APPENDICES

APPENDIX A

Table A1 Changes in BI of pericarp of individual longan fruits during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
E_0	3.7 ± 0.1a	3.8 ± 0.1a	4.6 ± 0.1a	4.7 ± 0.2a
E_1	2.7 ± 0.1b	2.8 ± 0.1b	4.5 ± 0.1a	4.7 ± 0.1a
E_2	1.7 ± 0.1c	2.7 ± 0.1b	3.7 ± 0.1b	4.6 ± 0.1a
E_3	1.0 ± 0.0d	1.7 ± 0.1c	3.4 ± 0.1b	4.5 ± 0.2a
E_4	1.0 ± 0.0d	1.6 ± 0.1c	2.6 ± 0.1c	3.6 ± 0.1b
E_5	1.0 ± 0.0d	1.5 ± 0.1c	1.7 ± 0.1d	2.6 ± 0.1c
E_6	1.0 ± 0.0d	1.0 ± 0.0d	1.4 ± 0.1d	1.6 ± 0.1c

Table A2 Changes in FCI of individual longan fruits during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
E_0	1.0 ± 0.0a	1.7 ± 0.1a	2.5 ± 0.1a	3.7 ± 0.1a
E_1	1.0 ± 0.0a	1.5 ± 0.1ab	2.5 ± 0.1a	2.6 ± 0.1b
E_2	1.0 ± 0.0a	1.4 ± 0.1b	1.7 ± 0.1b	2.7 ± 0.1b
E_3	1.0 ± 0.0a	1.0 ± 0.0c	1.0 ± 0.0c	2.7 ± 0.1b
E_4	1.0 ± 0.0a	1.0 ± 0.0c	1.6 ± 0.1b	2.5 ± 0.1b
E_5	1.0 ± 0.0a	1.0 ± 0.0c	1.0 ± 0.0c	1.6 ± 0.1c
E_6	1.0 ± 0.0a	1.0 ± 0.0c	1.0 ± 0.0c	1.2 ± 0.1d

[1]Means within a column with the same letter are not significantly different at 95% ($P \leq 0.05$) level by least significant difference comparison. Data are mean value ± SE.

Table A3 The sensory quality expressed as odor score of individual longan fruits during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
E_0	1.0 ± 0.0a	1.0 ± 0.0a	2.0 ± 0.0a	2.0 ± 0.0a
E_1	1.0 ± 0.0a	1.0 ± 0.0a	2.0 ± 0.0a	2.0 ± 0.0a
E_2	1.0 ± 0.0a	1.0 ± 0.0a	2.0 ± 0.0a	2.0 ± 0.0a
E_3	1.0 ± 0.0a	1.0 ± 0.0a	1.6 ± 0.2ab	2.0 ± 0.0a
E_4	1.4 ± 0.2a	1.0 ± 0.0a	1.4 ± 0.2bc	1.8 ± 0.2a
E_5	1.4 ± 0.2a	1.0 ± 0.0a	1.4 ± 0.2bc	1.2 ± 0.2b
E_6	1.4 ± 0.2a	1.0 ± 0.0a	1.0 ± 0.0c	1.0 ± 0.0b

Table A4 The sensory quality expressed as flavor score of individual longan fruits during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
E_0	1.0 ± 0.0a	1.8 ± 0.2a	2.0 ± 0.0a	2.0 ± 0.0a
E_1	1.0 ± 0.0a	1.4 ± 0.2ab	2.0 ± 0.0a	2.0 ± 0.0a
E_2	1.0 ± 0.0a	1.4 ± 0.2ab	2.0 ± 0.0a	2.0 ± 0.0a
E_3	1.0 ± 0.0a	1.0 ± 0.0b	2.0 ± 0.0a	2.0 ± 0.0a
E_4	1.0 ± 0.0a	1.0 ± 0.0b	1.6 ± 0.2b	1.6 ± 0.2ab
E_5	1.0 ± 0.0a	1.0 ± 0.0b	1.0 ± 0.0c	1.4 ± 0.2b
E_6	1.0 ± 0.0a	1.0 ± 0.0b	1.0 ± 0.0c	1.0 ± 0.0c

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE.

APPENDIX B

Table B1 Changes in BI of pericarp of bunches of longan fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
T_0	4.8 ± 0.1a	4.8 ± 0.1a	4.9 ± 0.0a	5.0 ± 0.0a
T_1	2.7 ± 0.1b	3.7 ± 0.1b	4.6 ± 0.1b	4.8 ± 0.0b
T_2	2.7 ± 0.1b	3.6 ± 0.1c	4.7 ± 0.1ab	4.8 ± 0.1bc
T_3	1.0 ± 0.0c	1.7 ± 0.0d	2.8 ± 0.0c	4.7 ± 0.0c
T_4	1.0 ± 0.0c	1.6 ± 0.0e	2.7 ± 0.0cd	3.7 ± 0.0d
T_5	1.0 ± 0.0c	1.6 ± 0.0e	2.6 ± 0.0d	3.6 ± 0.1d
T_6	1.0 ± 0.0c	1.0 ± 0.0f	1.6 ± 0.0e	2.7 ± 0.1e

Table B2 Change in FCI of pericarp of bunches of longan fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
T_0	1.0 ± 0.0a	1.8 ± 0.0a	2.7 ± 0.1a	3.7 ± 0.1a
T_1	1.0 ± 0.0a	1.7 ± 0.0b	1.7 ± 0.1b	2.7 ± 0.1b
T_2	1.0 ± 0.0a	1.6 ± 0.0c	1.6 ± 0.0bc	2.6 ± 0.1bc
T_3	1.0 ± 0.0a	1.0 ± 0.0d	1.6 ± 0.0c	2.6 ± 0.0c
T_4	1.0 ± 0.0a	1.0 ±0.0d	1.0 ± 0.0d	1.8 ± 0.0d
T_5	1.0 ± 0.0a	1.0 ± 0.0d	1.6 ± 0.0c	1.7 ± 0.1d
T_6	1.0 ± 0.0a	1.0 ± 0.0d	1.0 ± 0.0d	1.5 ± 0.0e

[1]Means within a column with the same letter are not significantly different at 95% ($P \leq 0.05$) level by least significant difference comparison. Data are mean value ± SE.

Table B3 The sensory quality expressed as odor score of bunches of longan fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
T_0	1.0 ± 0.0a	1.0 ± 0.0b	1.8 ± 0.2a	2.0 ± 0.0a
T_1	1.0 ± 0.0a	1.0 ± 0.0b	1.6 ± 0.2ab	2.0 ± 0.0a
T_2	1.0 ± 0.0a	1.0 ± 0.0b	1.4 ± 0.2b	2.0 ± 0.0a
T_3	1.0 ± 0.0a	1.0 ± 0.0b	1.6 ± 0.2ab	2.0 ± 0.0a
T_4	1.4 ± 0.2a	1.0 ± 0.0b	1.2 ± 0.2b	1.8 ± 0.2b
T_5	1.2 ± 0.2a	1.4 ± 0.2a	1.4 ± 0.2b	1.4 ± 0.2bc
T_6	1.4 ± 0.2a	1.2 ± 0.2ab	1.0 ± 0.0c	1.2 ± 0.2c

Table B4 The sensory quality expressed as flavor score of bunches of longan fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
T_0	1.0 ± 0.0a	2.0 ± 0.0a	1.8 ± 0.2a	2.0 ± 0.0a
T_1	1.2 ± 0.2a	1.4 ± 0.2bc	1.8 ± 0.2a	2.0 ± 0.0a
T_2	1.2 ± 0.2a	1.6 ± 0.2ab	1.6 ± 0.2a	2.0 ± 0.0a
T_3	1.2 ± 0.2a	1.4 ± 0.2bc	1.6 ± 0.2a	2.0 ± 0.0a
T_4	1.0 ± 0.0a	1.0 ± 0.0c	1.2 ± 0.2b	2.0 ± 0.0a
T_5	1.0 ± 0.0a	1.0 ± 0.0c	1.2 ± 0.2b	1.6 ± 0.2b
T_6	1.0 ± 0.0a	1.0 ± 0.0c	1.2 ± 0.2b	1.2 ± 0.2c

[1]Means within a column with the same letter are not significantly different at 95% ($P \leq 0.05$) level by least significant difference comparison. Data are mean value ± SE.

Table B5 The PPO activity of bunches of longan fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
T_0	3.3 ± 0.0a	3.1 ± 0.0a	3.5 ± 0.1a	4.3 ± 0.1a
T_1	1.0 ± 0.1b	1.3 ± 0.0b	1.8 ± 0.1b	2.6 ± 0.1b
T_2	0.9 ± 0.1b	1.2 ± 0.0b	1.6 ± 0.1c	2.5 ± 0.0b
T_3	0.4 ± 0.0c	0.6 ± 0.0c	0.8 ± 0.0d	1.0 ± 0.1c
T_4	0.4 ± 0.0c	0.6 ± 0.0cd	0.7 ± 0.0de	0.8 ± 0.1d
T_5	0.2 ± 0.0d	0.5 ± 0.0cd	0.5 ± 0.0ef	0.7 ± 0.0d
T_6	0.1 ± 0.0d	0.4 ± 0.0d	0.4 ± 0.0f	0.6 ± 0.0d

[1]Means within a column with the same letter are not significantly different at 95% ($P \leq 0.05$) level by least significant difference comparison. Data are mean value ± SE.

APPENDIX C

Table C1 Changes in browning index of longan pericarp of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	3.6 ± 0.1a	4.5 ± 0.1a	4.7 ± 0.1a	4.8 ± 0.1a
7.5% SMB treated individual fruits	1.0 ± 0.0b	1.0 ± 0.0b	1.5 ± 0.1b	1.7 ± 0.1c
7.5% SMB treated bunches of fruit	1.0 ± 0.0b	1.0 ± 0.0b	1.7 ± 0.1b	2.8 ± 0.1b

Table C2 Changes in flesh color index of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	1.0 ± 0.0a	1.7 ± 0.1a	2.7 ± 0.1a	3.7 ± 0.1a
7.5% SMB treated individual fruits	1.0 ± 0.0a	1.0 ± 0.0b	1.0 ± 0.0b	1.7 ± 0.1b
7.5% SMB treated bunches of fruit	1.0 ± 0.0a	1.0 ± 0.0b	1.0 ± 0.0b	1.7 ± 0.1b

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE.

Table C3 The L* values of pericarp of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	44.7 ± 0.5b	41.9 ± 0.9b	41.7 ± 0.7b	40.2 ± 0.7b
7.5% SMB treated individual fruits	50.1 ± 0.6a	49.5 ± 0.5a	49.5 ± 0.5a	48.7 ± 0.6a
7.5% SMB treated bunches of fruit	49.9 ± 0.6a	49.3 ± 0.4a	48.6 ± 1.0a	47.3 ± 0.5a

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE. The average L* value of fruit pericarp at initial date was 47.3 ± 1.8.

Table C4 The a* values of pericarp of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	10.3 ± 0.3a	12.1 ± 0.4a	12.4 ± 0.2a	11.5 ± 0.5a
7.5% SMB treated individual fruits	10.4 ± 0.3a	10.0 ± 0.3b	11.3 ± 0.3b	10.8 ± 0.2a
7.5% SMB treated bunches of fruit	10.3 ± 0.3a	10.3 ± 0.2b	11.0 ± 0.2b	10.9 ± 0.3a

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE. The average a* value of fruit pericarp at initial date was 7.9 ± 1.3.

Table C5 The b* values of pericarp of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	21.1 ± 0.7b	21.6 ± 0.8b	18.5 ± 0.7c	18.0 ± 0.7b
7.5% SMB treated individual fruits	29.1 ± 1.0a	31.6 ± 0.6a	32.8 ± 0.4a	27.8 ± 0.5a
7.5% SMB treated bunches of fruit	28.9 ± 0.9a	31.4 ± 0.6a	31.1 ± 0.4b	27.4 ± 0.4a

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE. The average b* value of fruit pericarp at initial date was 26.9 ± 1.5.

Table C6 The sensory quality expressed as odor score of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	1.4 ± 0.2a	1.6 ± 0.3a	2.0 ± 0.0a	2.0 ± 0.0a
7.5% SMB treated individual fruits	1.0 ± 0.0a	1.0 ± 0.0b	1.4 ± 0.2b	1.4 ± 0.2b
7.5% SMB treated bunches of fruit	1.0 ± 0.0a	1.2 ± 0.0ab	1.4 ± 0.2b	1.4 ± 0.2b

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE.

Table C7 The sensory quality expressed as flavor score of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	1.4 ± 0.2a	1.6 ± 0.2a	2.0 ± 0.0a	2.0 ± 0.0a
7.5% SMB treated individual fruits	1.0 ± 0.0a	1.2 ± 0.2ab	1.4 ± 0.2ab	1.4 ± 0.2ab
7.5% SMB treated bunches of fruit	1.0 ± 0.0a	1.2 ± 0.2ab	1.4 ± 0.2ab	1.4 ± 0.2ab

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE.

Table C8 The change in TSS content (%Brix) of both 7.5% SMB treated individual fruits and bunches of fruit during storage period.

Treatment	Days of storage at 5ºC[1]			
	7	14	21	28
Control	17.1 ± 0.3a	18.1 ± 0.3a	17.9 ± 0.3a	16.7 ± 0.7a
7.5% SMB treated individual fruits	17.9 ± 0.6a	17.2 ± 0.6a	17.1 ± 0.2a	17.9 ± 0.5a
7.5% SMB treated bunches of fruit	18.1 ± 0.4a	18.0 ± 0.6a	17.4 ± 0.3a	18.1 ± 0.6a

[1]Means within a column with the same letter are not significantly different at 95% (P≤0.05) level by least significant difference comparison. Data are mean value ± SE. The average TSS content of fruit at initial date was 17.8 ± 2.3.

Table C9 The changes in L*, a*, and b* values of pericarp color of individual 'Long' longan fruits were soaked in 7.5% sodium metabisulfite for 10 minutes and stored at 5ºC for 28 days, and transferred to 25ºC.

Days after transferred to 25ºC	Values[2]		
	L*	a*	b*
1 day	47.9 ± 3.5	12.0 ± 2.1	27.1 ± 3.2
2 days	46.3 ± 3.4	13.3 ± 2.1	26.9 ± 3.3
3 days	43.9 ± 3.7	14.6 ± 3.2	23.7 ± 5.3
4 days	43.3 ± 2.2	15.2 ± 4.2	22.8 ± 5.2
5 days	42.8 ± 2.4	16.9 ± 5.0	21.7 ± 4.1

[2]Data are mean value ± SD. The average L* value of fruit pericarp at initial date was 47.8 ± 2.1; a* value was 7.9 ±1.3; b* value was 26.9 ± 1.5.

Table C10 Changes in L*, a*, and b* values of pericarp color of individual 'Long' longan fruits were soaked in 7.5% sodium metabisulfite for 10 minutes and stored at 5ºC for 28 days, and transferred to ambient temperature.

Days after transferred to ambient temperature	Values[2]		
	L*	a*	b*
1 day	46.4 ± 3.4	13.3 ± 1.8	26.4 ± 3.2
2 days	44.1 ± 3.4	15.2 ± 0.9	24.5 ± 3.7
3 days	41.5 ± 1.9	17.4 ± 1.3	20.6 ± 3.0

[2]Data are mean value ± SD. The average L* value of fruit pericarp at initial date was 47.8 ± 2.1; a* value was 7.9 ±1.3; b* value was 26.9 ± 1.5.

Publications

Poster Presentation

Quyen, D.T.M., **L.H. Hai,** A. Joomwong and P. Rachtanapun. 2010. Morphology, physical and chemical properties of Queen pineapple fruit. The 7th International Pineapple Symposium, July 12-15, 2010. Persada Johor International Convention Centre, Johor Bahru, Malaysia.

Oral Presentation

Hai, L.H., J. Uthaibutra and A. Joomwong. 2010. Effects of sodium metabisulfite on postharvest quality and storage life of Vietnamese longan cv. Long. The 8th National Postharvest Technology Conference, August 31 to September 2, 2010. The Empress Hotel, Chiang Mai, Thailand.

Journal Publications

Hai, L.H., J. Uthaibutra and A. Joomwong. 2011. Effects of sodium metabisulfite on postharvest quality and storage life of Vietnamese longan cv. Long. *Agricultural Science Journal* 42: 1 (Suppl.): 345-348.

Hai, L.H., J. Uthaibutra and A. Joomwong. 2011. The prevention of pericarp browning and the maintenance of post-harvest quality in Vietnamese longan cv. Long, using sodium metabisulfite treatment. *International Journal of Agriculture and Biology* (In press).

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