

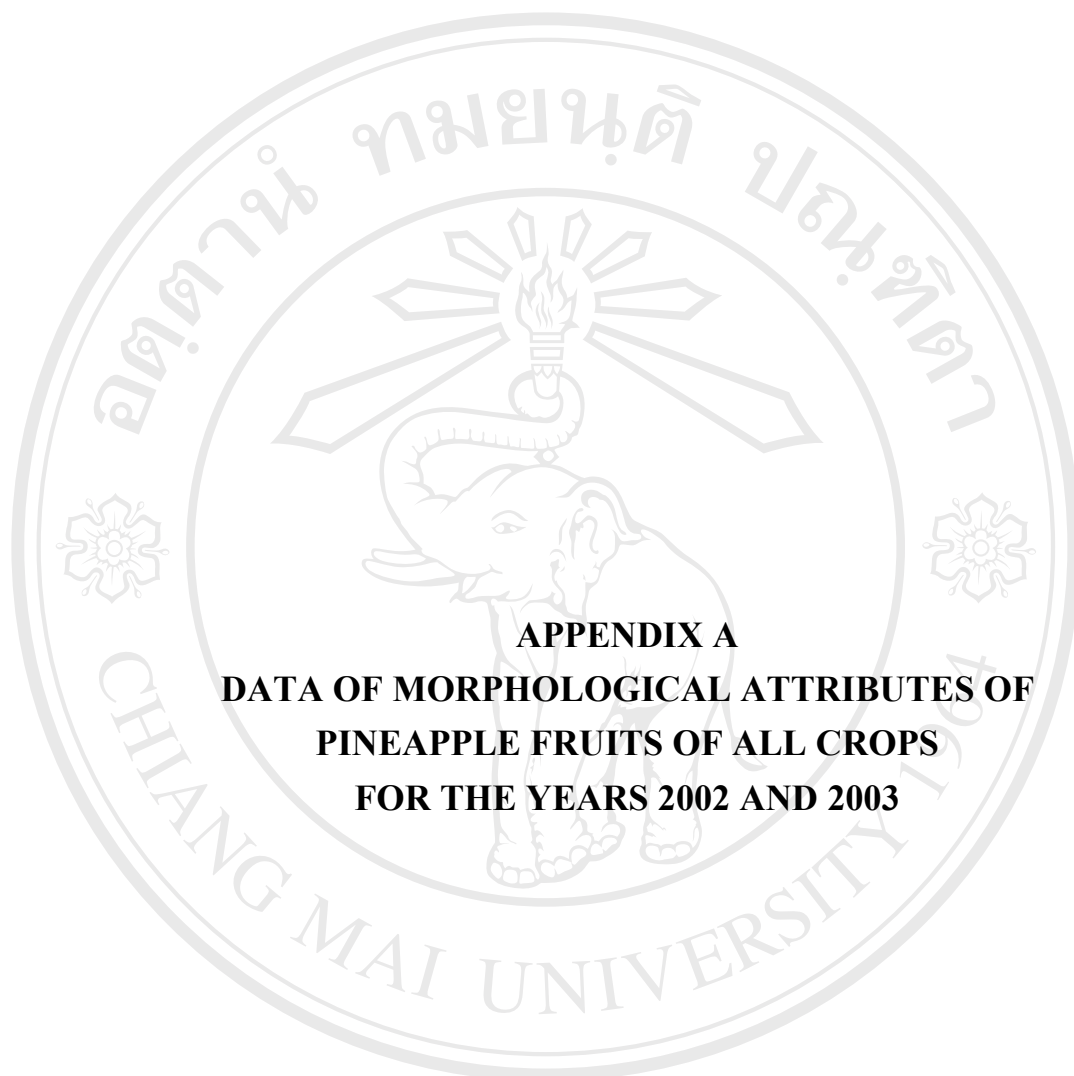


APPENDICES

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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APPENDIX A
DATA OF MORPHOLOGICAL ATTRIBUTES OF
PINEAPPLE FRUITS OF ALL CROPS
FOR THE YEARS 2002 AND 2003

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Table A3.1 Morphological attribute of cropping seasons of pineapple fruits at each harvesting date of the year 2002.

Crop	H * Date (DAFB)	Fruit				Fruit shape/ (%)			Crown	
		Weight (g)	Length (cm)	Diameter (cm)	Fruitlet number	A	B	C	Weight (g)	Length (cm)
Early	110	1857.14 ^d	17.13 ^f	12.90 ^{cd}	102.40 ^{bcd}	36.67	33.33	30.00	143.92 ^a	13.12 ^a
	120	2217.99 ^f	18.01 ^g	14.46 ^g	103.83 ^{bcd}	70.00	30.00	0	146.70 ^a	15.91 ^{ab}
	130	2023.46 ^c	18.95 ^h	13.58 ^{ef}	106.76 ^d	60.00	23.33	16.67	148.00 ^a	16.41 ^{ab}
	140	2185.35 ^{ef}	19.28 ^{hi}	13.78 ^g	105.93 ^d	66.67	33.33	0	155.49 ^{ab}	16.53 ^{ab}
	150	2160.7 ^{ef}	19.78 ^{hi}	13.89 ^g	106.13 ^d	63.33	36.67	0	171.84 ^{ab}	16.88 ^{ab}
	160	2226.64 ^f	20.03 ⁱ	14.47 ^g	103.30 ^{bcd}	70.00	30.00	0	208.94 ^b	22.86 ^c
Regular	110	735.47 ^a	11.45 ^a	11.81 ^a	93.77 ^a	0	6.66	93.33	345.20 ^c	34.36 ^d
	120	961.99 ^a	12.88 ^b	11.81 ^a	96.76 ^{ab}	0	0	100	372.24 ^{cd}	34.66 ^{de}
	130	1010.99 ^b	13.35 ^b	12.18 ^{ab}	97.40 ^{abc}	0	0	100	417.54 ^{de}	37.87 ^{ef}
	140	1063.48 ^b	14.58 ^c	12.35 ^b	99.33 ^{abcd}	0	0	100	437.36 ^c	38.30 ^f
	150	1085.88 ^b	14.60 ^{cd}	12.45 ^{bc}	96.06 ^{ab}	0	0	100	488.59 ^f	43.26 ^g
	160	1109.63 ^b	15.48 ^{cd}	12.58 ^{bc}	94.20 ^a	0	0	100	516.08 ^f	46.63 ^h
Late	110	1318.24 ^c	15.46 ^{cd}	12.90 ^{cd}	100.70 ^{abcd}	0	33.33	66.67	164.11 ^{ab}	15.03 ^{ab}
	120	1353.29 ^c	15.70 ^{de}	12.63 ^{bc}	104.63 ^{cd}	3.33	36.67	60.00	169.12 ^{ab}	15.67 ^{ab}
	130	1427.71 ^c	16.55 ^{ef}	13.10 ^d	103.60 ^{bcd}	3.33	26.67	70.00	170.31 ^{ab}	16.33 ^{ab}
	140	1474.85 ^c	16.55 ^{ef}	13.31 ^{de}	100.46 ^{abcd}	0	26.67	73.33	178.35 ^{ab}	17.00 ^{ab}
	150	-	-	-	-	-	-	-	-	-
	160	-	-	-	-	-	-	-	-	-

*Harvesting date

/Fruit shape: A is conical, B is cylindrical, and C is spherical.

Least Significant different with Randomized Complete Block (RCB) design

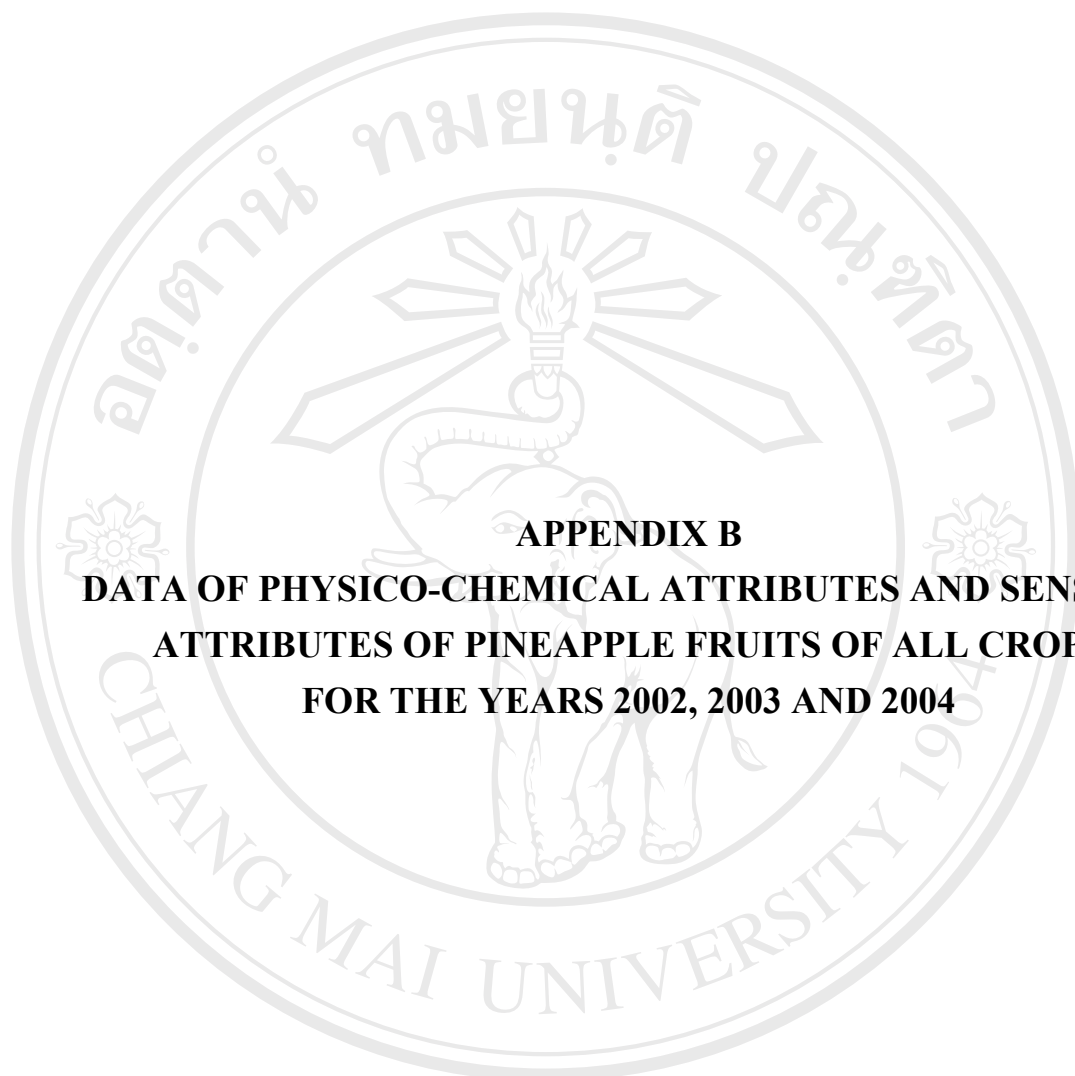
Table A3.2 Morphological attribute of cropping seasons of pineapple fruits at each harvesting date of the year 2003.

Crop	H * Date (DAFB)	Fruit				Fruit shape/ (%)			Crown	
		Weight (g)	Length (cm)	Diameter (cm)	Fruitlet number	A	B	C	Weight (g)	Length (cm)
Early	110	1301.86 ^{bc}	15.83 ^{bc}	11.66 ^a	101.46 ^{ab}	36.66	30.00	33.33	76.20 ^a	9.10 ^a
	120	1327.22 ^{cd}	16.35 ^{bcd}	13.11 ^{efg}	100.53 ^{ab}	67.66	30.00	3.33	79.50 ^a	10.06 ^a
	130	1533.40 ^{ef}	17.20 ^{de}	13.40 ^g	101.93 ^{ab}	43.33	36.66	20.00	93.90 ^a	10.40 ^a
	140	1578.00 ^{ef}	17.78 ^{ef}	13.43 ^g	101.23 ^{ab}	50.00	36.66	13.33	99.82 ^a	10.40 ^a
	150	1635.96 ^f	18.00 ^{ef}	13.58 ^g	100.30 ^{ab}	43.33	43.33	13.33	103.78 ^a	11.02 ^a
	160	-	-	-	-	-	-	-	-	-
Regular	110	1207.53 ^{bd}	15.57 ^b	12.91 ^{def}	100.76 ^{ab}	0	0	100	224.20 ^b	25.83 ^d
	120	1257.44 ^{bc}	15.84 ^a	12.47 ^{bcd}	101.73 ^{ab}	6.67	18.33	80.00	224.76 ^b	27.53 ^{de}
	130	1453.73 ^{de}	17.20 ^{de}	13.43 ^g	102.10 ^{ab}	3.33	36.67	60.00	229.00 ^b	26.40 ^d
	140	1525.23 ^{ef}	18.20 ^{ef}	13.31 ^{fg}	101.66 ^{ab}	3.33	50.00	46.67	251.40 ^{bcd}	29.10 ^e
	150	1533.40 ^{ef}	18.45 ^f	13.55 ^g	102.63 ^{ab}	3.33	43.33	53.33	240.63 ^{bc}	29.03 ^e
	160	1644.20 ^f	18.58 ^f	13.33 ^{fg}	103.83 ^{ab}	10.00	63.33	26.67	252.66 ^{bcd}	29.53 ^e
Late	110	933.20 ^a	13.56 ^a	11.36 ^a	98.63 ^a	0	3.33	96.67	266.66 ^{bcd}	22.93 ^c
	120	995.03 ^a	16.23 ^{bcd}	12.46 ^{bc}	103.26 ^{ab}	0	0	100	252.40 ^{bcd}	20.50 ^b
	130	1162.75 ^b	16.60 ^{bcd}	12.35 ^{bc}	103.66 ^{ab}	0	6.67	93.33	287.97 ^d	23.03 ^c
	140	1266.53 ^{bc}	16.70 ^{cd}	12.66 ^{cd}	103.53 ^{ab}	0	6.67	93.33	336.04 ^e	25.80 ^d
	150	1272.07 ^{bc}	14.26 ^a	12.10 ^b	102.03 ^{ab}	0	16.67	83.33	274.81 ^{cd}	23.26 ^c
	160	1322.84 ^{cd}	16.63 ^{bcd}	12.73 ^{cde}	107.93 ^b	0	30.00	70.00	337.48 ^e	27.93 ^{de}

*Harvested date

/Fruit shape: A is conical, B is cylindrical, and C is spherical.

Least Significant different with Randomized Complete Block (RCB) design



APPENDIX B
DATA OF PHYSICO-CHEMICAL ATTRIBUTES AND SENSORY
ATTRIBUTES OF PINEAPPLE FRUITS OF ALL CROPS
FOR THE YEARS 2002, 2003 AND 2004

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Table A4.1 Average shell color score and percentage distribution of fruit with different shell color score of pineapple fruits at each harvesting date (samples were harvested in crop year 2002)

Crop	H+ Date (DAFB)	Average of	Percentage of fruit with different					
		shell color Color score (CS)#	CS1	CS2	CS3	CS4	CS5	CS6
Early	110	1.07 ^a	93.3	6.67	0.00	0.00	0.00	0.00
	120	1.10 ^a	90.0	10.0	0.00	0.00	0.00	0.00
	130	1.83 ^b	40.0	36.6	23.3	0.00	0.00	0.00
	140	4.00 ^d	0.00	13.3	26.6	23.3	20.0	16.6
	150	5.03 ^e	0.00	3.33	10.0	13.3	26.6	46.6
	160	5.13 ^e	0.00	0.00	3.33	20.0	33.3	43.3
Regular	110	1.00 ^a	100	0.00	0.00	0.00	0.00	0.00
	120	1.43 ^{ab}	70.0	20.0	6.67	3.33	0.00	0.00
	130	4.17 ^d	0.00	26.6	6.67	20.0	16.6	30.0
	140	5.17 ^e	0.00	0.00	0.00	26.6	30.0	43.3
	150	5.67 ^f	0.00	0.00	0.00	3.33	26.6	70.0
	160	5.83 ^f	0.00	0.00	0.00	3.33	10.0	86.6
Late	110	1.50 ^{ab}	73.3	13.3	6.67	3.33	3.33	0.00
	120	2.77 ^c	6.67	40.0	33.3	10.0	10.0	0.00
	130	3.73 ^d	0.00	23.3	26.6	16.6	20.0	13.3
	140	5.30 ^f	0.00	0.00	0.00	3.33	10.0	86.6
	150	-	-	-	-	-	-	-
	160	-	-	-	-	-	-	-

H+: Harvesting date

#Color score: CS1= green, CS2 = breaker, CS3 = 25% yellow, CS4 = 50% yellow, CS5 = 75% yellow, CS6 = 100% yellow

/ Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.2 Average shell color score and percentage distribution of fruit with different shell color score of pineapple fruits at each harvesting date (samples were harvested in crop year 2003)

Crop	H+ Date (DAFB)	Average of	Percentage of fruit with different					
		shell color Color score (CS)#	CS1	CS2	CS3	CS4	CS5	CS6
Early	110	1.00 ^a	100	0.00	0.00	0.00	0.00	0.00
	120	1.37 ^a	66.6	30.0	3.33	0.00	0.00	0.00
	130	2.70 ^c	6.67	26.6	56.6	1.00	0.00	0.00
	140	4.10 ^e	0.00	3.33	30.0	30.0	26.6	10.0
	150	4.86 ^{gh}	0.00	0.00	0.00	43.3	26.6	30.0
	160 [#]	-	-	-	-	-	-	-
Regular	110	1.13 ^a	86.6	13.3	0.00	0.00	0.00	0.00
	120	2.70 ^c	6.67	26.6	56.6	10.0	0.00	0.00
	130	3.17 ^d	0.00	33.3	23.3	36.6	10.0	0.00
	140	4.30 ^{ef}	0.00	6.67	16.6	33.3	26.6	16.6
	150	4.86 ^{gh}	0.00	0.00	6.67	30.0	33.3	30.0
	160	5.03 ^{gh}	0.00	0.00	0.00	16.6	63.3	20.0
Late	110	1.96 ^b	33.3	40.0	33.3	3.33	0.00	0.00
	120	3.26 ^d	0.00	30.0	26.6	23.3	10.0	10.0
	130	4.53 ^{fg}	0.00	0.00	3.33	40.0	40.0	16.6
	140	4.86 ^{cd}	0.00	0.00	0.00	23.3	66.6	10.0
	150	5.06 ^{gh}	0.00	0.00	0.00	26.6	40.0	33.3
	160	5.20 ^h	0.00	0.00	0.00	16.6	46.6	36.6

H+: Harvested date

#Color score: CS1= green, CS2 = breaker, CS3 = 25% yellow, CS4 = 50% yellow, CS5 = 75% yellow, CS6 = 100% yellow.

/ Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.3 Average flesh color of pineapple fruits at each harvesting date (samples were harvested in crop year 2002).

Harvested crop	H+ Date (DAFB)	Flesh color				
		L*	a*	b*	Hue	Chroma#
Early	110	71.79 ^{hi}	-2.21 ^a	19.38 ^a	96.38 ^j	19.15 ^a
	120	69.61 ^{gh}	-2.08 ^a	21.24 ^b	95.74 ^{ij}	21.36 ^{ab}
	130	64.51 ^e	-1.63 ^{ab}	22.19 ^{bc}	94.34 ^{hij}	22.26 ^b
	140	55.41 ^a	-1.40 ^{abc}	22.68 ^{bc}	93.79 ^{ghi}	22.75 ^{bc}
	150	56.67 ^{ab}	4.86 ^g	23.35 ^c	77.58 ^b	24.78 ^c
	160	52.50 ^a	7.29 ^h	21.60 ^{bc}	71.83 ^a	23.19 ^{bc}
Regular	110	76.39 ^j	-0.91 ^{bcd}	23.46 ^c	92.36 ^c	23.49 ^{bc}
	120	72.75 ⁱ	-0.81 ^{bcd}	27.58 ^d	91.79 ^c	27.16 ^d
	130	70.01 ^{ghi}	-0.39 ^{de}	33.20 ^f	90.75 ^{bc}	33.22 ^{fg}
	140	66.06 ^{ef}	-0.39 ^{de}	32.18 ^{ef}	90.82 ^{ef}	32.19 ^f
	150	68.02 ^{fg}	-0.25 ^{de}	32.65 ^f	88.88 ^{cde}	34.47 ^g
	160	69.02 ^{gh}	1.73 ^f	39.52 ^f	87.51 ^c	38.75 ^h
Late	110	66.48 ^{ef}	-0.74 ^{bcd}	28.52 ^d	89.73 ^{cdef}	30.39 ^e
	120	63.73 ^{de}	-0.66 ^{cde}	31.65 ^{ef}	91.32 ^{efg}	31.67 ^{ef}
	130	61.37 ^d	-0.14 ^{de}	32.07 ^{ef}	90.33 ^{def}	31.57 ^{ef}
	140	58.55 ^c	-0.00 ^e	30.61 ^e	88.00 ^{cd}	30.63 ^e
	150	-	-	-	-	-
	160	-	-	-	-	-

H+: Harvesting date (Days after full bloom)

$$\#Chroma = (a^2 + b^2)^{1/2}$$

[/] Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.4 Average flesh color of pineapple fruits at each harvesting date (samples were harvested in crop year 2003).

Harvested crop	H + Date (DAFB)	Flesh color				
		L*	a*	b*	Hue	Chroma#
Early	110	73.09 ^e	-1.40 ^a	22.01 ^a	93.68 ^k	22.06 ^a
	120	68.27 ^{de}	-0.97 ^b	25.86 ^b	92.28 ^j	25.90 ^b
	130	61.85 ^a	-0.95 ^b	27.00 ^{bc}	92.09 ^{ij}	27.04 ^{bcd}
	140	62.41 ^a	-0.50 ^c	28.41 ^{de}	91.09 ^{hij}	28.43 ^{de}
	150	63.00 ^a	0.95 ^j	29.86 ^f	88.26 ^{ab}	29.88 ^f
	160	-	-	-	-	-
Regular	110	68.84 ^e	-0.84 ^b	32.35 ^g	91.57 ^{hij}	32.36 ^g
	120	68.79 ^e	-0.15 ^{de}	33.48 ^{gh}	90.35 ^{efg}	33.49 ^{gh}
	130	67.67 ^{cde}	0.00 ^{ef}	34.27 ^h	90.03 ^{defg}	34.28 ^h
	140	68.71 ^{de}	0.54 ^{hi}	31.01 ^f	89.07 ^{abcd}	31.03 ^f
	150	68.88 ^e	0.75 ^{ij}	33.99 ^h	88.79 ^{abc}	34.01 ^h
	160	65.48 ^{bc}	1.34 ^k	35.90 ⁱ	87.89 ^a	35.93 ⁱ
Late	110	68.26 ^{de}	-0.39 ^{cd}	27.80 ^{bcd}	90.91 ^{fgh}	27.67 ^{bc}
	120	66.23 ^{bcd}	0.16 ^{fg}	27.97 ^{cde}	89.80 ^{cdef}	27.98 ^{cde}
	130	62.78 ^a	0.32 ^{fgh}	25.87 ^b	88.05 ^{ab}	25.87 ^b
	140	64.31 ^{ab}	0.35 ^{gh}	26.80 ^{bc}	89.21 ^{bcde}	26.81 ^{bc}
	150	62.71 ^a	0.66 ⁱ	28.47 ^e	88.82 ^{abc}	28.49 ^e
	160	65.70 ^{bc}	0.70 ^{ij}	25.74 ^b	88.53 ^{ab}	26.33 ^b

H+: Harvested date

$$\#Chroma = (a^2 + b^2)^{1/2}$$

[/] Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.5 chlorophyll and carotenoids of peel and carotenoids of flesh pineapple fruits at each harvesting date (samples were harvested in crop year 2003)

Crop	H ⁺ Date (DAFB)	Peel chlorophyll			Peel carotenoids			Flesh carotenoids		
		a	b	Total	420nm	447nm	474nm	420nm	447nm	474nm
Early	110	0.026 ⁱ	0.023 ^g	1.530 ^g	1.18 ^a	0.98 ^a	0.53 ^a	0.40 ^a	0.30 ^a	0.15 ^a
	120	0.012 ^{ef}	0.008 ^{bc}	0.573 ^{cd}	1.67 ^b	1.20 ^b	0.75 ^b	1.12 ^{cd}	0.89 ^{bc}	0.46 ^b
	130	0.008 ^{cd}	0.007 ^{abc}	0.507 ^{bcd}	1.97 ^{cd}	1.51 ^{de}	0.92 ^{cd}	1.06 ^c	0.92 ^{bcd}	0.53 ^{cde}
	140	0.005 ^{ab}	0.005 ^a	0.411 ^{ab}	2.11 ^d	1.58 ^e	0.98 ^{de}	1.18 ^{def}	0.98 ^{de}	0.53 ^{df}
	150	0.0035 ^a	0.007 ^{abc}	0.360 ^a	2.76 ^f	2.09 ^g	1.40 ^g	1.26 ^g	1.01 ^e	0.52 ^{cd}
	160	-	-	-	-	-	-	-	-	-
Regular	110	0.022 ^h	0.015 ^f	1.07 ^f	1.66 ^b	1.29 ^{bc}	0.76 ^b	0.93 ^b	0.85 ^a	0.48 ^{bc}
	120	0.012 ^f	0.011 ^e	0.74 ^e	1.89 ^{bc}	1.39 ^{cd}	0.88 ^{bc}	1.12 ^{cd}	0.88 ^a	0.45 ^b
	130	0.010 ^{ef}	0.011 ^{de}	0.70 ^e	2.07 ^d	1.56 ^e	0.96 ^{cde}	1.16 ^{de}	0.90 ^{bcd}	0.43 ^b
	140	0.008 ^c	0.008 ^{bc}	0.53 ^{bcd}	2.38 ^e	1.83 ^f	1.15 ^f	1.16 ^{de}	0.93 ^{bcd}	0.54 ^{def}
	150	0.005 ^b	0.009 ^{cd}	0.52 ^{bcd}	2.41 ^e	1.68 ^{ef}	1.08 ^{ef}	1.28 ^{gh}	0.97 ^{cde}	0.48 ^{bc}
	160	0.003 ^{ab}	0.006 ^{ab}	0.36 ^a	4.16 ⁱ	3.89 ^{jk}	2.61 ^j	1.90 ^j	1.46 ^h	0.89 ⁱ
Late	110	0.014 ^g	0.011 ^{de}	0.77 ^c	3.13 ^g	2.95 ^h	2.02 ^h	1.07 ^c	0.93 ^{bcd}	0.46 ^b
	120	0.010 ^{ef}	0.009 ^{cde}	0.64 ^{de}	3.46 ^h	3.30 ⁱ	2.20 ⁱ	1.20 ^{defg}	1.09 ^e	0.58 ^{efg}
	130	0.010 ^{de}	0.008 ^{bc}	0.56 ^{cd}	3.50 ^h	3.29 ⁱ	2.19 ⁱ	1.22 ^{efg}	1.13 ^f	0.59 ^{fg}
	140	0.009 ^{cde}	0.007 ^{abc}	0.52 ^{bcd}	3.58 ^h	3.36 ⁱ	2.28 ⁱ	1.26 ^{fg}	1.15 ^f	0.62 ^{gh}
	150	0.007 ^c	0.006 ^{ab}	0.43 ^{abc}	4.05 ⁱ	3.77 ^j	2.56 ^j	1.35 ^{hi}	1.23 ^g	0.66 ^h
	160	0.007 ^c	0.006 ^{ab}	0.43 ^{abc}	4.20 ⁱ	4.03 ^k	2.67 ^j	1.38 ⁱ	1.25 ^g	0.67 ^h

H⁺ = Harvesting date

Table A4.6 Percentage of fruits translucency in crop years 2002/2003

Harvested crop	H+ DAFB	Crop year 2002		Crop year 2003	
		Translucency (%)	Normal (%)	Translucency (%)	Normal (%)
Early	110	0	100	0	100
	120	13.3	86.7	6.7	93.3
	130	20.0	80.0	13.3	86.7
	140	33.3	66.7	23.3	76.7
	150	33.3	66.7	20.0	80.0
	160	30.0	70.0	-	-
	All stages	21.6	78.3	12.6	87.3
Regular	110	0	100	6.7	93.3
	120	10.0	90.0	13.3	86.7
	130	23.3	76.7	16.7	83.3
	140	30.0	70.0	20.0	80.0
	150	26.7	73.7	16.7	83.3
	160	23.3	76.7	13.3	86.7
	All stages	18.8	81.1	14.4	85.5
Late	110	0	100	0	100
	120	16.7	83.3	3.3	96.7
	130	30.0	70.0	20.0	80.0
	140	26.7	73.3	20.0	80.0
	150	-	-	16.7	83.3
	160	-	-	13.3	86.7
	All stages	18.3	81.6	12.2	87.7

H+ = harvesting date

Table A4.7 Flesh firmness of basal part and all positions of pineapple fruit crop year 2002

Harvested crop	Stage	Basal		
		Inner	Middle	Outer
Early	110 D	13.85 ^h ±1.70	12.79 ^h ±1.20	21.49 ^f ±6.05
	120 D	13.44 ^{gh} ±0.55	11.40 ^{fg} ±0.34	14.80 ^d ±2.09
	130 D	11.83 ^e ±0.83	10.99 ^f ±0.61	11.86 ^c ±0.88
	140 D	11.41 ^{de} ±0.94	9.78 ^{bc} ±0.51	9.62 ^{ab} ±0.71
	150 D	10.87 ^{bcd} ±0.77	9.99 ^{cd} ±0.57	9.14 ^a ±0.62
	160 D	11.35 ^{de} ±0.55	9.91 ^{cd} ±0.49	9.32 ^a ±0.52
Regular	110 D	13.15 ^e ±1.08	14.24 ⁱ ±1.74	26.78 ^g ±5.31
	120 D	12.31 ^f ±0.71	11.06 ^f ±0.57	17.78 ^e ±4.55
	130 D	10.97 ^{cd} ±0.62	9.26 ^a ±0.37	11.88 ^c ±1.41
	140 D	10.77 ^{bc} ±0.73	8.96 ^a ±0.50	11.35 ^c ±1.52
	150 D	9.98 ^a ±0.79	9.39 ^{ab} ±0.63	17.45 ^e ±4.95
	160 D	12.43 ^f ±1.53	10.17 ^{cde} ±0.76	15.04 ^d ±2.80
Late	110 D	10.88 ^{bcd} ±0.90	11.81 ^g ±1.25	14.17 ^d ±2.06
	120 D	11.06 ^{cd} ±0.63	10.49 ^e ±0.53	12.22 ^c ±2.18
	130 D	10.39 ^{ab} ±0.75	10.36 ^{de} ±0.75	11.13 ^{bc} ±1.68
	140 D	11.17 ^{cd} ±1.10	10.23 ^{cde} ±0.89	10.50 ^{abc} ±1.31
	150 D	-	-	-
	160 D	-	-	-
Aver. SD		±1.43	±1.55	±5.53

Table A4.8 Flesh firmness of basal part and all positions of pineapple fruit crop year 2003

Harvested crop	Stage	Basal		
		Inner	Middle	Outer
Early	110 D	18.05 ⁱ ±1.99	14.18 ^h ±2.03	28.18 ^{def} ±5.27
	120 D	12.10 ^{def} ±0.81	10.04 ^f ±0.53	3.33 ^f ±3.78
	130 D	10.69 ^a ±0.55	8.31 ^{ab} ±0.42	22.04 ^{bc} ±4.68
	140 D	12.23 ^{ef} ±0.70	8.56 ^b ±0.64	20.52 ^b ±6.51
	150 D	12.08 ^{def} ±1.41	8.09 ^a ±0.57	29.10 ^{def} ±3.24
	160 D	-	-	-
Regular	110 D	12.91 ^g ±1.68	9.83 ^{ef} ±0.60	34.27 ^g ±5.53
	120 D	12.53 ^{fg} ±0.71	9.26 ^d ±0.76	26.96 ^d ±4.37
	130 D	11.89 ^{cde} ±0.75	8.74 ^{bc} ±0.58	27.58 ^{def} ±4.16
	140 D	11.10 ^{ab} ±0.60	8.74 ^{bc} ±0.32	24.02 ^c ±4.66
	150 D	11.55 ^{bcd} ±0.68	8.29 ^{ab} ±0.34	24.47 ^c ±3.68
	160 D	12.11 ^{def} ±0.58	9.11 ^{cd} ±0.68	29.68 ^{def} ±5.08
Late	110 D	13.71 ^h ±0.75	10.76 ^g ±0.59	28.88 ^{def} ±4.82
	120 D	14.01 ^h ±0.96	10.31 ^f ±0.73	27.35 ^{de} ±4.29
	130 D	12.61 ^{fg} ±1.10	10.14 ^f ±0.63	29.88 ^{ef} ±6.21
	140 D	11.36 ^{bc} ±0.66	9.49 ^{de} ±0.42	22.60 ^{bc} ±5.40
	150 D	12.58 ^{fg} ±0.80	9.87 ^{ef} ±0.79	16.49 ^a ±2.44
	160 D	12.92 ^g ±0.97	10.86 ^g ±1.64	
Aver. SD		±1.87	±1.63	±6.26

Table A4.9 Flesh firmness of medial part and all positions of pineapple fruit crop year 2002

Harvested Crop	Stage	Medial		
		Inner	Middle	Outer
Early	110 D	14.00 ^f ±1.62	12.95 ^j ±2.00	18.99 ^f ±5.46
	120 D	12.60 ^{de} ±0.84	12.35 ⁱ ±0.69	15.42 ^e ±1.59
	130 D	12.22 ^{cd} ±1.11	11.18 ^g ±0.75	12.48 ^c ±0.92
	140 D	10.08 ^a ±0.74	9.61 ^{bc} ±0.51	10.24 ^{ab} ±0.93
	150 D	9.98 ^a ±0.78	9.71 ^{cd} ±0.61	10.10 ^{ab} ±1.03
	160 D	10.16 ^a ±0.70	9.85 ^{cd} ±0.77	9.63 ^{ab} ±0.78
Regular	110 D	13.09 ^e ±1.37	13.30 ^j ±1.48	22.87 ^g ±3.76
	120 D	11.84 ^c ±0.75	10.52 ^{ef} ±0.62	12.74 ^c ±1.16
	130 D	9.83 ^a ±0.54	9.18 ^{ab} ±0.52	10.21 ^{ab} ±0.95
	140 D	9.90 ^a ±0.60	8.98 ^a ±0.55	9.98 ^{ab} ±0.74
	150 D	9.71 ^a ±0.86	9.11 ^a ±0.42	12.17 ^c ±0.89
	160 D	10.73 ^b ±0.85	9.42 ^{abc} ±0.79	10.38 ^{ab} ±0.81
Late	110 D	10.95 ^b ±1.09	11.76 ^h ±0.90	13.97 ^d ±1.40
	120 D	12.45 ^d ±1.08	10.16 ^{de} ±0.68	10.69 ^b ±0.78
	130 D	11.76 ^c ±1.04	10.63 ^f ±0.87	9.92 ^{ab} ±0.75
	140 D	11.75 ^c ±0.89	9.78 ^{cd} ±0.32	9.49 ^a ±0.85
	150 D	-	-	-
	160 D	-	-	-
Aver. SD		±1.60	±1.60	±4.11

Table A4.10 Flesh firmness of medial part and all positions of pineapple fruit crop year 2003

Harvested Crop	Stage	Medial		
		Inner	Middle	Outer
Early	110 D	19.83 ^c ±2.17	15.77 ^f ±2.35	27.69 ^g ±3.18
	120 D	12.70 ^d ±1.16	10.42 ^{de} ±1.04	20.32 ^f ±3.25
	130 D	10.81 ^{abc} ±0.44	8.45 ^a ±0.53	12.56 ^b ±2.29
	140 D	11.54 ^c ±0.46	8.70 ^a ±0.61	10.98 ^a ±1.50
	150 D	11.19 ^{bc} ±0.84	8.74 ^a ±0.98	14.81 ^d ±3.58
	160 D	-	-	-
Regular	110 D	11.80 ^{cd} ±0.75	9.98 ^{cd} ±0.74	20.70 ^f ±2.45
	120 D	21.15 ^f ±7.71	8.94 ^{ab} ±0.81	16.89 ^e ±2.56
	130 D	10.81 ^{abc} ±0.60	8.95 ^{ab} ±0.61	15.46 ^d ±1.95
	140 D	9.82 ^a ±0.69	8.92 ^{ab} ±0.44	15.46 ^d ±1.75
	150 D	10.11 ^{ab} ±0.61	8.62 ^a ±0.43	15.37 ^d ±2.93
	160 D	11.20 ^{bc} ±0.49	9.33 ^b ±0.59	18.02 ^e ±3.46
Late	110 D	12.79 ^d ±0.76	10.53 ^e ±0.52	14.38 ^d ±2.22
	120 D	12.96 ^d ±0.56	10.01 ^{cd} ±0.63	14.97 ^d ±2.04
	130 D	11.42 ^c ±0.81	10.13 ^{cde} ±0.71	12.97 ^{bc} ±1.55
	140 D	11.41 ^c ±0.71	10.14 ^{cde} ±0.68	14.46 ^d ±3.35
	150 D	11.06 ^{bc} ±1.12	9.90 ^c ±0.50	14.00 ^{cd} ±2.25
	160 D	11.89 ^{cd} ±0.81	10.20 ^{cde} ±0.84	14.90 ^d ±2.06
Aver. SD		±3.66	±1.84	±4.55

Table A4.11 Flesh firmness of top part and all positions of pineapple fruit crop year 2002

Harvested Crop	Stage	Top		
		Inner	Middle	Outer
Early	110 D	15.56 ^f ±3.52	14.06 ^h ±1.90	19.11 ^g ±5.11
	120 D	13.54 ^e ±1.49	13.06 ^g ±1.04	16.56 ^f ±2.42
	130 D	12.54 ^d ±0.86	11.68 ^f ±0.70	12.04 ^e ±1.28
	140 D	10.41 ^{ab} ±0.83	9.91 ^{bc} ±0.51	9.63 ^{abc} ±0.40
	150 D	10.11 ^a ±0.78	9.95 ^{bc} ±0.66	10.10 ^{bcd} ±0.58
	160 D	10.63 ^{abc} ±0.54	10.52 ^{de} ±0.43	10.18 ^{bcd} ±0.91
Regular	110 D	19.36 ^g ±3.93	14.04 ^h ±2.30	21.44 ^h ±3.65
	120 D	12.71 ^{de} ±1.34	10.64 ^{de} ±0.52	11.98 ^e ±1.08
	130 D	10.68 ^{abc} ±0.81	8.79 ^a ±0.44	9.10 ^{ab} ±0.60
	140 D	9.98 ^a ±0.92	8.40 ^a ±0.33	8.82 ^a ±0.37
	150 D	10.46 ^{abc} ±0.93	8.37 ^a ±0.53	10.33 ^{cd} ±1.18
	160 D	11.41 ^c ±1.22	9.64 ^b ±0.59	9.17 ^{ab} ±0.89
Late	110 D	12.98 ^{de} ±1.02	11.00 ^e ±1.42	12.20 ^e ±0.97
	120 D	12.62 ^d ±0.96	10.30 ^{cd} ±0.72	10.98 ^d ±0.76
	130 D	10.92 ^{abc} ±1.22	9.98 ^{bc} ±0.64	10.07 ^{bcd} ±0.88
	140 D	11.26 ^{bc} ±1.53	9.48 ^b ±0.45	9.46 ^{abc} ±0.83
	150 D	-	-	-
	160 D	-	-	-
Aver. SD		±2.87	±1.98	±4.09

Table A4.12 Flesh firmness of top part and all positions of pineapple fruit crop year 2003

Harvested Crop	Stage	Top		
		Inner	Middle	Outer
Early	110 D	25.38 ^h ±4.57	17.56 ^h ±2.00	26.93 ^h ±1.96
	120 D	13.81 ^g ±1.64	11.30 ^g ±1.46	20.48 ^f ±3.87
	130 D	11.77 ^{cdef} ±0.72	9.20 ^{bc} ±0.83	11.25 ^a ±1.17
	140 D	12.13 ^{ef} ±0.69	9.16 ^{bc} ±0.67	14.59 ^{bcd} ±2.02
	150 D	11.59 ^{cdef} ±1.05	8.77 ^{ab} ±1.04	14.99 ^{cd} ±2.64
	160 D	-	-	-
Regular	110 D	11.54 ^{bcd} ±0.66	8.87 ^{ab} ±0.55	17.92 ^c ±2.89
	120 D	11.34 ^{bcd} ±0.80	10.75 ^f ±0.95	15.61 ^d ±1.77
	130 D	10.97 ^{bc} ±0.59	8.56 ^a ±0.35	13.75 ^{bc} ±2.19
	140 D	9.36 ^a ±0.48	8.60 ^a ±0.60	14.29 ^{bcd} ±2.29
	150 D	9.63 ^a ±0.60	8.36 ^a ±0.52	14.14 ^{bcd} ±2.44
	160 D	11.00 ^{bcd} ±0.87	8.80 ^{ab} ±0.50	14.16 ^{bcd} ±1.55
Late	110 D	12.35 ^f ±0.76	9.93 ^{de} ±0.62	13.98 ^{bcd} ±2.26
	120 D	11.62 ^{cdef} ±0.55	9.69 ^{de} ±0.52	14.18 ^{bcd} ±2.57
	130 D	11.16 ^{bcd} ±0.80	9.56 ^{cd} ±0.49	13.13 ^b ±2.28
	140 D	10.76 ^b ±1.00	9.83 ^{de} ±0.69	13.85 ^{bcd} ±1.84
	150 D	10.96 ^{bc} ±1.06	9.90 ^{de} ±0.64	15.67 ^d ±2.67
	160 D	11.82 ^{def} ±1.00	10.16 ^c ±1.01	24.28 ^g ±8.47
Aver. SD		±3.70	±2.23	±5.02

Table A4.13 Chemical attributes of pineapple fruits at each harvesting date (samples were harvested in crop year 2002).

Harvested crop	Harvest date (DAFB)	TSS (%)	TA (%w/v)	TSS/TA ratio	pH
Early	110	11.39 ^b	0.67 ^e	18.21 ^{ab}	3.92 ^g
	120	12.36 ^{cd}	0.56 ^d	22.81 ^b	4.17 ^h
	130	12.53 ^{cde}	0.48 ^{bcd}	31.09 ^b	4.28 ^h
	140	12.71 ^{cdefg}	0.48 ^{bcd}	31.55 ^c	4.57 ⁱ
	150	12.98 ^{defg}	0.44 ^{abc}	32.94 ^{cd}	4.62 ⁱ
	160	13.31 ^{fg}	0.38 ^a	37.25 ^d	4.78 ^j
Regular	110	10.12 ^a	0.53 ^{cd}	19.86 ^b	3.00 ^b
	120	12.18 ^c	0.49 ^{bcd}	28.01 ^c	3.08 ^{bc}
	130	12.60 ^{cdef}	0.49 ^{bcd}	29.74 ^c	3.54 ^{de}
	140	12.53 ^{cdf}	0.46 ^{abc}	27.54 ^c	3.58 ^{def}
	150	12.87 ^{cdefg}	0.45 ^{abc}	30.56 ^c	3.68 ^{ef}
	160	13.34 ^g	0.42 ^{ab}	32.91 ^{cd}	3.71 ^f
Late	110	13.13 ^{efg}	0.94 ^g	14.28 ^a	2.84 ^a
	120	14.43 ^h	0.87 ^{fg}	17.70 ^{ab}	3.19 ^c
	130	14.56 ^h	0.67 ^e	22.50 ^b	3.19 ^c
	140	14.25 ^h	0.79 ^f	19.58 ^b	3.47 ^d
	150	-	-	-	-
	160	-	-	-	-

[/] Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.14 Average flesh color of pineapple fruits at each harvesting date (samples were harvested in crop year 2003)

Harvested crop	Harvesting		TSS (%)	TA (%w/v)	TSS/TA ratio	pH
	date (DAFB)					
Early	110		11.86 ^a	0.68 ^f	17.58 ^a	3.54 ^a
	120		11.63 ^b	0.64 ^{ef}	18.60 ^{ab}	4.06 ^g
	130		12.44 ^c	0.59 ^{de}	21.15 ^{abc}	4.03 ^g
	140		13.06 ^{cd}	0.44 ^a	31.22 ^g	4.30 ^h
	150		13.57 ^{de}	0.44 ^a	31.51 ^g	4.34 ^h
	160		-	-	-	-
Regular	110		13.68 ^{de}	0.55 ^{cd}	25.67 ^{def}	3.75 ^c
	120		14.25 ^{ef}	0.51 ^{bc}	30.31 ^g	3.76 ^{cd}
	130		14.53 ^{fg}	0.51 ^{bc}	30.47 ^g	3.78 ^{cd}
	140		14.80 ^{fgh}	0.45 ^{ab}	35.85 ^h	3.85 ^{def}
	150		15.27 ^{gh}	0.43 ^a	35.49 ^h	3.88 ^{ef}
	160		15.38 ^{gh}	0.42 ^a	35.78 ^h	3.89 ^f
Late	110		14.97 ^{fgh}	0.75 ^g	19.90 ^{ab}	3.64 ^b
	120		14.83 ^{fgh}	0.68 ^f	22.43 ^{bcd}	3.61 ^{ab}
	130		15.35 ^{gh}	0.65 ^{ef}	24.50 ^{cde}	3.79 ^{cde}
	140		15.65 ^h	0.59 ^{de}	27.97 ^{efg}	3.76 ^{cd}
	150		15.17 ^{gh}	0.56 ^{cd}	27.75 ^{efg}	3.91 ^f
	160		15.68 ^h	0.55 ^{cd}	29.56 ^{fg}	3.90 ^f

[/] Significant different at 95% internal tested by Tukey's Least Significant different with randomized completed bock (RCB) design.

Table A4.15 Chemical compositions of pineapple fruits harvested at each harvesting date. (Samples were harvested in regular crop year 2004)

Part	H+ DAFB	TSS ^φ	TA ^θ	TSS/TA ratio	pH	Sugar (% w/w fresh weight)*				
						Suc	Fru	Glu	Red	TS
Basal	110	12.80 ^g	0.356 ^{efg}	35.98 ^{fg}	3.56 ^c	11.09 ^{gh}	2.54 ^c	2.27 ^b	4.81 ^c	15.91 ^{fgh}
	120	13.05 ^{ij}	0.346 ^{def}	37.82 ^{gh}	3.70 ^g	13.25 ^h	2.84 ^c	2.33 ^{bc}	5.17 ^e	18.43 ^j
	130	13.10 ^{ij}	0.313 ^{ab}	41.75 ⁱ	3.72 ^h	10.29 ^d	2.80 ^{de}	2.33 ^{bc}	5.13 ^{de}	15.43 ^{ef}
	140	13.15 ^j	0.308 ^{ab}	42.70 ⁱ	3.74 ⁱ	11.34 ^g	3.37 ⁱ	2.48 ^d	5.86 ^g	17.20 ⁱ
	150	14.05 ^l	0.300 ^{ab}	46.82 ^j	3.77 ^j	10.15 ^{cd}	3.11 ^{gh}	2.33 ^{bc}	5.45 ^f	15.60 ^{efg}
	160	14.35 ^m	0.298 ^a	48.17 ^j	3.81 ^l	10.44 ^{de}	3.95 ^j	3.08 ^g	6.48 ⁱ	16.92 ⁱ
Medial	110	11.80 ^c	0.382 ^{ghi}	30.86 ^{cd}	3.48 ^a	8.70 ^a	2.19 ^a	2.04 ^a	4.24 ^a	12.94 ^a
	120	11.95 ^d	0.360 ^{fgh}	33.16 ^{def}	3.65 ^e	11.49 ^g	2.60 ^c	2.13 ^a	4.73 ^{bc}	16.22 ^h
	130	12.35 ^e	0.345 ^{cdef}	35.78 ^{fg}	3.70 ^g	9.59 ^{bc}	2.93 ^f	2.49 ^d	5.43 ^f	15.02 ^{cde}
	140	12.55 ^f	0.329 ^{bcde}	38.15 ^{gh}	3.72 ^h	11.13 ^{fg}	2.92 ^f	2.07 ^a	4.99 ^d	16.12 ^{gh}
	150	13.00 ^h	0.326 ^{abcd}	39.81 ^{hi}	3.87 ^m	10.14 ^{cd}	3.06 ^g	2.43 ^{cd}	5.50 ^f	15.65 ^{efgh}
	160	13.40 ^k	0.316 ^{abc}	42.44 ⁱ	3.91 ^h	8.72 ^a	3.19 ⁱ	2.86 ^f	6.06 ^h	14.78 ^{cd}
Top	110	11.05 ^a	0.441 ^l	25.62 ^a	3.50 ^b	8.40 ^a	2.20 ^a	2.06 ^a	4.26 ^a	12.67 ^a
	120	11.40 ^b	0.416 ^{jk}	27.35 ^{ab}	3.61 ^d	10.53 ^{def}	2.43 ^b	2.25 ^b	4.69 ^{bc}	15.23 ^{de}
	130	12.25 ^e	0.406 ^{ij}	30.13 ^{bc}	3.68 ^f	9.40 ^b	2.62 ^c	2.12 ^a	4.74 ^{bc}	14.14 ^b
	140	12.25 ^e	0.388 ^{hij}	31.52 ^{cdf}	3.70 ^g	10.56 ^{def}	2.74 ^d	2.00 ^a	4.75 ^{bc}	15.31 ^{def}
	150	12.50 ^f	0.374 ^{fgh}	33.42 ^{def}	3.80 ^k	10.94 ^{efg}	2.62 ^c	2.02 ^a	4.64 ^b	15.58 ^{efg}
	160	12.55 ^f	0.364 ^{fgh}	34.46 ^{df}	3.87 ^m	8.60 ^a	3.15 ^{hi}	2.69 ^e	5.84 ^g	14.44 ^{bc}
All	110	11.88 ^a	0.393 ^b	30.62 ^a	3.51 ^a	9.40 ^a	2.31 ^a	2.12 ^a	4.44 ^a	13.84 ^a
	120	12.13 ^a	0.374 ^{ab}	32.77 ^a	3.65 ^b	11.76 ^c	2.63 ^b	2.24 ^a	4.87 ^{ab}	16.63 ^b
	130	12.56 ^{ab}	0.355 ^{ab}	35.89 ^{ab}	3.70 ^c	9.76 ^{ab}	2.78 ^{bc}	2.31 ^a	5.10 ^b	14.87 ^{ba}
	140	12.65 ^{abc}	0.341 ^a	37.46 ^{ab}	3.72 ^c	11.01 ^{bc}	3.01 ^{cd}	2.18 ^a	5.20 ^b	16.21 ^b
	150	13.18 ^{bc}	0.333 ^a	40.02 ^b	3.81 ^d	10.41 ^{abc}	2.93 ^{bcd}	2.26 ^a	5.20 ^b	15.61 ^{ab}
	160	13.43 ^c	0.326 ^a	41.69 ^b	3.86 ^e	9.26 ^a	3.24 ^d	2.88 ^b	6.12 ^c	15.38 ^{ab}

⁺Harvesting Date

^φTotal Soluble Solids

^θ Titratable acidity

* Suc: Sucrose; Fru: fructose; Glu: Glucose; Red: Reducing sugar (Fructose+Glucose); TS: Total Sugar (Fructose+Glucose+sucrose)

/ significant different at 95% interval tested by Tukey's Least significant Different with Randomized complete Block (RCB) design.

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