

Annexure 1. Seasonal summary of weather parameters for winter periods (December–February) across two years (December 2023 – February 2024 and December 2024 – February 2025)

Season	Month	Average maximum temperature (°C)	Average minimum temperature (°C)	Average mean temperature (°C)	Average relative humidity (RH) (%)	Total rainfall (mm)	Average solar radiation (MJ/m ² /day)
December 2023 - February 2024	December	28.93	22.95	25.94	87.95	82.19	13.29
	January	29.20	21.68	25.44	83.32	87.82	16.42
December 2024 - February 2025	February	33.11	22.74	27.92	73.33	0.71	21.20
	December	28.67	22.92	25.79	89.25	240.74	13.69
	January	27.90	20.94	24.42	85.16	26.25	15.37
	February	31.61	21.10	26.36	78.04	14.52	21.60

Supplementary Table 1. Details of the treatments

Treatment ID	Treatment technique	Specification
T1 (Control)	No treatment	No pruning or thinning; all fruits are retained.
T2	Single stem pruning at 35 DAS	Pruning of lateral branches beyond the fifth leaf leaving the main stem intact.
T3	Double stem pruning at 35 DAS	Prune to retain only two stems. Main stem and the primary lateral.
T4	Fruit thinning when fruits are at 3 cm diameter	Removing all fruits except for the three closest to the main stem.

Supplementary Table 2. Effect of pruning and fruit thinning treatments on growth of watermelon

Treatment	Main axis length (m)		Internodal length (cm)		Nodes/plant		Stem girth (mm)	
	Field	Pot	Field	Pot	Field	Pot	Field	Pot
T1 (Control)	2.85±0.03 ^d	2.57±0.07 ^c	7.15±0.04 ^d	6.44±0.02 ^d	20.64±0.48 ^d	18.72±0.49 ^d	10.40±1.05 ^d	9.97±0.07 ^d
T2 (Single stem pruning)	4.00±0.05 ^a	3.17±0.09 ^a	10.31±0.02 ^a	9.57±0.27 ^a	27.57±0.09 ^a	25.05±0.08 ^a	14.76±0.18 ^a	12.25±0.08 ^a
T3 (Double stem pruning)	3.25±0.02 ^b	2.92±0.01 ^b	9.04±0.02 ^b	8.14±0.02 ^b	25.96±0.07 ^b	23.59±0.08 ^b	13.52±0.29 ^b	12.07±0.08 ^b
T4 (Fruit thinning)	3.17±0.02 ^c	2.87±0.01 ^b	8.62±0.01 ^c	7.76±0.02 ^c	25.19±0.07 ^c	22.91±0.07 ^c	11.82±0.13 ^c	10.72±0.08 ^c
CD	0.04	0.09	0.04	0.21	0.3	0.39	0.76	0.12

Cell values are mean ± SD; Different superscript letters (a, b, c) within a column indicate significant differences between treatments according to LSD at $p < 0.05$. Treatments with the same letter grouping are not significantly different.

Supplementary Table 3. Effect of pruning and fruit thinning treatments on flowering of watermelon

Treatment	Days to first male flower		Days to first female flower		Days to 50 % flowering		Number of male flowers		Number of female flowers		Female: Male flower ratio		Flower to fruit set ratio	
	Field	Pot	Field	Pot	Field	Pot	Field	Pot	Field	Pot	Field	Pot	Field	Pot
T1 (Control)	33.38±0.0	33.38±	39.28±	40.61±	51.92±	51.58±	39.14±	31.30±	3.95±	3.51±	0.10±	0.11±	0.38±	0.69±
	6 ^b	0.06 ^b	0.08 ^b	0.12 ^b	0.73 ^a	0.55 ^a	2.99 ^a	1.20 ^a	0.07 ^b	0.42 ^b	0.01 ^c	0.01 ^c	0.00 ^c	0.13 ^b
T2 (Single stem pruning)	30.28±	30.08±	36.90±	36.81±	39.91±	39.88±	36.43±	28.80±	4.52±	3.98±	0.12±	0.14±	0.45±	0.73±
	0.06 ^d	0.09 ^d	0.06 ^d	0.07 ^d	0.15 ^d	0.45 ^d	2.19 ^{ab}	0.39 ^b	0.26 ^a	0.26 ^a	0.01 ^b	0.01 ^a	0.03 ^b	0.02 ^b
T3 (Double stem pruning)	31.22±	30.35±	37.27±	37.24±	41.98±	41.17±	35.59±	30.70±	4.41±	3.83±	0.12±	0.12±	0.44±	0.86±
	0.58 ^c	0.07 ^c	0.07 ^c	0.08 ^c	0.19 ^c	0.17 ^c	1.84 ^b	1.38 ^a	0.26 ^a	0.23 ^{ab}	0.01 ^b	0.00 ^b	0.04 ^b	0.04 ^a
T4 (Fruit thinning)	34.31±	34.30±	39.86±	41.26±	43.08±	42.44±	24.67±	31.16±	3.74±	3.44±	0.15±	0.11±	0.49±	0.86±
	0.07 ^a	0.08 ^a	0.08 ^a	0.14 ^a	0.19 ^b	0.18 ^b	1.37 ^c	0.58 ^a	0.14 ^b	0.08 ^b	0.01 ^a	0.00 ^c	0.03 ^a	0.03 ^a
CD	0.39	0.11	0.02	0.16	0.51	0.58	3.24	1.5	0.29	0.43	0.01	0.01	0.03	0.11

Cell values are mean ± SD; Different superscript letters (a, b, c) within a column indicate significant differences between treatments according to LSD at $p < 0.05$. Treatments with the same letter grouping are not significantly different.

Supplementary Table 4. Effect of pruning and fruit thinning treatments on stress-related enzyme activity and chlorophyll content of watermelon

Treatment	Proline content ($\mu\text{mol g}^{-1}$)		Peroxidase ($\text{U g}^{-1} \text{FW min}^{-1}$)		Superoxide dismutase ($\text{U g}^{-1} \text{FW min}^{-1}$)		Chlorophyll a ($\text{mg g}^{-1} \text{FW}$)		Chlorophyll b ($\text{mg g}^{-1} \text{FW}$)		Total chlorophyll ($\text{mg g}^{-1} \text{FW}$)	
	Field	Pot	Field	Pot	Field	Pot	Field	Pot	Field	Pot	Field	Pot
T1 (Control)	22.34±0.40 ^d	23.35±0.47 ^d	32.06±0.18 ^d	35.59±0.22 ^d	22.74±0.77 ^d	24.00±1.04 ^d	1.92±0.04 ^d	1.73±0.05 ^d	1.06±0.07 ^c	1.17±0.05 ^c	3.76±0.02 ^d	3.43±0.03 ^d
T2 (Single Stem pruning)	34.00±0.51 ^a	39.42±0.64 ^a	38.30±0.14 ^a	42.58±0.17 ^a	37.82±0.53 ^a	39.65±0.66 ^a	2.69±0.19 ^a	2.41±0.07 ^a	1.37±0.08 ^a	1.51±0.02 ^a	4.37±0.02 ^a	3.99±0.02 ^a
T3 (Double stem pruning)	28.90±0.42 ^b	33.60±0.55 ^b	35.77±0.12 ^b	39.75±0.15 ^b	34.48±0.51 ^b	36.33±0.66 ^b	2.40±0.13 ^b	2.26±0.09 ^b	1.16±0.05 ^b	1.46±0.09 ^{ab}	4.22±0.02 ^b	3.86±0.03 ^b
T4 (Fruit thinning)	24.96±0.47 ^c	28.90±0.52 ^c	33.34±0.15 ^c	37.08±0.18 ^c	30.70±0.47 ^c	32.33±0.59 ^c	2.22±0.12 ^c	2.01±0.07 ^c	1.09±0.09 ^{bc}	1.38±0.06 ^b	4.06±0.02 ^c	3.71±0.03 ^c
CD	0.17	0.19	0.27	0.29	0.05	0.14	0.17	0.11	0.08	0.09	0.01	0.04

Cell values are mean ± SD; Different superscript letters (a, b, c) within a column indicate significant differences between treatments according to LSD at $p < 0.05$. Treatments with the same letter grouping are not significantly different.