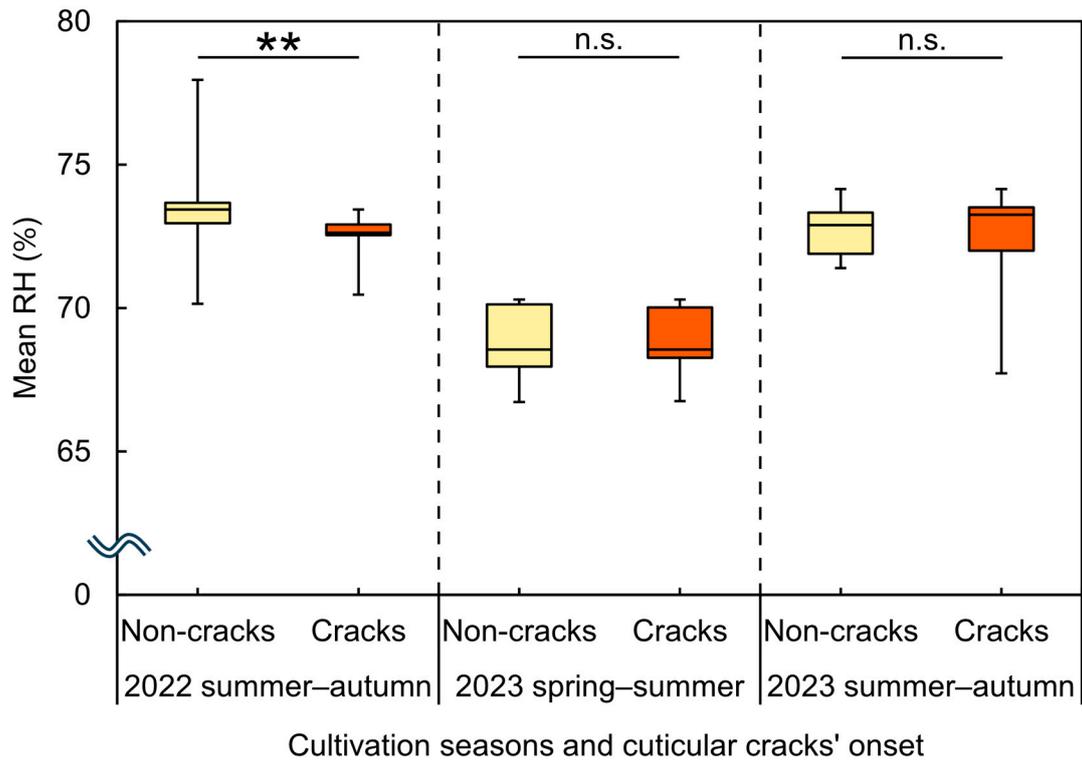


Supplementary Figure S7. Comparison of mean nighttime temperature between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. The mean nighttime temperature was calculated as the mean of the daily nighttime temperature over the 20 (2022 and 2023 summer-autumn cultivations) or 30 (2023 spring-summer cultivation) days following anthesis. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by t -test. $n = 27-53$. Nighttime was considered from sunset to sunrise.



Cultivation seasons and cuticular cracks' onset

Supplementary Figure S8. Comparison of difference between daytime and nighttime temperatures between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by *t*-test ($p < 0.05$). $n = 27$ – 53 . Difference in temperature was calculated by subtracting the mean nighttime temperature from the mean daytime temperature. Daytime was considered from sunrise to sunset. Nighttime was considered from sunset to sunrise.



Supplementary Figure S9. Comparison of daily mean relative humidity (RH) between fruits with cuticular cracks and without cuticular cracks from anthesis to the onset of cuticular cracks. ** indicates significant difference ($p < 0.01$) and n.s. indicates no significant difference between fruits with cuticular cracks and without cuticular cracks by *t*-test. $n = 27-53$. The mean RH was calculated as the mean of the daily mean RH over the 20 (2022 and 2023 summer-autumn cultivations) or 30 (2023 spring-summer cultivation) days following anthesis.

Table S1. Analysis on fruit height, diameter and length-to-width ratio in developing ‘Nene’ fruits classified by cuticular cracks’ severity and cultivation season.

D A A	Cuticular Cracks’ severity ^z	Height (mm) ^y			Diameter (mm) ^y			Length-to-Width Ratio (Height/Diameter) ^y		
		2022	2023	2023	2022	2023	2023	2022	2023	2023
		Summer– Autumn	Spring– Summer	Summer– Autumn	Summer– Autumn	Spring– Summer	Summer– Autumn	Summer– Autumn	Spring– Summer	Summer– Autumn
10	Grade 0	21.67 ± 0.21	15.95 ± 0.33	20.59 ± 0.19	19.20 ± 0.19	13.07 ± 0.29	17.54 ± 0.18	1.13 ± 0.01	1.16 ± 0.01	1.18 ± 0.01
	Grade1	22.70	N.D.	N.D.	21.35	N.D.	N.D.	1.06	N.D.	N.D.
	Grade 2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Grade 3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Grade 4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
20	Grade 0	29.02 ± 0.22 a	28.58 ± 0.28	28.18 ± 0.28 a	27.04 ± 0.23 a	25.89 ± 0.19	26.38 ± 0.32 a	1.08 ± 0.01 a	1.10 ± 0.01	1.07 ± 0.01 a
	Grade 1	29.07 ± 0.26 a	29.80	28.87 ± 0.32 a	27.58 ± 0.22 a	26.05	26.26 ± 0.27 a	1.05 ± 0.01 a	1.14	1.10 ± 0.01 a
	Grade 2	28.42 ± 0.67 a	N.D.	28.15 ± 0.55 a	27.87 ± 0.44 a	N.D.	25.68 ± 0.18 a	1.02 ± 0.02 a	N.D.	1.10 ± 0.03 a
	Grade 3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	Grade 4	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
30	Grade 0	N.D.	32.00 ± 0.21 b	28.00	N.D.	31.03 ± 0.21 b	25.15	N.D.	1.03 ± 0.01 b	1.11
	Grade 1	30.61 ± 0.42 a	33.48 ± 0.36 a	29.81 ± 0.23 a	31.19 ± 0.23 a	32.16 ± 0.19 a	27.72 ± 0.33 a	0.98 ± 0.01 a	1.04 ± 0.01 a	1.08 ± 0.01 a
	Grade 2	31.91 ± 0.38 a	33.90	30.71 ± 0.39 a	31.63 ± 0.36 a	30.85	27.62 ± 0.40 a	1.01 ± 0.01 a	1.10	1.11 ± 0.01 a

	Grade 3	31.66 ± 0.29 a	N.D.	30.57 ± 0.45 a	31.39 ± 0.20 a	N.D.	27.86 ± 0.47 a	1.01 ± 0.01 a	N.D.	1.10 ± 0.01 a
	Grade 4	31.72 ± 0.47 a	N.D.	29.37 ± 0.54 a	31.48 ± 0.45 a	N.D.	27.58 ± 0.58 a	1.01 ± 0.01 a	N.D.	1.07 ± 0.02 a
40	Grade 0	N.D.	31.97 ± 0.29 a	25.20	N.D.	31.24 ± 0.23 a	25.00	N.D.	1.02 ± 0.01 a	1.01
	Grade 1	34.58 ± 1.10 a	32.73 ± 0.26 a	30.03 ± 0.51 a	32.84 ± 1.05 ab	31.77 ± 0.20 a	29.20 ± 0.53 a	1.05 ± 0.01 a	1.03 ± 0.01 a	1.03 ± 0.01 a
	Grade 2	33.79 ± 0.57 a	32.91 ± 0.54 a	30.67 ± 0.44 a	33.49 ± 0.62 a	32.09 ± 0.41 a	29.79 ± 0.43 a	1.01 ± 0.01 b	1.03 ± 0.02 a	1.03 ± 0.01 a
	Grade 3	32.61 ± 0.31 a	34.30	31.53 ± 0.54 a	32.05 ± 0.22 b	31.95	30.62 ± 0.71 a	1.02 ± 0.01 ab	1.07	1.03 ± 0.01 a
	Grade 4	32.36 ± 0.24 a	31.15 ± 0.85 a	32.01 ± 0.52 a	31.51 ± 0.22 b	29.98 ± 2.63 a	30.19 ± 0.54 a	1.03 ± 0.00 ab	1.04 ± 0.06 a	1.06 ± 0.02 a

DAA: days after anthesis; N.D.: no data

^z Grade 0 (fruits without cuticular cracks). Grade 1 (fruits with cuticular cracks, approximately <300 µm in length, with most cuticular cracks not connected to each other). Grade 2 (fruits with cuticular cracks, having a maximum length of approximately >300 µm, and half of cuticular cracks not connected to each other). Grade 3 (fruits with cuticular cracks connected to each other, with approximately half of the field of view covered with connected cuticular cracks). Grade 4 (fruits with cuticular cracks, forming a net-like structure, with almost the entire fruit surface under view covered with cuticular cracks).

^y Values are expressed as the mean ± SE. Different letters indicate significant differences between cuticular cracks severities by Tukey's honestly significant difference test ($p < 0.05$). If only one sample was available for a given severity, it was excluded from statistical analysis.