

Supplemental file for: Cauliflower Yield, Growth, and Physiological Responses to Environments, Fall Planting Dates, and Cultivars in North Dakota.

Table S1. Days to harvest and yield performance of cauliflower cultivars across two growing seasons as affected by field environment and planting date.

Envir- onment	Cultivar	Date	Days to Harvest (Day)			Yield (g)		
			2023	2024	Year Mean	2023	2024	Year Mean
High Tunnel	Amazing	10 Jul	99.00±15.59	83.33±2.89	91.17±13.20	1415.0±238.5	993.7±86.9	1204.3±281.1
		25 Jul	-	78.00±9.63	78.00±9.63	-	990.8±433.5	990.8±433.5
		10 Aug	101.00±0.00	85.67±5.77	89.50±9.00	191.0±0.0	420.7±192.4	363.3±194.6
	Cheddar	10 Jul	88.75±12.01	71.00±0.00	81.14±12.73	1403.5±433.5	819.7±325.4	1153.3±476.1
		25 Jul	-	60.33±4.51	60.33±4.51	-	624.0±248.0	624.0±248.0
		10 Aug	86.00±0.00	72.00±3.46	75.50±7.55	122.0±0.0	994.7±382.1	776.5±536.4
	Clementine	10 Jul	91.00±12.73	77.75±11.00	82.17±12.32	1323.0±920.7	886.8±609.1	1032.2±665.5
		25 Jul	109.50±10.61	70.50±12.92	83.50±22.98	439.0±250.3	885.3±146.0	736.5±280.0
		10 Aug	96.75±7.18	71.25±7.32	84.00±15.19	176.3±72.6	586.8±245.0	381.5±275.9
	Flame Star	10 Jul	103.67±23.86	71.00±24.76	87.33±28.16	1547.7±612.3	1066.0±421.4	1355.0±549.1
		25 Jul	117.00±0.00	73.75±14.36	88.17±24.95	61.5±33.2	732.5±358.1	508.8±444.1
		10 Aug	-	89.00±0.00	89.00±0.00	-	941.5±873.3	941.5±873.3
	Snow Crown	10 Jul	76.00±0.00	62.00±4.76	69.00±8.11	1599.0±273.3	591.5±303.4	1095.3±601.2
		25 Jul	85.75±5.68	59.25±4.27	72.50±14.91	1792.5±287.8	662.3±181.8	1227.4±643.9
		10 Aug	100.33±0.58	68.75±7.09	82.29±17.61	319.7±174.0	904.5±515.6	653.9±490.6
	Vitaverde	10 Jul	107.33±8.74	88.33±18.93	97.83±16.80	733.7±361.4	408.3±149.1	571.0±304.8
		25 Jul	117.00±0.00	56.00±0.00	76.33±31.50	182.5±65.8	444.0±109.9	356.8±162.3
		10 Aug	100.67±0.58	73.75±12.53	85.29±16.90	225.3±63.8	722.5±226.2	509.4±312.4
	Cultivar Mean	Amazing	99.50±12.77	81.90±7.23	86.93±11.91	1109.0±642.2	820.6±385.6	903.0±465.2
		Cheddar	88.20±10.47	67.78±6.28	75.07±12.69	1147.2±685.1	812.8±322.7	932.2±486.0
		Clementine	98.50±10.66	73.17±10.23	83.30±16.27	528.6±621.2	786.3±380.9	683.2±492.9
		Flame Star	109.00±18.38	76.22±16.87	87.93±23.34	953.2±922.1	868.1±461.0	900.8±639.7
		Snow Crown	86.18±10.55	63.33±6.50	74.26±14.42	1320.5±688.4	719.4±355.3	1006.9±610.6
		Vitaverde	107.25±8.22	71.27±17.37	86.42±22.96	405.3±336.7	535.5±213.6	480.7±271.7
	Date Mean	10 Jul	93.21±16.11	75.00±14.39	83.87±17.65	1355.0±488.2	774.2±390.5	1064.6±526.1
		25 Jul	103.00±15.87	66.57±11.80	77.61±21.35	853.6±839.5	727.4±302.9	765.7±514.5
		10 Aug	98.08±5.66	75.30±9.87	83.84±14.02	221.1±109.7	749.2±400.2	551.2±412.2
Open	Amazing	10 Jul	90.25±10.11	69.50±3.00	79.88±13.07	1384.0±225.8	1212.0±349.9	1298.0±287.7
		25 Jul	-	61.67±2.89	61.67±2.89	-	881.0±75.3	881.0±75.3
		10 Aug	-	71.67±7.51	71.67±7.51	-	485.7±318.0	485.7±318.0
	Cheddar	10 Jul	80.00±2.83	66.00±3.46	70.67±7.81	1621.0±165.5	974.8±268.0	1190.2±399.9
		25 Jul	-	56.00±0.00	56.00±0.00	-	1396.3±280.6	1396.3±280.6
		10 Aug	-	67.00±6.06	67.00±6.06	-	567.5±329.7	567.5±329.7
	Clementine	10 Jul	80.00±2.31	63.00±8.00	72.71±10.32	1149.0±446.6	837.7±280.2	1015.6±391.9
		25 Jul	81.00±12.73	56.00±0.00	64.33±14.11	715.0±63.6	697.0±252.2	703.0±197.7
		10 Aug	-	73.00±4.24	73.00±4.24	-	390.5±328.8	390.5±328.8
	Flame Star	10 Jul	87.25±4.50	71.75±6.18	79.50±9.68	1749.3±756.4	1524.3±466.7	1636.8±594.2
		25 Jul	-	58.00±2.31	58.00±2.31	-	820.3±157.5	820.3±157.5
		10 Aug	-	82.50±7.51	82.50±7.51	-	316.5±109.8	316.5±109.8
		10 Jul	69.75±5.50	58.25±9.29	64.00±9.37	945.5±737.1	931.5±515.5	938.5±588.9

	Snow	25 Jul	72.00±0.00	53.00±3.46	56.80±9.01	1252.0±0.0	841.8±214.5	923.8±261.1
	Crown	10 Aug	74.00±0.00	60.75±10.44	65.17±10.59	976.0±101.8	777.7±404.6	857.0±310.2
		10 Jul	98.00±6.24	64.00±6.56	81.00±19.48	1165.3±429.0	591.7±80.9	878.5±418.3
	Vitaverde	25 Jul	-	57.33±2.31	57.33±2.31	-	819.3±581.3	819.3±581.3
		10 Aug	86.00±0.00	77.25±9.88	79.00±9.41	529.0±0.0	348.3±183.1	384.4±178.0
		Amazing	90.25±10.11	67.80±6.01	74.21±12.63	1384.0±225.8	894.8±406.4	1034.6±422.7
		Cheddar	80.00±2.83	63.64±6.23	66.15±8.41	1621.0±165.5	941.6±434.0	1046.2±473.6
	Cultivar	Clementine	80.33±5.99	62.11±8.18	69.40±11.68	1004.3±413.1	675.8±295.6	807.2±372.4
	Mean	Flame Star	87.25±4.50	70.75±11.70	74.88±12.61	1749.3±756.4	887.0±580.6	1102.6±714.4
		Snow Crown	71.29±4.39	57.33±8.24	62.47±9.78	998.0±534.9	856.9±361.2	911.8±427.5
		Vitaverde	95.00±7.87	67.30±11.14	75.21±16.40	1006.3±473.2	562.6±361.1	689.4±430.4
		10 Jul	83.95±10.62	65.59±7.26	74.56±12.90	1316.6±555.8	1039.0±439.1	1174.6±513.0
	Date Mean	25 Jul	78.00±10.39	56.81±3.31	59.46±8.38	894.0±313.3	891.7±332.4	892.0±323.4
		10 Aug	78.00±6.93	71.95±10.46	72.71±10.17	827.0±267.9	475.0±289.2	520.9±305.7
		10 Jul	94.00±12.41	75.43±7.87	84.71±13.88	1397.3±211.5	1118.4±278.2	1257.9±278.0
Amazing		25 Jul	-	71.00±11.20	71.00±11.20	-	943.7±315.1	943.7±315.1
		10 Aug	101.00±0.00	78.67±9.73	81.86±12.25	191.0±0.0	453.2±237.7	415.7±238.6
		10 Jul	85.83±10.42	68.14±3.63	76.31±11.66	1476.0±361.7	908.3±279.4	1170.3±424.6
Cheddar		25 Jul	-	58.17±3.71	58.17±3.71	-	1010.2±484.8	1010.2±484.8
		10 Aug	86.00±0.00	69.14±5.43	71.25±7.80	122.0±0.0	750.6±393.9	672.0±427.1
		10 Jul	83.67±8.24	71.43±12.00	77.08±11.86	1207.0±545.2	865.7±460.8	1023.2±511.3
Clementine		25 Jul	95.25±19.03	63.25±11.47	73.92±20.76	577.0±218.2	791.1±215.7	719.8±231.8
		10 Aug	96.75±7.18	71.83±6.05	81.80±14.25	176.3±72.6	521.3±260.6	383.3±266.9
		10 Jul	94.29±16.64	71.43±14.95	82.86±19.28	1662.9±650.1	1371.5±471.4	1528.4±571.6
Flame Star		25 Jul	117.00±0.00	65.88±12.71	76.10±24.30	61.5±33.2	776.4±260.4	633.4±379.1
		10 Aug	-	84.67±6.71	84.67±6.71	-	524.8±513.7	524.8±513.7
		10 Jul	72.88±4.91	60.13±7.12	66.50±8.85	1272.3±622.0	761.5±431.7	1016.9±580.6
Snow Crown		25 Jul	83.00±7.87	56.13±4.91	66.46±14.83	1684.4±347.2	752.0±207.6	1110.6±536.9
		10 Aug	89.80±14.43	64.75±9.30	74.38±16.76	582.2±383.4	850.1±438.2	738.5±421.0
		10 Jul	102.67±8.50	76.17±18.39	89.42±19.44	949.5±426.3	500.0±147.0	724.8±384.1
Vitaverde		25 Jul	117.00±0.00	56.57±1.51	70.00±26.68	182.5±65.8	604.9±398.6	511.0±393.0
		10 Aug	97.00±7.35	75.50±10.61	82.67±14.09	301.3±160.5	535.4±276.3	457.3±262.5
	Environment Mean	High Tunnel	97.02±14.09	72.02±12.65	81.88±18.01	900.8±711.5	748.8±358.3	809.3±530.0
		Open Field	82.63±10.25	64.80±9.71	70.09±12.79	1215.3±536.9	810.9±428.6	932.2±496.9
		Amazing	94.88±11.75	74.85±9.71	80.57±13.67	1246.5±469.3	857.7±387.4	968.8±441.3
		Cheddar	85.86±9.51	65.50±6.44	70.78±11.57	1282.6±609.0	883.7±383.8	987.1±474.3
	Cultivar Mean	Clementine	90.71±12.73	68.43±10.76	77.34±15.90	732.5±577.1	738.9±343.3	736.3±443.5
		Flame Star	99.33±17.55	73.10±14.03	80.97±19.24	1307.0±903.2	879.5±523.0	1012.1±677.7
		Snow Crown	80.39±11.32	60.33±7.88	68.93±13.74	1195.1±637.2	785.2±356.8	965.1±533.8
		Vitaverde	103.17±9.81	69.38±14.52	81.67±20.91	605.6±469.9	548.4±285.8	569.2±357.4
		10 Jul	88.35±14.13	70.07±12.07	78.99±15.95	1334.9±518.4	916.3±433.3	1123.0±518.9
Date Mean		25 Jul	97.23±18.09	61.91±10.03	69.96±19.26	862.9±738.4	805.8±324.4	818.9±445.2
		10 Aug	94.07±10.06	73.59±10.19	79.07±13.60	342.3±287.5	612.1±371.6	538.5±368.6

Dashes (–) indicate treatment combinations where plants did not survive to harvest due to freeze exposure; these observations were excluded from statistical analysis.

Table S2. Days to curd diameter and fresh root weight of cauliflower cultivars across two growing seasons as affected by field environment and planting date.

Environ- ment	Cultivar	Date	Curd Diameter (cm)			Fresh Root Weight (g)		
			2023	2024	Year Mean	2023	2024	Year Mean
High Tunnel	Amazing	10 Jul	20.24±1.30	17.86±1.25	19.05±1.73	143.3±42.4	165.3±45.1	154.3±41.0
		25 Jul	-	17.57±2.11	17.57±2.11	110.0±0.0	138.3±34.0	131.3±31.1
		10 Aug	12.70±0.00	13.05±1.94	12.96±1.60	108.0±41.8	60.0±0.0	96.0±41.7
	Cheddar	10 Jul	18.23±1.43	15.65±1.76	17.12±1.99	158.0±69.0	189.0±84.0	171.3±70.8
		25 Jul	-	14.54±1.80	14.54±1.80	166.0±0.0	130.5±58.7	142.3±46.3
		10 Aug	8.89±0.00	15.75±2.01	14.03±3.80	83.7±41.0	151.0±26.9	110.6±48.8
	Clementine	10 Jul	18.93±3.77	16.37±3.09	17.22±3.21	113.0±32.5	151.0±41.4	138.3±40.3
		25 Jul	13.97±3.59	17.03±1.77	16.01±2.64	101.5±58.4	166.8±61.2	134.1±65.5
		10 Aug	9.34±1.58	14.58±2.29	11.96±3.34	130.3±39.8	88.3±21.4	109.3±37.1
	Flame Star	10 Jul	18.88±2.78	17.78±1.07	18.44±2.13	247.0±91.9	187.0±32.5	217.0±66.1
		25 Jul	6.35±1.80	15.58±3.88	12.50±5.69	94.7±45.3	174.0±11.3	126.4±54.3
		10 Aug	-	14.99±5.03	14.99±5.03	91.0±18.4	168.0±25.5	129.5±48.0
	Snow Crown	10 Jul	19.51±0.95	13.86±2.59	16.69±3.52	156.0±9.2	127.3±79.6	141.6±54.7
		25 Jul	20.26±1.15	15.78±1.43	18.02±2.68	153.5±31.6	149.3±91.5	151.7±57.4
		10 Aug	11.18±1.66	16.11±2.41	13.99±3.28	86.3±49.1	72.0±0.0	82.8±40.7
	Vitaverde	10 Jul	15.98±1.75	11.77±1.55	13.88±2.74	118.3±59.2	115.0±29.4	116.7±41.8
		25 Jul	9.40±1.80	13.59±0.98	12.19±2.43	77.0±46.3	133.3±25.1	105.1±45.7
		10 Aug	9.78±1.32	14.92±2.17	12.72±3.24	106.3±38.8	89.0±11.8	97.6±28.1
	Cultivar Mean	Amazing	18.35±3.92	16.30±2.78	16.89±3.13	123.4±39.1	138.7±49.5	131.1±43.6
		Cheddar	16.36±4.35	15.31±1.71	15.69±2.81	131.1±63.8	161.4±61.5	145.3±62.5
		Clementine	12.89±4.79	15.99±2.46	14.75±3.79	115.3±44.4	135.3±53.5	126.2±49.5
		Flame Star	13.87±7.20	15.98±3.40	15.17±5.01	137.1±88.2	176.3±21.0	155.2±67.0
		Snow Crown	17.51±4.23	15.25±2.25	16.33±3.46	136.1±42.8	128.6±75.8	132.9±57.1
		Vitaverde	12.01±3.56	13.58±1.97	12.92±2.78	98.9±46.1	112.2±28.3	105.5±37.9
	Date Mean	10 Jul	18.64±2.12	15.39±2.85	17.01±2.98	153.4±59.2	152.4±57.1	152.9±57.3
		25 Jul	14.05±6.14	15.73±2.40	15.22±3.90	111.1±49.9	148.4±48.7	130.3±52.1
		10 Aug	10.15±1.68	14.94±2.37	13.14±3.16	103.3±38.4	105.6±39.8	104.3±38.4
Open Field	Amazing	10 Jul	19.08±1.71	17.86±1.97	18.47±1.83	196.1±79.9	173.0±94.8	188.4±75.9
		25 Jul	-	17.10±0.29	17.10±0.29	-	185.0±0.0	185.0±0.0
		10 Aug	-	12.41±3.61	12.41±3.61	-	88.7±24.5	88.7±24.5
	Cheddar	10 Jul	19.78±0.42	16.56±1.48	17.63±2.02	152.0±8.5	180.5±41.7	166.3±29.6
		25 Jul	-	18.14±1.06	18.14±1.06	132.0±0.0	95.5±6.4	107.7±21.5
		10 Aug	-	12.51±3.13	12.51±3.13	50.0±12.2	57.3±44.7	53.7±29.6
	Clementine	10 Jul	18.88±1.35	16.89±2.10	18.03±1.87	103.0±34.6	68.0±0.0	96.0±33.8
		25 Jul	17.02±1.07	16.73±1.65	16.83±1.37	155.3±80.9	109.3±39.7	132.3±62.3
		10 Aug	-	11.39±3.18	11.39±3.18	54.0±2.8	73.0±35.4	63.5±23.2
	Flame Star	10 Jul	20.32±1.06	19.53±1.07	19.93±1.07	190.0±57.9	221.0±43.7	205.5±50.3
		25 Jul	-	16.54±0.56	16.54±0.56	122.0±0.0	100.3±8.1	105.8±12.7
		10 Aug	-	11.01±1.43	11.01±1.43	168.0±22.6	117.5±24.7	134.3±33.9
	Snow Crown	10 Jul	15.48±3.76	16.93±3.24	16.20±3.34	149.5±24.0	-	149.5±24.0
		25 Jul	19.05±0.00	15.86±1.60	16.50±1.99	154.0±0.0	120.8±51.3	127.4±46.9

Vitaverde	10 Aug	17.62±0.59	15.66±4.71	16.44±3.51	68.0±0.0	97.5±53.0	82.8±35.0
	10 Jul	17.24±1.37	15.75±1.11	16.50±1.38	115.5±18.4	115.7±22.7	115.6±18.5
	25 Jul	-	15.99±2.24	15.99±2.24	108.7±89.1	109.0±12.8	108.8±56.9
	10 Aug	12.70±0.00	10.73±2.59	11.13±2.41	93.8±39.6	108.0±26.0	100.9±31.9
Cultivar Mean	Amazing	19.08±1.71	16.00±3.23	16.88±3.16	196.1±79.9	132.8±66.3	158.2±75.1
	Cheddar	19.78±0.42	15.52±3.15	16.17±3.29	97.7±53.4	103.4±63.5	100.8±56.7
	Clementine	18.26±1.50	15.60±3.01	16.66±2.79	109.6±60.5	90.3±36.3	101.9±51.6
	Flame Star	20.32±1.06	15.69±3.82	16.85±3.90	174.0±49.0	150.5±62.8	159.6±57.5
	Snow Crown	16.60±3.05	16.19±2.95	16.35±2.91	126.9±43.7	113.0±47.8	120.5±44.3
	Vitaverde	16.11±2.53	13.81±3.27	14.47±3.16	105.7±47.5	110.6±19.7	108.0±36.2
Planting Date Mean	10 Jul	18.40±2.48	17.34±2.14	17.85±2.35	150.9±55.3	167.2±65.6	156.7±58.6
	25 Jul	17.70±1.40	16.68±1.42	16.80±1.43	133.3±64.0	113.4±34.8	120.6±47.1
	10 Aug	15.98±2.87	12.20±3.15	12.69±3.32	85.0±46.4	93.4±35.3	89.9±39.8
Amazing	10 Jul	19.58±1.55	17.86±1.57	18.72±1.74	173.5±67.7	168.4±57.3	171.4±60.8
	25 Jul	-	17.37±1.52	17.37±1.52	110.0±0.0	150.0±36.2	142.0±36.1
Cheddar	10 Aug	12.70±0.00	12.73±2.61	12.73±2.39	108.0±41.8	81.5±24.6	92.9±32.9
	10 Jul	18.74±1.38	16.17±1.54	17.36±1.94	156.0±53.7	185.6±63.2	169.5±57.2
Clementine	25 Jul	-	16.34±2.38	16.34±2.38	149.0±24.0	113.0±39.6	125.0±37.5
	10 Aug	8.89±0.00	13.90±3.04	13.27±3.32	66.8±32.8	94.8±61.8	79.5±47.7
Flame Star	10 Jul	18.90±1.98	16.59±2.52	17.66±2.50	106.3±30.9	134.4±51.6	119.1±41.9
	25 Jul	15.50±2.79	16.88±1.59	16.42±2.05	124.6±68.7	142.1±57.8	133.4±61.7
Snow Crown	10 Aug	9.34±1.58	13.52±2.81	11.84±3.14	104.8±50.0	83.2±24.2	94.0±39.1
	10 Jul	19.70±1.93	18.95±1.32	19.35±1.66	209.0±67.6	209.7±40.8	209.3±53.3
Vitaverde	25 Jul	6.35±1.80	16.06±2.62	14.12±4.74	101.5±39.4	129.8±41.1	117.2±40.6
	10 Aug	-	12.33±3.24	12.33±3.24	129.5±47.5	134.3±34.3	132.4±37.6
Field Mean	10 Jul	17.50±3.33	15.40±3.17	16.45±3.32	152.8±17.2	127.3±79.6	144.3±45.5
	25 Jul	20.02±1.13	15.82±1.41	17.43±2.47	153.6±27.3	133.0±65.9	141.6±52.5
Cultivar Mean	10 Aug	13.75±3.73	15.92±3.22	15.01±3.46	79.0±36.1	89.0±40.3	82.8±35.2
	10 Jul	16.61±1.56	13.76±2.49	15.19±2.48	116.7±36.6	115.3±23.5	116.1±30.0
Planting Date Mean	25 Jul	9.40±1.80	14.61±1.95	13.46±2.92	90.6±63.3	122.9±23.2	106.7±48.7
	10 Aug	10.51±1.82	12.83±3.15	12.06±2.92	100.0±36.9	98.5±21.3	99.3±29.1
Field Mean	High Tunnel	15.03±4.98	15.37±2.52	15.24±3.68	122.4±53.6	138.2±52.9	130.1±53.6
	Open	18.05±2.48	15.49±3.23	16.25±3.23	127.9±60.7	119.6±53.1	123.6±56.8
Cultivar Mean	Amazing	18.72±2.82	16.15±2.94	16.88±3.09	149.9±64.6	136.0±55.4	142.4±58.9
	Cheddar	17.33±3.93	15.43±2.54	15.92±3.00	116.8±59.9	132.4±67.2	124.6±62.9
	Clementine	15.19±4.56	15.82±2.65	15.57±3.49	112.6±51.2	120.3±52.1	116.4±51.1
	Flame Star	16.73±6.15	15.81±3.56	16.09±4.43	155.6±71.2	159.6±52.6	157.8±60.6
	Snow Crown	17.16±3.74	15.70±2.59	16.34±3.19	132.5±42.1	121.9±63.6	127.9±51.9
	Vitaverde	13.38±3.72	13.69±2.60	13.58±3.00	102.3±45.8	111.4±24.0	106.8±36.7
Planting Date Mean	10 Jul	18.51±2.29	16.43±2.65	17.46±2.68	152.0±56.3	158.1±59.9	154.7±57.6
	25 Jul	14.89±5.58	16.18±2.03	15.89±3.18	118.8±55.0	132.0±45.7	126.3±49.9
	10 Aug	11.32±3.03	13.57±3.08	12.95±3.20	95.8±42.1	98.8±37.2	97.3±39.4

Dashes (–) indicate treatment combinations where plants did not survive to harvest due to freeze exposure; these observations were excluded from statistical analysis.

Table S3. Days to root length and width of cauliflower cultivars across two growing seasons as affected by field environment and planting date.

Field	Cultivar	Date	Root Length (cm)			Root Width (cm)		
			2023	2024	Year Mean	2023	2024	Year Mean
High Tunnel	Amazing	10 Jul	29.21±4.58	26.25±1.47	27.73±3.45	35.77±6.10	43.18±2.54	39.48±5.83
		25 Jul	20.32±0.00	23.28±6.99	22.54±5.90	30.48±0.00	38.10±9.16	36.20±8.39
		10 Aug	22.86±2.54	12.70±0.00	20.32±5.49	35.56±6.72	20.32±0.00	31.75±9.39
	Cheddar	10 Jul	22.54±8.06	24.55±1.47	23.40±5.86	30.48±10.57	40.64±2.54	34.83±9.36
		25 Jul	43.18±0.00	20.32±7.18	27.94±14.14	41.91±0.00	38.10±7.18	39.37±5.54
		10 Aug	21.59±6.35	18.42±0.90	20.32±4.84	22.01±4.81	30.48±3.59	25.40±6.02
	Clementine	10 Jul	24.13±5.39	30.48±6.56	28.36±6.51	27.94±7.18	43.18±7.18	38.10±10.16
		25 Jul	19.05±13.16	20.96±6.99	20.00±9.81	20.64±11.47	30.48±9.95	25.56±11.25
		10 Aug	25.40±5.49	23.50±5.54	24.45±5.20	32.70±7.06	35.56±5.49	34.13±6.05
	Flame Star	10 Jul	31.12±0.90	27.31±0.90	29.21±2.32	42.55±2.69	41.91±1.80	42.23±1.91
		25 Jul	23.71±6.00	38.10±0.00	29.46±8.95	32.17±5.29	45.72±3.59	37.59±8.50
		10 Aug	17.78±0.00	21.59±5.39	19.69±3.81	27.94±3.59	35.56±7.18	31.75±6.39
	Snow Crown	10 Jul	23.18±2.17	21.59±3.44	22.38±2.79	32.39±1.27	33.66±7.58	33.02±5.08
		25 Jul	20.00±3.65	15.24±5.08	17.96±4.66	29.21±2.54	24.55±10.57	27.21±6.83
		10 Aug	20.32±8.89	16.51±0.00	19.37±7.50	20.96±9.88	25.40±0.00	22.44±7.44
	Vitaverde	10 Jul	20.32±6.72	32.17±19.40	26.25±14.52	32.17±8.92	35.56±7.62	33.87±7.65
		25 Jul	14.29±1.22	21.59±7.90	17.94±6.53	21.59±3.28	33.02±5.49	27.31±7.41
		10 Aug	22.54±4.45	24.45±4.56	23.50±4.29	23.81±7.99	34.93±1.27	29.37±7.96
	Cultivar Mean	Amazing	25.22±4.89	23.04±6.33	24.13±5.55	34.93±5.60	37.74±9.77	36.33±7.79
		Cheddar	24.77±9.74	21.59±4.21	23.28±7.60	28.73±10.02	37.01±5.84	32.60±9.12
		Clementine	22.61±8.98	24.98±7.15	23.90±7.92	26.92±9.94	36.41±8.89	32.10±10.35
		Flame Star	24.13±6.48	29.00±7.89	26.38±7.30	33.93±7.14	41.06±5.88	37.22±7.32
		Snow Crown	21.24±4.86	18.57±4.80	20.12±4.89	28.83±5.74	29.21±8.90	29.00±7.08
		Vitaverde	18.93±5.46	25.52±10.96	22.23±9.10	25.28±7.67	34.41±4.73	29.85±7.78
	Date Mean	10 Jul	24.55±5.94	26.94±8.14	25.78±7.16	33.13±7.35	39.44±6.52	36.37±7.55
		25 Jul	20.47±9.17	22.37±8.41	21.44±8.71	26.74±8.35	33.87±9.46	30.41±9.52
		10 Aug	22.19±5.24	21.50±5.24	21.90±5.17	27.59±8.12	32.84±5.85	29.88±7.59
Open	Amazing	10 Jul	28.89±6.83	19.69±0.90	25.82±7.12	38.42±5.52	38.10±3.59	38.31±4.57
		25 Jul	-	26.67±0.00	26.67±0.00	-	45.72±0.00	45.72±0.00
		10 Aug	-	22.44±4.46	22.44±4.46	-	33.02±7.62	33.02±7.62
	Cheddar	10 Jul	16.51±1.80	12.70±14.37	14.61±8.64	25.40±7.18	39.37±1.80	32.39±9.13
		25 Jul	19.05±0.00	27.94±0.00	24.98±5.13	31.75±0.00	38.10±0.00	35.98±3.67
		10 Aug	15.66±4.08	23.71±3.20	19.69±5.49	24.13±5.82	35.56±2.54	29.85±7.44
	Clementine	10 Jul	23.50±3.81	16.51±0.00	22.10±4.54	32.70±5.52	27.94±0.00	31.75±5.24
		25 Jul	22.01±5.73	22.44±6.99	22.23±5.72	32.60±10.65	33.02±7.62	32.81±8.29
		10 Aug	17.15±0.90	16.51±1.80	16.83±1.22	31.75±1.80	27.94±7.18	29.85±4.81
	Flame Star	10 Jul	28.26±7.21	30.48±2.07	29.37±5.05	39.69±8.70	46.67±4.32	43.18±7.37
		25 Jul	17.78±0.00	25.40±4.40	23.50±5.24	29.21±0.00	40.64±5.08	37.78±7.06
		10 Aug	22.23±2.69	18.73±2.40	19.90±2.86	31.75±5.39	29.53±4.32	30.27±4.28
	Snow Crown	10 Jul	27.94±4.64	-	27.94±4.64	32.07±7.85	-	32.07±7.85
		25 Jul	22.86±0.00	25.72±4.91	25.15±4.44	29.21±0.00	36.20±6.68	34.80±6.57
		10 Aug	17.78±1.80	30.48±3.59	24.13±7.69	27.94±7.18	37.47±4.49	32.70±7.36
	Vitaverde	10 Jul	22.54±1.91	25.40±7.62	23.77±4.85	32.39±7.37	37.68±5.13	34.65±6.63

	25 Jul	16.09±6.99	24.55±5.29	20.32±7.23	27.52±6.99	38.95±1.47	33.23±7.72
	10 Aug	17.15±2.20	22.86±4.75	20.00±4.59	29.53±7.58	36.83±7.90	33.18±8.16
Cultivar Mean	Amazing	28.89±6.83	22.23±3.83	24.89±5.96	38.42±5.52	36.83±7.14	37.47±6.26
	Cheddar	16.51±3.01	21.77±8.93	19.34±7.15	25.82±5.72	37.37±2.42	32.04±7.24
	Clementine	21.59±4.53	19.47±5.55	20.74±4.89	32.46±6.35	30.48±6.43	31.67±6.23
	Flame Star	25.04±6.75	24.82±5.89	24.91±6.04	35.92±8.09	38.79±8.75	37.68±8.38
	Snow Crown	24.31±5.89	27.31±4.80	25.69±5.42	30.48±6.60	36.62±5.59	33.31±6.70
	Vitaverde	18.82±4.61	24.13±5.29	21.35±5.53	30.02±6.89	37.72±5.29	33.69±7.20
Date Mean	10 Jul	25.34±5.90	23.28±8.80	24.62±7.00	34.17±7.55	40.22±6.55	36.31±7.69
	25 Jul	19.33±5.38	25.16±4.53	23.06±5.53	30.06±6.78	37.78±5.63	35.00±7.03
	10 Aug	17.68±3.09	22.15±4.97	20.28±4.78	28.72±5.97	33.44±6.22	31.46±6.47
Amazing	10 Jul	29.03±5.51	23.62±3.77	26.78±5.43	37.28±5.45	41.15±3.77	38.89±5.03
	25 Jul	20.32±0.00	24.13±5.96	23.37±5.43	30.48±0.00	40.01±8.39	38.10±8.42
	10 Aug	22.86±2.54	20.00±6.08	21.23±4.79	35.56±6.72	29.85±8.89	32.29±7.99
Cheddar	10 Jul	20.53±7.02	19.81±9.74	20.20±7.92	28.79±9.18	40.13±2.13	33.94±8.89
	25 Jul	31.12±17.06	24.13±6.05	26.46±9.65	36.83±7.18	38.10±4.15	37.68±4.59
	10 Aug	18.63±5.77	21.59±3.70	19.97±4.95	23.07±4.91	33.53±3.77	27.82±6.90
Clementine	10 Jul	23.71±3.82	27.69±8.44	25.52±6.34	31.12±5.89	40.13±9.23	35.21±8.58
	25 Jul	20.32±10.00	21.59±6.43	20.96±8.11	25.76±12.02	31.57±8.41	28.67±10.41
	10 Aug	22.65±6.03	21.17±5.66	21.91±5.63	32.39±5.55	33.02±6.62	32.70±5.84
Flame Star	10 Jul	29.21±5.79	29.42±2.33	29.32±4.21	40.64±7.00	45.09±4.23	42.86±5.98
	25 Jul	22.23±5.73	30.48±7.62	26.81±7.76	31.43±4.56	42.67±4.89	37.68±7.41
	10 Aug	20.00±3.00	19.69±3.38	19.81±3.06	29.85±4.34	31.54±5.59	30.86±4.94
Snow Crown	10 Jul	25.56±4.21	21.59±3.44	24.24±4.28	32.23±5.21	33.66±7.58	32.70±5.79
	25 Jul	20.57±3.41	21.23±7.21	20.96±5.72	29.21±2.20	31.21±9.92	30.37±7.51
	10 Aug	19.30±6.50	25.82±8.46	21.75±7.48	24.45±8.12	33.44±7.66	28.30±8.70
Vitaverde	10 Jul	21.59±4.28	28.79±13.69	24.91±10.06	32.29±7.33	36.62±5.93	34.29±6.82
	25 Jul	15.06±4.24	22.86±6.56	18.96±6.67	24.13±5.63	35.56±5.08	29.85±7.86
	10 Aug	19.84±4.34	23.65±4.40	21.75±4.66	26.67±7.83	35.88±5.33	31.27±8.03
Field Mean	High Tunnel	22.44±6.99	23.83±7.81	23.11±7.40	29.20±8.30	35.66±7.97	32.37±8.72
	Open	21.85±6.15	23.50±6.07	22.69±6.13	31.72±7.26	36.72±6.61	34.28±7.34
Cultivar Mean	Amazing	26.55±5.64	22.66±5.13	24.45±5.61	36.20±5.57	37.32±8.32	36.80±7.07
	Cheddar	21.23±8.52	21.68±6.71	21.45±7.53	27.49±8.30	37.19±4.30	32.34±8.15
	Clementine	22.12±7.05	23.14±7.02	22.62±6.96	29.54±8.68	34.43±8.46	31.92±8.81
	Flame Star	24.58±6.37	26.30±6.73	25.52±6.52	34.93±7.40	39.59±7.74	37.49±7.83
	Snow Crown	22.44±5.34	22.32±6.43	22.38±5.74	29.51±5.97	32.39±8.32	30.81±7.15
	Vitaverde	18.88±4.93	24.86±8.55	21.80±7.49	27.65±7.52	35.98±5.16	31.72±7.66
Date Mean	10 Jul	24.99±5.85	25.52±8.45	25.22±7.06	33.70±7.38	39.74±6.44	36.34±7.56
	25 Jul	20.08±7.96	23.68±6.91	22.12±7.54	27.89±7.87	35.71±8.03	32.32±8.81
	10 Aug	20.36±4.97	21.87±5.02	21.11±5.01	28.06±7.21	33.18±5.97	30.66±7.04

Dashes (–) indicate treatment combinations where plants did not survive to harvest due to freeze exposure; these observations were excluded from statistical analysis.

Table S4. Days to leaf number and plant height of cauliflower cultivars for two growing seasons as affected by field environment and planting date.

Field	Cultivar	Date	Leaf Number			Plant Height (cm)		
			2023	2024	Year Mean	2023	2024	Year Mean
High Tunnel	Amazing	10 Jul	26.67±3.21	22.75±11.24	24.43±8.42	71.12±4.40	54.93±24.04	61.87±19.24
		25 Jul	17.00±0.00	32.75±4.99	29.60±8.26	67.31±0.00	85.09±7.90	81.53±10.49
		10 Aug	23.25±4.99	29.50±5.00	26.38±5.71	74.93±1.47	71.12±17.23	73.03±11.50
	Cheddar	10 Jul	24.50±0.58	27.25±5.06	25.88±3.64	68.90±8.45	76.84±3.81	72.87±7.40
		25 Jul	20.00±0.00	27.50±4.12	26.00±4.90	73.66±0.00	74.93±6.05	74.68±5.27
		10 Aug	17.25±1.89	26.50±3.87	21.88±5.69	59.06±20.91	76.84±4.81	67.95±16.96
	Clementine	10 Jul	21.50±3.54	17.00±7.44	18.50±6.41	80.65±8.08	67.31±31.89	71.76±25.90
		25 Jul	13.00±7.35	24.75±3.30	18.88±8.20	67.95±28.54	84.46±6.99	76.20±21.16
		10 Aug	18.50±1.73	25.50±2.38	22.00±4.21	82.55±7.69	78.11±11.43	80.33±9.33
	Flame Star	10 Jul	20.67±4.04	17.25±8.85	18.71±6.92	80.01±17.46	55.88±21.65	66.22±22.41
		25 Jul	15.00±1.00	23.50±4.65	19.86±5.64	70.27±2.93	76.84±3.20	74.02±4.50
		10 Aug	17.25±1.89	25.50±3.11	21.38±5.01	74.30±7.51	77.47±3.28	75.88±5.63
	Snow Crown	10 Jul	25.50±1.29	29.50±7.23	27.50±5.26	82.87±3.34	79.38±16.90	81.12±11.43
		25 Jul	20.00±2.94	24.50±2.65	22.25±3.54	84.77±7.29	75.57±20.57	80.17±15.11
		10 Aug	20.00±3.00	23.75±3.50	22.14±3.63	77.89±22.37	83.82±4.64	81.28±13.70
	Vitaverde	10 Jul	15.00±6.06	17.75±8.81	16.38±7.15	59.06±27.52	57.79±23.41	58.42±23.66
		25 Jul	14.00±2.00	25.50±2.52	19.75±6.50	60.33±12.85	81.28±4.64	70.80±14.33
		10 Aug	17.25±0.96	26.75±3.59	22.00±5.63	82.23±1.91	78.74±3.59	80.49±3.25
	Cultivar Mean	Amazing	23.75±4.89	28.33±8.18	26.50±7.27	72.55±3.81	70.38±20.52	71.25±15.82
		Cheddar	20.78±3.83	27.08±3.99	24.38±4.98	65.05±15.01	76.20±4.60	71.42±11.56
		Clementine	16.90±5.74	22.42±5.98	19.91±6.38	76.33±18.74	76.62±19.52	76.49±18.71
		Flame Star	17.60±3.24	22.08±6.58	20.05±5.69	74.80±10.22	70.06±15.60	72.22±13.34
		Snow Crown	22.00±3.55	25.92±5.16	24.04±4.80	82.20±11.30	79.59±14.54	80.84±12.87
		Vitaverde	15.42±3.65	23.33±6.61	19.38±6.61	67.20±19.39	72.60±16.72	69.90±17.92
	Date Mean	10 Jul	22.25±5.24	21.92±8.96	22.07±7.42	72.90±15.80	65.35±21.96	68.78±19.56
		25 Jul	15.88±4.59	26.42±4.62	22.05±6.95	70.82±16.56	79.69±9.82	76.01±13.59
		10 Aug	18.87±3.29	26.25±3.70	22.64±5.09	75.04±13.75	77.68±8.89	76.39±11.48
Open	Amazing	10 Jul	24.50±1.29	32.25±5.06	28.38±5.37	64.14±3.36	66.04±2.07	65.09±2.78
		25 Jul	-	24.75±7.41	24.75±7.41	-	60.33±15.15	60.33±15.15
		10 Aug	14.50±2.12	28.75±2.75	24.00±7.72	31.12±0.90	60.33±6.99	50.59±16.03
	Cheddar	10 Jul	18.67±4.93	28.25±4.79	24.14±6.77	55.03±10.34	60.33±4.34	58.06±7.29
		25 Jul	-	27.00±2.83	27.00±2.83	-	66.68±4.81	66.68±4.81
		10 Aug	17.00±2.65	27.00±2.71	22.71±5.88	59.69±7.93	62.23±4.40	61.14±5.70
	Clementine	10 Jul	23.25±0.96	24.00±4.24	23.63±2.88	71.76±3.20	64.14±13.50	67.95±9.95
		25 Jul	19.00±2.16	21.25±2.75	20.13±2.59	72.71±3.18	67.31±11.82	70.01±8.52
		10 Aug	17.50±2.65	21.25±2.36	19.38±3.07	59.69±13.83	59.69±8.68	59.69±10.69
	Flame Star	10 Jul	18.50±2.52	28.25±1.89	23.38±5.60	65.09±1.91	69.85±1.47	67.47±2.99
		25 Jul	16.67±4.62	22.00±2.16	19.71±4.19	55.88±5.08	67.95±3.20	62.77±7.44
		10 Aug	17.33±0.58	22.75±1.26	20.43±3.05	64.77±8.89	60.96±3.59	62.59±6.08
	Snow Crown	10 Jul	23.75±2.22	25.50±5.32	24.63±3.89	69.85±3.28	70.49±6.35	70.17±4.69
		25 Jul	21.00±4.24	22.50±1.73	22.00±2.45	62.23±1.80	70.80±5.12	67.95±6.00
		10 Aug	21.00±0.00	24.00±2.16	23.00±2.28	70.49±4.49	70.49±6.99	70.49±5.78
	Vitaverde	10 Jul	17.50±2.65	25.50±5.26	21.50±5.76	65.09±6.99	62.23±4.86	63.66±5.78

	25 Jul	20.50±2.38	19.75±5.80	20.13±4.12	66.04±2.93	58.74±15.67	62.39±11.14
	10 Aug	18.00±0.82	24.00±1.15	21.00±3.34	69.22±3.36	67.95±2.43	68.58±2.80
Cultivar Mean	Amazing	21.17±5.34	28.58±5.85	26.11±6.60	53.13±17.25	62.23±9.22	59.20±12.73
	Cheddar	17.83±3.66	27.42±3.29	24.22±5.70	57.36±8.63	63.08±4.94	61.17±6.74
	Clementine	19.92±3.15	22.17±3.21	21.04±3.32	68.05±9.80	63.71±10.91	65.88±10.38
	Flame Star	17.60±2.76	24.33±3.34	21.27±4.57	62.23±6.61	66.25±4.78	64.42±5.91
	Snow Crown	22.38±2.62	24.00±3.38	23.35±3.13	68.10±4.60	70.59±5.61	69.60±5.25
	Vitaverde	18.67±2.35	23.08±4.85	20.88±4.36	66.78±4.70	62.97±9.53	64.88±7.60
Date Mean	10 Jul	21.13±3.70	27.29±4.90	24.28±5.31	65.60±6.87	65.51±7.07	65.55±6.89
	25 Jul	19.23±3.22	22.88±4.52	21.59±4.43	65.16±7.17	65.30±10.36	65.25±9.26
	10 Aug	17.56±2.25	24.63±3.21	21.60±4.52	60.68±13.72	63.61±6.72	62.35±10.27
Amazing	10 Jul	25.43±2.37	27.50±9.53	26.53±7.00	67.13±5.10	60.48±16.87	63.58±12.86
	25 Jul	17.00±0.00	28.75±7.25	27.44±7.83	67.31±0.00	72.71±17.33	72.11±16.31
	10 Aug	20.33±6.02	29.13±3.76	25.36±6.48	60.33±22.66	65.72±13.47	63.41±17.40
Cheddar	10 Jul	22.00±4.24	27.75±4.59	25.07±5.20	62.96±11.24	68.58±9.60	65.96±10.42
	25 Jul	20.00±0.00	27.25±3.28	26.44±3.91	73.66±0.00	70.80±6.71	71.12±6.35
	10 Aug	17.14±2.04	26.75±3.11	22.27±5.59	59.33±15.48	69.53±8.90	64.77±13.04
Clementine	10 Jul	22.67±1.97	20.50±6.74	21.43±5.21	74.72±6.35	65.72±22.74	69.58±17.75
	25 Jul	16.00±5.95	23.00±3.38	19.50±5.91	70.33±18.97	75.88±12.84	73.10±15.91
	10 Aug	18.00±2.14	23.38±3.16	20.69±3.81	71.12±16.02	68.90±13.61	70.01±14.40
Flame Star	10 Jul	19.43±3.15	22.75±8.35	21.20±6.48	71.48±12.92	62.87±16.05	66.89±14.84
	25 Jul	15.83±3.13	22.75±3.45	19.79±4.77	63.08±8.71	72.39±5.60	68.40±8.30
	10 Aug	17.29±1.38	24.13±2.64	20.93±4.10	70.21±8.97	69.22±9.38	69.68±8.88
Snow Crown	10 Jul	24.63±1.92	27.50±6.26	26.06±4.71	76.36±7.60	74.93±12.74	75.64±10.16
	25 Jul	20.33±3.01	23.50±2.33	22.14±3.01	77.26±12.96	73.18±14.11	74.93±13.27
	10 Aug	20.40±2.19	23.88±2.70	22.54±2.99	74.93±16.49	77.15±9.00	76.30±11.79
Vitaverde	10 Jul	16.25±4.53	21.63±7.89	18.94±6.81	62.07±18.87	60.01±15.83	61.04±16.86
	25 Jul	17.25±4.03	22.63±5.15	19.94±5.26	63.18±9.15	70.01±16.11	66.60±13.14
	10 Aug	17.63±0.92	25.38±2.88	21.50±4.50	75.72±7.40	73.34±6.43	74.53±6.81
Field Mean	High Tunnel	19.15±5.00	24.86±6.46	22.27±6.48	73.13±15.11	74.24±15.93	73.74±15.51
	Open Field	19.48±3.48	24.93±4.59	22.60±4.94	63.85±9.84	64.81±8.14	64.40±8.88
Cultivar Mean	Amazing	22.64±5.06	28.46±6.96	26.32±6.87	64.23±14.89	66.30±16.11	65.54±15.50
	Cheddar	19.60±3.92	27.25±3.58	24.31±5.26	61.98±13.06	69.64±8.17	66.69±10.84
	Clementine	18.55±4.66	22.29±4.69	20.50±5.00	71.81±14.78	70.17±16.81	70.95±15.72
	Flame Star	17.60±2.93	23.21±5.23	20.66±5.14	68.52±10.57	68.16±11.45	68.32±10.93
	Snow Crown	22.16±3.11	24.96±4.38	23.72±4.08	76.27±11.42	75.09±11.72	75.61±11.46
	Vitaverde	17.04±3.43	23.21±5.67	20.13±5.59	66.99±13.80	67.79±14.19	67.39±13.85
Date Mean	10 Jul	21.65±4.46	24.60±7.64	23.21±6.48	68.99±12.30	65.43±16.13	67.11±14.48
	25 Jul	17.33±4.33	24.65±4.87	21.83±5.86	68.37±13.44	72.50±12.35	70.91±12.86
	10 Aug	18.29±2.93	25.44±3.52	22.15±4.83	68.73±15.36	70.64±10.55	69.76±12.95

Dashes (–) indicate treatment combinations where plants did not survive to harvest due to freeze exposure; these observations were excluded from statistical analysis.