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TG Bhadke

Ph.D., Student, Department of Horticulture, MPKV, Rahuri, Maharashtra, India

VR Joshi

Chairman and Research Guide, Horticulturist, AICRP on AZF, Department of Horticulture, MPKV, Rahuri, Maharashtra, India

VK Garande

Associate Professor, Zonal Agriculture Research Station, NARP, Ganeshkhind Pune, Maharashtra, India

BB Dhakare

Professor, Department of Horticulture, MPKV, Rahuri, Maharashtra, India

Corresponding Author:

TG Bhadke

Ph.D., Student, Department of Horticulture, MPKV, Rahuri, Maharashtra, India

Post-harvest studies in banana (*Musa paradisiaca* L.) CV. Grand Naine

TG Bhadke, VR Joshi, VK Garande and BB Dhakare

Abstract

The present investigation on “Post-harvest studies in banana (*Musa paradisiaca* L.) cv. Grand Naine” was conducted during June 2021 and November 2021 at the Laboratory of Postharvest Technology, Department of Horticulture, MPKV., Rahuri, Dist. Ahmednagar. The effect of post-harvest treatment of chemicals, wax emulsion and storage conditions on shelf life and quality of banana cv. Grand Naine was laid out with six chemical treatments viz., C₁ - Hexanal @ 3%, C₂ - Hexanal @ 4%, C₃ - Hexanal @ 5%, C₄ - Salicylic acid @ 2mM, C₅ - Salicylic acid @ 3mM, C₆ - Salicylic acid @ 4mM, two wax emulsions viz., W₁ - Wax emulsion @ 6%, W₂ - Wax emulsion @ 8%, two different storage conditions viz., S₁ - Ambient temperature and S₂ - Cold storage (13°C+1) and fruits were analyzed for physico-chemical parameters at an interval of two days.

Fruits treated with hexanal @ 3% + wax emulsion @ 8% and stored under cold storage recorded minimum PLW (9.12%), pulp to peel ratio (2.13), ripening (97.13%), spoilage (49.79%) and maximum firmness (13.02N), maximum number of days taken to colour break (9.00), maximum overall acceptability (8.64) with maximum shelf life of 24 days. At ambient conditions, treatment combination with same chemical and wax emulsion revealed maximum shelf life of 18 days. However, fruits under control recorded shelf life 8 days at ambient conditions.

Keywords: Banana, post-harvest, hexanal, salicylic acid, shelf life

Introduction

Banana (*Musa paradisiaca* L.) belongs to the family Musaceae of order scitaminae and originated from tropical region of South East Asia. It is being an important fruit crop in tropical and subtropical region. In India banana is predominant and popular among the people as they are relished and consumed by all kind of people. Bananas are known as the "Poor Man's Apple" (Patel *et al.*, 2010) [9] because of its nutritional and fruit properties and it is the cheapest among all the fruits in the country. Hexanal is an aldehyde, produced during the termination phase of fat oxidation in plant materials, known to extend shelf life of many horticultural commodities by inhibiting enzyme phospholipase D activity, which hydrolyses the phospholipid to phosphatidic acid and a free head group. Banana is a climacteric and perishable fruit, application of post-harvest treatments become necessary to delay the ripening to reduce losses and extend shelf life. Hexanal treatment results in cell membranes remaining intact and stable, causing fruits to remain firmer and fresher-looking for a longer period (Yumbya *et al.*, 2018) [14]. Thus, the experiment was undertaken to study the effect of post-harvest treatments of chemicals, wax emulsion and storage conditions on shelf life of banana.

Methodology: Experiment was carried out at Post-harvest Technology Laboratory, Department of Horticulture, MPKV, Rahuri, during 2021 in the month of June and November consisting of three factors *i.e.*

Factor A: Chemical treatments (C₁ - Hexanal @ 3%, C₂ - Hexanal @ 4%, C₃ - Hexanal @ 5%, C₄ - Salicylic acid @ 2mM, C₅ - Salicylic acid @ 3mM, C₆ - Salicylic acid @ 4mM and control).

Factor B: Wax emulsions (W₁ - Wax emulsion @ 6%, W₂ - Wax emulsion @ 8%)

Factor C: Storage conditions (S₁ - Ambient temperature and S₂ - Cold storage (13 °C) laid out in Factorial Completely Randomized Design (FCRD) in two replications with twenty four treatment combinations.

Result and Discussion

Physical parameters

Physiological loss in weight (%)

The data presented in Table 4.1 revealed that, PLW of banana fruits was found to be increased significantly with the advancement of storage period irrespective of postharvest treatments.

The PLW showed significantly influenced by chemical treatments during storage. On 12th day of storage, the minimum PLW was recorded in treatment C₁ *i.e.* hexanal 3% (4.88%) while the maximum PLW was recorded in treatment C₄ *i.e.* salicylic acid 2 mM (8.42%) followed by treatment C₅ (8.34%). On 24th day of storage, fruits treated with C₁ *i.e.* hexanal 3% could remained in storage which recorded the PLW of 9.12%.

The individual effect of wax emulsion showed significant influence on PLW. On 12th day of storage, effect of wax emulsion showed significant influence on PLW. The treatment W₂ *i.e.* wax emulsion 8% recorded minimum PLW (5.65%) whereas the treatment W₁ *i.e.* wax emulsion 6% recorded minimum PLW (7.87%). At the end of storage period, W₂ *i.e.* wax emulsion 8% were remained in storage with PLW of 9.12%.

Fruits under ambient conditions showed faster increased in PLW than cold storage conditions. On 18th day of storage, fruits under ambient conditions *i.e.* S₁ recorded PLW content of 10.14%. The PLW was found to be increased from 0.00 to 10.14% under ambient conditions. At the end of storage, cold storage was found superior as it recorded minimum increase in PLW *i.e.* 9.12%.

Chemicals and wax emulsion showed significant influence on PLW of banana. On 12th day, the treatment combination of C₁W₂ *i.e.* hexanal 3% + wax emulsion 8% recorded minimum PLW (4.23%) whereas the treatment combination C₄W₁ *i.e.* salicylic acid 2 mM + wax emulsion 6% recorded maximum

PLW (10.28%). Only one interaction C₁W₂ *i.e.* hexanal 3% + wax emulsion 8% remained in storage up to 24th day with PLW of 9.12%.

PLW was significantly influenced by different chemicals and storage conditions. On 12th day of storage, the treatment combination C₁S₂ *i.e.* hexanal 3% + cold storage recorded minimum PLW (3.26%) whereas the maximum PLW was recorded in C₄S₁ *i.e.* salicylic acid 2 mM + ambient temperature (9.74%) which was at par with the treatment C₅S₁ (9.72%). At the end of storage, fruits treated with C₁S₂ *i.e.* hexanal 3% + cold storage remained in good condition with PLW of 9.12%. Interaction of wax emulsion and storage conditions was found significant variation in PLW during storage conditions. On 12th day of storage, effect of wax emulsion and storage conditions indicated significant influence on PLW of banana. The treatment combination W₂S₂ *i.e.* wax emulsion 8% + cold storage recorded the minimum PLW (4.38%) whereas the treatment combination W₁S₁ *i.e.* wax emulsion 6% + ambient temperature recorded maximum PLW (9.18%). Interaction of W₂S₂ *i.e.* wax emulsion 8% + cold storage was remained in storage with PLW of 9.12%.

Three factors such as (chemicals, wax emulsion and storage conditions) and their interaction effect showed significant effect on PLW during storage. On 12th day of storage, the data on PLW indicated was found to significantly influenced by the chemicals, wax emulsion and storage conditions. The treatment combination of C₁W₂S₂ *i.e.* hexanal 3% + wax emulsion 8% + cold storage recorded minimum PLW (2.44%) whereas the treatment combination C₄W₁S₁ *i.e.* salicylic acid 2 mM + wax emulsion 6% + ambient temperature recorded maximum PLW (11.86%). On 24th day of storage, interaction C₁W₂S₂ *i.e.* hexanal 3% + wax emulsion 8% + cold storage revealed slower changes in PLW recorded the PLW of 9.12%.

Table 1: Effect of different post-harvest treatment of chemicals, wax emulsion and storage conditions on PLW (%) of banana fruit *cv.* Grand Naine during storage

Treatment	Initial days			2 days			4 days			6 days			8 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	0.00	0.00	0.00	1.13	1.05	1.09	1.26	1.18	1.22	1.80	1.71	1.76	2.99	2.89	2.94
C ₂	0.00	0.00	0.00	1.23	1.16	1.20	1.40	1.31	1.36	1.91	1.83	1.87	3.15	3.05	3.10
C ₃	0.00	0.00	0.00	1.20	1.11	1.15	1.34	1.23	1.29	1.85	1.78	1.81	3.10	3.03	3.06
C ₄	0.00	0.00	0.00	1.46	1.35	1.41	1.86	1.72	1.79	2.56	2.43	2.49	3.76	3.61	3.69
C ₅	0.00	0.00	0.00	1.42	1.35	1.39	1.86	1.69	1.77	2.34	2.22	2.28	3.69	3.61	3.65
C ₆	0.00	0.00	0.00	1.38	1.29	1.33	1.72	1.57	1.65	2.47	2.35	2.41	3.56	3.49	3.53
SEm (±)	0.00	0.00	0.00	0.03	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.00	0.00	0.00	0.12	0.04	0.08	0.02	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.03
W ₁	0.00	0.00	0.00	1.37	1.30	1.33	1.68	1.55	1.62	2.26	2.15	2.20	3.51	3.41	3.46
W ₂	0.00	0.00	0.00	1.23	1.14	1.19	1.46	1.35	1.41	2.05	1.96	2.00	3.24	3.15	3.19
SEm (±)	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
CD 1%	0.00	0.00	0.00	0.07	0.02	0.05	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
S ₁	0.00	0.00	0.00	1.61	1.52	1.56	2.01	1.88	1.95	2.75	2.64	2.70	3.91	3.81	3.86
S ₂	0.00	0.00	0.00	1.00	0.92	0.96	1.14	1.02	1.08	1.56	1.46	1.51	2.84	2.75	2.80
SEm (±)	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
CD 1%	0.00	0.00	0.00	0.07	0.02	0.05	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
C ₁ W ₁	0.00	0.00	0.00	1.23	1.16	1.19	1.38	1.30	1.34	1.90	1.80	1.85	3.09	2.98	3.03
C ₁ W ₂	0.00	0.00	0.00	1.03	0.94	0.98	1.15	1.07	1.11	1.71	1.62	1.66	2.90	2.80	2.85
C ₂ W ₁	0.00	0.00	0.00	1.31	1.24	1.28	1.48	1.40	1.44	2.01	1.92	1.96	3.26	3.17	3.21
C ₂ W ₂	0.00	0.00	0.00	1.16	1.08	1.12	1.33	1.23	1.28	1.82	1.75	1.78	3.05	2.93	2.99
C ₃ W ₁	0.00	0.00	0.00	1.28	1.21	1.25	1.42	1.29	1.36	1.94	1.87	1.90	3.23	3.15	3.19
C ₃ W ₂	0.00	0.00	0.00	1.12	1.01	1.06	1.26	1.18	1.22	1.76	1.69	1.73	2.97	2.92	2.94
C ₄ W ₁	0.00	0.00	0.00	1.56	1.43	1.49	2.02	1.88	1.95	2.71	2.56	2.64	3.99	3.82	3.91
C ₄ W ₂	0.00	0.00	0.00	1.37	1.28	1.32	1.70	1.57	1.63	2.42	2.29	2.35	3.53	3.41	3.47
C ₅ W ₁	0.00	0.00	0.00	1.45	1.38	1.42	1.96	1.75	1.85	2.43	2.30	2.37	3.77	3.70	3.73

C ₅ W ₂	0.00	0.00	0.00	1.39	1.32	1.36	1.77	1.63	1.70	2.25	2.14	2.19	3.62	3.53	3.57
C ₆ W ₁	0.00	0.00	0.00	1.42	1.36	1.39	1.85	1.68	1.77	2.58	2.44	2.51	3.74	3.67	3.71
C ₆ W ₂	0.00	0.00	0.00	1.34	1.22	1.28	1.59	1.47	1.53	2.36	2.26	2.31	3.38	3.32	3.35
SEm (±)	0.00	0.00	0.00	0.04	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.00	0.00	0.00	NS	0.05	NS	0.03	0.05	0.04	0.06	0.06	0.05	0.06	0.04	0.05
C ₁ S ₁	0.00	0.00	0.00	1.49	1.39	1.44	1.63	1.56	1.59	2.29	2.18	2.23	3.46	3.35	3.40
C ₁ S ₂	0.00	0.00	0.00	0.77	0.71	0.74	0.90	0.81	0.85	1.32	1.25	1.28	2.53	2.43	2.48
C ₂ S ₁	0.00	0.00	0.00	1.55	1.45	1.50	1.74	1.64	1.69	2.40	2.32	2.36	3.66	3.56	3.61
C ₂ S ₂	0.00	0.00	0.00	0.92	0.87	0.90	1.06	0.99	1.02	1.42	1.35	1.38	2.65	2.54	2.60
C ₃ S ₁	0.00	0.00	0.00	1.52	1.42	1.47	1.69	1.58	1.64	2.34	2.26	2.30	3.60	3.55	3.57
C ₃ S ₂	0.00	0.00	0.00	0.88	0.80	0.84	0.99	0.89	0.94	1.36	1.30	1.33	2.60	2.52	2.56
C ₄ S ₁	0.00	0.00	0.00	1.76	1.65	1.70	2.41	2.29	2.35	3.38	3.23	3.30	4.39	4.20	4.29
C ₄ S ₂	0.00	0.00	0.00	1.16	1.06	1.11	1.31	1.16	1.24	1.75	1.63	1.69	3.14	3.03	3.08
C ₅ S ₁	0.00	0.00	0.00	1.70	1.62	1.66	2.42	2.20	2.31	2.87	2.73	2.80	4.24	4.16	4.20
C ₅ S ₂	0.00	0.00	0.00	1.15	1.08	1.11	1.31	1.18	1.24	1.81	1.71	1.76	3.14	3.07	3.10
C ₆ S ₁	0.00	0.00	0.00	1.66	1.58	1.62	2.19	2.03	2.11	3.25	3.16	3.20	4.12	4.05	4.09
C ₆ S ₂	0.00	0.00	0.00	1.10	1.00	1.05	1.25	1.12	1.19	1.68	1.54	1.61	3.00	2.94	2.97
SEm (±)	0.00	0.00	0.00	0.04	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.00	0.00	0.00	NS	0.05	NS	0.03	0.05	0.04	0.06	0.06	0.05	0.06	0.04	0.05
W ₁ S ₁	0.00	0.00	0.00	1.66	1.57	1.62	2.15	2.00	2.08	2.87	2.75	2.81	4.06	3.94	4.00
W ₁ S ₂	0.00	0.00	0.00	1.09	1.02	1.05	1.22	1.10	1.16	1.65	1.54	1.60	2.96	2.89	2.92
W ₂ S ₁	0.00	0.00	0.00	1.56	1.46	1.51	1.87	1.76	1.82	2.64	2.54	2.59	3.76	3.68	3.72
W ₂ S ₂	0.00	0.00	0.00	0.91	0.82	0.86	1.06	0.95	1.00	1.46	1.38	1.42	2.72	2.62	2.67
SEm (±)	0.00	0.00	0.00	0.02	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.00	0.00	0.00	NS	0.03	0.07	0.02	0.03	0.02	0.03	0.03	0.03	0.03	NS	0.03
C ₁ W ₁ S ₁	0.00	0.00	0.00	1.52	1.43	1.48	1.70	1.63	1.67	2.38	2.26	2.32	3.55	3.41	3.48
C ₁ W ₁ S ₂	0.00	0.00	0.00	0.94	0.88	0.91	1.06	0.96	1.01	1.41	1.34	1.38	2.63	2.54	2.59
C ₁ W ₂ S ₁	0.00	0.00	0.00	1.45	1.34	1.40	1.56	1.48	1.52	2.19	2.09	2.14	3.36	3.28	3.32
C ₁ W ₂ S ₂	0.00	0.00	0.00	0.60	0.53	0.57	0.73	0.66	0.70	1.22	1.15	1.19	2.43	2.31	2.37
C ₂ W ₁ S ₁	0.00	0.00	0.00	1.59	1.51	1.55	1.83	1.75	1.79	2.51	2.42	2.47	3.79	3.65	3.72
C ₂ W ₁ S ₂	0.00	0.00	0.00	1.03	0.97	1.00	1.12	1.05	1.09	1.50	1.41	1.46	2.73	2.68	2.71
C ₂ W ₂ S ₁	0.00	0.00	0.00	1.50	1.39	1.45	1.65	1.53	1.59	2.29	2.21	2.25	3.52	3.46	3.49
C ₂ W ₂ S ₂	0.00	0.00	0.00	0.81	0.77	0.79	1.00	0.92	0.96	1.34	1.28	1.31	2.57	2.40	2.49
C ₃ W ₁ S ₁	0.00	0.00	0.00	1.55	1.46	1.51	1.76	1.60	1.68	2.43	2.35	2.39	3.76	3.68	3.72
C ₃ W ₁ S ₂	0.00	0.00	0.00	1.01	0.96	0.99	1.08	0.98	1.03	1.44	1.38	1.41	2.69	2.61	2.65
C ₃ W ₂ S ₁	0.00	0.00	0.00	1.49	1.37	1.43	1.62	1.56	1.59	2.24	2.16	2.20	3.43	3.41	3.42
C ₃ W ₂ S ₂	0.00	0.00	0.00	0.75	0.64	0.70	0.90	0.79	0.85	1.28	1.22	1.25	2.50	2.43	2.47
C ₄ W ₁ S ₁	0.00	0.00	0.00	1.88	1.73	1.81	2.65	2.54	2.60	3.57	3.40	3.49	4.68	4.45	4.57
C ₄ W ₁ S ₂	0.00	0.00	0.00	1.23	1.13	1.18	1.39	1.22	1.31	1.85	1.72	1.79	3.30	3.19	3.25
C ₄ W ₂ S ₁	0.00	0.00	0.00	1.64	1.56	1.60	2.16	2.03	2.10	3.19	3.05	3.12	4.09	3.95	4.02
C ₄ W ₂ S ₂	0.00	0.00	0.00	1.09	0.99	1.04	1.23	1.10	1.17	1.64	1.53	1.59	2.97	2.86	2.92
C ₅ W ₁ S ₁	0.00	0.00	0.00	1.73	1.65	1.69	2.57	2.28	2.43	2.94	2.82	2.88	4.31	4.23	4.27
C ₅ W ₁ S ₂	0.00	0.00	0.00	1.17	1.11	1.14	1.34	1.21	1.28	1.92	1.78	1.85	3.22	3.16	3.19
C ₅ W ₂ S ₁	0.00	0.00	0.00	1.66	1.59	1.63	2.27	2.11	2.19	2.79	2.64	2.72	4.17	4.09	4.13
C ₅ W ₂ S ₂	0.00	0.00	0.00	1.12	1.05	1.09	1.27	1.14	1.21	1.70	1.63	1.67	3.06	2.97	3.02
C ₆ W ₁ S ₁	0.00	0.00	0.00	1.70	1.63	1.67	2.40	2.19	2.30	3.38	3.24	3.31	4.28	4.21	4.25
C ₆ W ₁ S ₂	0.00	0.00	0.00	1.14	1.08	1.11	1.30	1.17	1.24	1.77	1.63	1.70	3.20	3.13	3.17
C ₆ W ₂ S ₁	0.00	0.00	0.00	1.61	1.52	1.57	1.98	1.86	1.92	3.12	3.07	3.10	3.96	3.89	3.93
C ₆ W ₂ S ₂	0.00	0.00	0.00	1.06	0.91	0.99	1.20	1.07	1.14	1.59	1.45	1.52	2.80	2.74	2.77
SEm (±)	0.00	0.00	0.00	0.06	0.02	0.04	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
CD 1%	0.00	0.00	0.00	NS	0.07	NS	0.04	0.08	0.06	0.08	0.08	0.08	0.08	0.05	0.07
Treated	0.00	0.00	0.00	1.30	1.22	1.26	1.57	1.45	1.51	2.15	2.05	2.10	3.38	3.28	3.33
Control	0.00	0.00	0.00	5.09	4.93	5.01	8.83	8.68	8.76	13.27	13.03	13.15	20.13	20.03	20.08
SEm (±)	0.00	0.00	0.00	0.05	0.02	0.04	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01
CD 1%	0.00	0.00	0.00	0.14	0.04	0.10	0.02	0.05	0.03	0.05	0.05	0.05	0.05	0.03	0.04

Continue.

	10 days			12 days			14 days			16 days			18 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	4.05	3.97	4.01	4.94	4.82	4.88	6.32	6.18	6.25	7.56	7.43	7.50	8.28	8.16	8.22
C ₂	4.56	4.52	4.54	5.66	5.54	5.60	7.44	7.33	7.38	9.24	9.14	9.19	9.53	9.45	9.49
C ₃	4.44	4.32	4.38	5.57	5.47	5.52	7.27	7.16	7.21	8.51	8.40	8.45	8.83	8.76	8.80
C ₄	6.47	6.38	6.43	8.48	8.36	8.42	9.57	9.46	9.51	10.17	10.06	10.11	10.20	10.12	10.16
C ₅	6.98	6.89	6.93	8.38	8.29	8.34	10.16	10.09	10.13	10.25	10.18	10.22	-	-	-
C ₆	6.21	6.09	6.15	7.89	7.75	7.82	9.01	8.87	8.94	10.06	9.96	10.01	10.11	9.99	10.05
SEm (±)	0.01	0.02	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.04	0.07	0.05	0.04	0.04	0.04	-	-	-	-	-	-	-	-	-

W ₁	5.99	5.89	5.94	7.93	7.82	7.87	8.75	8.63	8.69	9.45	9.32	9.39	9.55	9.47	9.51
W ₂	4.91	4.83	4.87	5.71	5.59	5.65	7.63	7.52	7.58	8.65	8.56	8.61	8.87	8.77	8.82
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.02	0.04	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
S ₁	6.60	6.50	6.55	8.11	7.98	8.05	9.42	9.29	9.36	10.18	10.08	10.13	10.20	10.07	10.14
S ₂	4.30	4.23	4.26	5.53	5.43	5.48	7.13	7.03	7.08	7.83	7.72	7.77	8.96	8.87	8.91
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.02	0.04	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
C ₁ W ₁	4.67	4.60	4.63	5.61	5.46	5.53	7.39	7.24	7.31	9.00	8.86	8.93	9.47	9.39	9.43
C ₁ W ₂	3.43	3.35	3.39	4.28	4.18	4.23	5.26	5.12	5.19	6.12	6.00	6.06	7.69	7.55	7.62
C ₂ W ₁	4.94	4.78	4.86	6.38	6.28	6.33	8.13	8.03	8.08	9.74	9.64	9.69	9.66	9.56	9.61
C ₂ W ₂	4.18	4.26	4.22	4.93	4.80	4.87	6.75	6.63	6.69	8.74	8.64	8.69	9.39	9.33	9.36
C ₃ W ₁	4.82	4.71	4.76	6.29	6.19	6.24	7.89	7.76	7.83	9.62	9.46	9.54	9.51	9.45	9.48
C ₃ W ₂	4.06	3.94	4.00	4.86	4.75	4.80	6.65	6.55	6.60	7.40	7.34	7.37	8.15	8.07	8.11
C ₄ W ₁	7.37	7.30	7.33	10.35	10.21	10.28	10.75	10.61	10.68	-	-	-	-	-	-
C ₄ W ₂	5.58	5.47	5.52	6.61	6.52	6.56	8.98	8.88	8.93	10.17	10.06	10.11	10.20	10.12	10.16
C ₅ W ₁	7.26	7.17	7.21	9.71	9.60	9.65	10.64	10.58	10.61	-	-	-	-	-	-
C ₅ W ₂	6.70	6.61	6.65	7.05	6.99	7.02	9.93	9.84	9.88	10.25	10.18	10.22	-	-	-
C ₆ W ₁	6.91	6.82	6.87	9.27	9.17	9.22	10.55	10.41	10.48	-	-	-	-	-	-
C ₆ W ₂	5.52	5.37	5.44	6.51	6.34	6.42	8.24	8.10	8.17	10.06	9.96	10.01	10.11	9.99	10.05
SEm (±)	0.01	0.02	0.02	0.01	0.02	0.02	-	-	-	-	-	-	-	-	-
CD 1%	0.06	0.09	0.07	0.06	0.06	0.06	-	-	-	-	-	-	-	-	-
C ₁ S ₁	4.76	4.70	4.73	6.58	6.42	6.50	7.93	7.80	7.86	9.37	9.27	9.32	10.20	10.07	10.14
C ₁ S ₂	3.34	3.25	3.29	3.31	3.22	3.26	4.71	4.57	4.64	5.76	5.60	5.68	7.32	7.21	7.26
C ₂ S ₁	5.53	5.38	5.45	6.81	6.66	6.73	9.26	9.12	9.19	10.41	10.32	10.36	-	-	-
C ₂ S ₂	3.59	3.66	3.62	4.51	4.42	4.46	5.62	5.54	5.58	8.06	7.97	8.01	9.53	9.45	9.49
C ₃ S ₁	5.44	5.31	5.38	6.70	6.60	6.65	9.01	8.86	8.93	9.82	9.73	9.78	-	-	-
C ₃ S ₂	3.44	3.33	3.38	4.44	4.34	4.39	5.53	5.46	5.49	7.20	7.07	7.13	8.83	8.76	8.80
C ₄ S ₁	7.98	7.89	7.93	9.80	9.68	9.74	10.52	10.41	10.47	-	-	-	-	-	-
C ₄ S ₂	4.97	4.88	4.92	7.17	7.05	7.11	9.10	8.98	9.04	9.15	9.04	9.10	10.20	10.12	10.16
C ₅ S ₁	8.38	8.31	8.34	9.76	9.69	9.72	11.53	11.47	11.50	-	-	-	-	-	-
C ₅ S ₂	5.58	5.47	5.52	7.00	6.90	6.95	9.48	9.40	9.44	10.25	10.18	10.22	-	-	-
C ₆ S ₁	7.52	7.41	7.46	9.03	8.86	8.94	10.34	10.20	10.27	11.06	10.94	11.00	-	-	-
C ₆ S ₂	4.91	4.78	4.85	6.76	6.64	6.70	8.34	8.21	8.27	9.05	8.98	9.02	10.11	9.99	10.05
SEm (±)	0.01	0.02	0.02	0.01	0.02	0.02	-	-	-	-	-	-	-	-	-
CD 1%	0.06	0.09	0.07	0.06	0.06	0.06	-	-	-	-	-	-	-	-	-
W ₁ S ₁	7.15	7.04	7.10	9.24	9.11	9.18	9.46	9.30	9.38	10.47	10.36	10.41	-	-	-
W ₁ S ₂	4.83	4.74	4.79	6.62	6.53	6.57	8.40	8.29	8.34	8.44	8.28	8.36	9.55	9.47	9.51
W ₂ S ₁	6.05	5.95	6.00	6.98	6.86	6.92	9.40	9.29	9.34	10.01	9.91	9.96	10.20	10.07	10.14
W ₂ S ₂	3.77	3.71	3.74	4.44	4.33	4.38	5.86	5.76	5.81	7.53	7.44	7.48	8.60	8.51	8.56
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.03	0.05	0.04	0.03	0.04	0.03	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₁	5.41	5.34	5.38	7.09	6.87	6.98	8.71	8.59	8.65	10.38	10.26	10.32	-	-	-
C ₁ W ₁ S ₂	3.93	3.85	3.89	4.12	4.05	4.09	6.06	5.89	5.98	7.62	7.46	7.54	9.47	9.39	9.43
C ₁ W ₂ S ₁	4.11	4.06	4.09	6.06	5.97	6.02	7.15	7.00	7.08	8.35	8.27	8.31	10.20	10.07	10.14
C ₁ W ₂ S ₂	2.75	2.64	2.70	2.50	2.38	2.44	3.36	3.24	3.30	3.89	3.73	3.81	5.17	5.02	5.10
C ₂ W ₁ S ₁	5.68	5.49	5.59	7.46	7.31	7.39	10.03	9.87	9.95	10.53	10.45	10.49	-	-	-
C ₂ W ₁ S ₂	4.19	4.07	4.13	5.30	5.24	5.27	6.23	6.18	6.21	8.94	8.83	8.89	9.66	9.56	9.61
C ₂ W ₂ S ₁	5.37	5.26	5.32	6.15	6.01	6.08	8.49	8.37	8.43	10.29	10.18	10.24	-	-	-
C ₂ W ₂ S ₂	2.98	3.25	3.12	3.71	3.59	3.65	5.00	4.89	4.95	7.18	7.10	7.14	9.39	9.33	9.36
C ₃ W ₁ S ₁	5.59	5.46	5.53	7.34	7.23	7.29	9.63	9.45	9.54	10.49	10.37	10.43	-	-	-
C ₃ W ₁ S ₂	4.04	3.95	4.00	5.23	5.15	5.19	6.15	6.07	6.11	8.75	8.54	8.65	9.51	9.45	9.48
C ₃ W ₂ S ₁	5.29	5.16	5.23	6.06	5.97	6.02	8.38	8.26	8.32	9.15	9.09	9.12	-	-	-
C ₃ W ₂ S ₂	2.83	2.71	2.77	3.65	3.53	3.59	4.91	4.84	4.88	5.64	5.59	5.62	8.15	8.07	8.11
C ₄ W ₁ S ₁	9.12	9.03	9.08	11.92	11.79	11.86	-	-	-	-	-	-	-	-	-
C ₄ W ₁ S ₂	5.61	5.56	5.59	8.78	8.62	8.70	10.75	10.61	10.68	-	-	-	-	-	-
C ₄ W ₂ S ₁	6.83	6.74	6.79	7.67	7.56	7.62	10.52	10.41	10.47	11.19	11.07	11.13	-	-	-
C ₄ W ₂ S ₂	4.32	4.19	4.26	5.55	5.47	5.51	7.44	7.35	7.40	9.15	9.04	9.10	10.20	10.12	10.16
C ₅ W ₁ S ₁	8.81	8.74	8.78	11.15	11.06	11.11	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₂	5.70	5.59	5.65	8.26	8.14	8.20	10.64	10.58	10.61	-	-	-	-	-	-
C ₅ W ₂ S ₁	7.95	7.87	7.91	8.37	8.31	8.34	11.53	11.47	11.50	-	-	-	-	-	-
C ₅ W ₂ S ₂	5.45	5.34	5.40	5.73	5.66	5.70	8.32	8.21	8.27	10.25	10.18	10.22	-	-	-
C ₆ W ₁ S ₁	8.29	8.20	8.25	10.50	10.38	10.44	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₂	5.53	5.44	5.49	8.04	7.95	8.00	10.55	10.41	10.48	-	-	-	-	-	-
C ₆ W ₂ S ₁	6.74	6.61	6.68	7.55	7.34	7.45	10.34	10.20	10.27	11.06	10.94	11.00	-	-	-

C ₆ W ₂ S ₂	4.29	4.12	4.21	5.47	5.33	5.40	6.13	6.00	6.07	9.05	8.98	9.02	10.11	9.99	10.05
SEm (±)	0.02	0.03	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
CD 1%	0.08	0.13	0.10	0.08	0.09	0.08	-	-	-	-	-	-	-	-	-
Treated	5.45	5.36	5.41	6.82	6.70	6.76	8.11	7.99	8.05	8.94	8.83	8.88	9.10	9.00	9.05
Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Continue.

	20 days			22 days			24 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	8.71	8.66	8.69	8.91	8.86	8.89	9.19	9.04	9.12
C ₂	-	-	-	-	-	-	-	-	-
C ₃	9.29	9.19	9.24	9.35	9.29	9.32	-	-	-
C ₄	-	-	-	-	-	-	-	-	-
C ₅	-	-	-	-	-	-	-	-	-
C ₆	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
W ₁	-	-	-	-	-	-	-	-	-
W ₂	9.00	8.93	8.96	9.13	9.08	9.10	9.19	9.04	9.12
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
S ₁	-	-	-	-	-	-	-	-	-
S ₂	9.00	8.93	8.96	9.13	9.08	9.10	9.19	9.04	9.12
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
C ₁ W ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₂	8.71	8.66	8.69	8.91	8.86	8.89	9.19	9.04	9.12
C ₂ W ₁	-	-	-	-	-	-	-	-	-
C ₂ W ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₂	9.29	9.19	9.24	9.35	9.29	9.32	-	-	-
C ₄ W ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
C ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₁ S ₂	8.71	8.66	8.69	8.91	8.86	8.89	9.19	9.04	9.12
C ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₃ S ₁	-	-	-	-	-	-	-	-	-
C ₃ S ₂	9.29	9.19	9.24	9.35	9.29	9.32	-	-	-
C ₄ S ₁	-	-	-	-	-	-	-	-	-
C ₄ S ₂	-	-	-	-	-	-	-	-	-
C ₅ S ₁	-	-	-	-	-	-	-	-	-
C ₅ S ₂	-	-	-	-	-	-	-	-	-
C ₆ S ₁	-	-	-	-	-	-	-	-	-
C ₆ S ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
W ₁ S ₁	-	-	-	-	-	-	-	-	-
W ₁ S ₂	-	-	-	-	-	-	-	-	-
W ₂ S ₁	-	-	-	-	-	-	-	-	-
W ₂ S ₂	9.00	8.93	8.96	9.13	9.08	9.10	9.19	9.04	9.12
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₁ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₂ S ₂	8.71	8.66	8.69	8.91	8.86	8.89	9.19	9.04	9.12
C ₂ W ₁ S ₁	-	-	-	-	-	-	-	-	-

C ₂ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₂ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₂ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₂ S ₂	9.29	9.19	9.24	9.35	9.29	9.32	-	-	-
C ₄ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₄ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₂ S ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
Treated	9.00	8.93	8.96	9.13	9.08	9.10	9.19	9.04	9.12
Control	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-

C₁: Hexanal (3%) C₂: Hexanal (4%) C₃: Hexanal (5%) W₁: Wax emulsion (6%) S₁: Ambient temperature

C₄: Salicylic acid (2mM) C₅: Salicylic acid (3mM) C₆: Salicylic acid (4mM) W₂: Wax emulsion (8%) S₂: Cold storage (13°C±1)

Firmness (N)

The data on firmness of banana fruit *cv.* Grand Naine influenced by different post-harvest treatments, wax emulsion and storage conditions have been presented in Table 4.2 and graphically depicted in Fig. 2. It was noted that fruit firmness exhibited decreasing trend throughout the storage period.

In pooled data individual effect of different chemicals showed significant influence on firmness of banana fruits. On 12th day of storage, firmness of banana was significantly influenced by chemicals. The treatment C₁ *i.e.* hexanal 3% recorded maximum firmness (17.33N) whereas minimum firmness recorded in treatment C₄ *i.e.* salicylic acid 2 mM (13.80N). On 24th day of storage, only one interaction C₁ *i.e.* hexanal 3% remained in storage with firmness of (13.02N).

Fruit firmness indicated significant variation due to wax emulsion during storage. On 12th day of storage, effect of wax emulsion was found significant influence on fruit firmness of banana. The treatment W₂ *i.e.* wax emulsion 8% recorded maximum firmness (16.35N) whereas, the treatment W₁ *i.e.* wax emulsion 6% recorded minimum firmness (14.32N). On 24th day of storage, fruits treated with W₂ *i.e.* wax emulsion 8% was retained firmness of 13.02N.

The data with respect to fruit firmness was varied significantly among the different storage conditions. In case of storage conditions, the firmness of fruit was decreased very fast in S₁ than S₂ resulting significant variation in data throughout the storage period. On 18th day of storage, the fruits under ambient conditions S₁ recorded firmness of 12.44 N. At the end of storage, fruits under cold storage treatment S₂ recorded firmness of 13.02N.

Effect of chemicals and wax emulsion showed significant influenced on firmness. On 12th day of storage, the treatment combination C₁W₂ *i.e.* hexanal 3% + wax emulsion 8% recorded maximum firmness (17.99N) whereas the treatment

combination C₄W₁ *i.e.* salicylic acid 3mM + wax emulsion 6% recorded minimum firmness (12.21N). Only one interaction C₁W₂ *i.e.* hexanal 3% + wax emulsion 8% remained with better firmness up to 24th day with 13.02N.

Interaction effect of chemicals and storage conditions showed significant variation in firmness at all day of storage. On 12th day of storage, the treatment combination C₁S₂ *i.e.* hexanal 3% + cold storage recorded maximum firmness (18.81N) whereas the treatment combination C₄S₁ *i.e.* salicylic acid 2 mM + ambient temperature recorded minimum firmness (12.20N) which was at par with the treatment C₅S₁ (12.26N). On 24th day of storage, interaction C₁S₂ *i.e.* hexanal 3% + cold storage remained in storage and reported firmness of 13.02N.

Wax emulsion and storage conditions interaction effect revealed significant result with respect to firmness during storage. On 12th day of storage, the treatment combination of W₂S₂ *i.e.* wax emulsion 8% + cold storage recorded higher firmness (17.34N) whereas the treatment combination of W₁S₁ *i.e.* wax emulsion 6% + ambient temperature recorded minimum firmness (12.46N). At the end of storage, interaction W₂S₂ *i.e.* wax emulsion 8% + cold storage recorded firmness of 13.02N.

Firmness of banana fruits varied significantly with interaction effect of different chemicals, wax emulsion and storage conditions. On 12th day of storage, the treatment combination of C₁W₂S₂ *i.e.* hexanal 3% + wax emulsion 8% + cold storage recorded maximum firmness (19.39N) while the treatment combination C₄W₁S₁ *i.e.* salicylic acid 2 mM + wax emulsion 6% + ambient temperature recorded minimum firmness (9.62N) followed by the treatment C₅W₁S₁ (9.91N). At the end of storage, interaction C₁W₂S₂ *i.e.* hexanal 3% + wax emulsion 8% + cold storage recorded slower changes in firmness during storage and retained higher firmness at the end of storage life 13.02N.

Table 2: Effect of different post-harvest chemicals, wax emulsion and storage conditions on firmness (N) of banana fruit cv. Grand Naine during storage

Treatment	Initial days			2 days			4 days			6 days			8 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	24.18	24.29	24.23	23.19	23.34	23.26	22.29	22.39	22.34	21.09	21.21	21.15	20.02	20.13	20.07
C ₂	24.34	24.43	24.38	23.03	23.27	23.15	21.90	22.04	21.97	20.50	20.60	20.55	19.87	20.00	19.93
C ₃	24.13	24.24	24.18	23.12	23.29	23.20	22.17	22.29	22.23	20.82	20.93	20.88	19.93	20.03	19.98
C ₄	23.83	23.94	23.88	22.12	22.05	22.09	20.90	20.52	20.71	20.23	20.35	20.29	18.40	18.49	18.44
C ₅	23.88	23.95	23.92	22.15	22.06	22.10	21.10	21.21	21.15	20.26	20.37	20.31	18.39	18.54	18.46
C ₆	24.14	24.24	24.19	22.54	22.63	22.58	21.15	21.52	21.33	20.30	20.41	20.36	18.48	18.62	18.55
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01
CD 1%	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.06	0.06	0.04	0.04	0.04
W ₁	23.85	23.95	23.90	22.55	22.62	22.58	21.41	21.61	21.51	20.33	20.45	20.39	18.89	18.99	18.94
W ₂	24.31	24.42	24.36	22.83	22.93	22.88	21.76	21.71	21.74	20.73	20.83	20.78	19.47	19.60	19.54
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.03	0.03	0.02	0.02	0.02
S ₁	23.89	23.98	23.93	22.17	22.27	22.22	21.00	21.21	21.11	19.32	19.43	19.38	18.17	18.27	18.22
S ₂	24.28	24.38	24.33	23.21	23.28	23.24	22.17	22.11	22.14	21.75	21.85	21.80	20.19	20.33	20.26
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.03	0.03	0.02	0.02	0.02
C ₁ W ₁	23.89	23.98	23.94	23.09	23.29	23.19	21.97	22.06	22.02	20.53	20.66	20.59	19.50	19.60	19.55
C ₁ W ₂	24.46	24.60	24.53	23.29	23.40	23.34	22.61	22.72	22.67	21.65	21.76	21.70	20.55	20.65	20.60
C ₂ W ₁	24.26	24.36	24.31	22.93	23.21	23.07	21.79	21.93	21.86	20.43	20.54	20.48	19.39	19.50	19.44
C ₂ W ₂	24.42	24.51	24.46	23.14	23.34	23.24	22.02	22.15	22.08	20.57	20.66	20.61	20.36	20.50	20.43
C ₃ W ₁	23.81	23.92	23.87	23.04	23.24	23.14	21.91	22.04	21.98	20.47	20.58	20.52	19.46	19.54	19.50
C ₃ W ₂	24.45	24.55	24.50	23.19	23.35	23.27	22.42	22.55	22.48	21.17	21.29	21.23	20.40	20.52	20.46
C ₄ W ₁	23.46	23.56	23.51	22.04	21.91	21.97	20.62	20.73	20.67	20.13	20.26	20.19	18.29	18.36	18.32
C ₄ W ₂	24.20	24.31	24.25	22.21	22.20	22.20	21.18	20.30	20.74	20.34	20.44	20.39	18.51	18.63	18.57
C ₅ W ₁	23.64	23.71	23.67	22.10	21.95	22.02	21.07	21.16	21.11	20.21	20.32	20.26	18.34	18.46	18.40
C ₅ W ₂	24.12	24.20	24.16	22.20	22.17	22.18	21.13	21.26	21.19	20.32	20.41	20.36	18.45	18.62	18.53
C ₆ W ₁	24.07	24.15	24.11	22.13	22.12	22.13	21.09	21.72	21.40	20.24	20.37	20.30	18.39	18.52	18.46
C ₆ W ₂	24.22	24.33	24.27	22.95	23.14	23.04	21.21	21.32	21.26	20.37	20.46	20.41	18.57	18.72	18.64
SEm (±)	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
CD 1%	0.06	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.08	0.08	0.05	0.05	0.05
C ₁ S ₁	23.87	23.98	23.93	22.62	22.81	22.71	21.74	21.83	21.78	19.87	20.00	19.93	19.13	19.24	19.18
C ₁ S ₂	24.48	24.60	24.54	23.76	23.88	23.82	22.85	22.95	22.90	22.31	22.42	22.36	20.92	21.02	20.97
C ₂ S ₁	24.21	24.32	24.26	22.49	22.75	22.62	21.59	21.72	21.65	19.30	19.40	19.35	18.97	19.08	19.03
C ₂ S ₂	24.46	24.55	24.50	23.58	23.80	23.69	22.22	22.36	22.29	21.70	21.79	21.74	20.78	20.91	20.84
C ₃ S ₁	23.79	23.89	23.84	22.55	22.76	22.66	21.68	21.81	21.74	19.55	19.64	19.59	19.03	19.11	19.07
C ₃ S ₂	24.47	24.58	24.53	23.68	23.83	23.75	22.65	22.78	22.72	22.09	22.23	22.16	20.83	20.95	20.89
C ₄ S ₁	23.75	23.85	23.80	21.61	21.59	21.60	20.30	20.45	20.37	19.03	19.16	19.09	17.28	17.34	17.31
C ₄ S ₂	23.91	24.03	23.97	22.64	22.52	22.58	21.50	20.58	21.04	21.44	21.54	21.49	19.52	19.64	19.58
C ₅ S ₁	23.84	23.88	23.86	21.64	21.60	21.62	20.33	20.45	20.39	19.06	19.20	19.13	17.27	17.41	17.34
C ₅ S ₂	23.92	24.03	23.97	22.65	22.52	22.59	21.87	21.97	21.92	21.46	21.54	21.50	19.51	19.67	19.59
C ₆ S ₁	23.86	23.95	23.90	22.10	22.14	22.12	20.38	21.03	20.70	19.11	19.22	19.16	17.35	17.46	17.40
C ₆ S ₂	24.43	24.54	24.48	22.98	23.12	23.05	21.92	22.01	21.97	21.50	21.61	21.55	19.61	19.79	19.70
SEm (±)	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
CD 1%	0.06	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.08	0.08	0.05	0.05	0.05
W ₁ S ₁	23.61	23.69	23.65	22.02	22.11	22.07	20.93	21.22	21.07	19.13	19.26	19.20	17.90	18.00	17.95
W ₁ S ₂	24.10	24.20	24.15	23.08	23.12	23.10	21.89	22.00	21.94	21.53	21.64	21.59	19.89	19.99	19.94
W ₂ S ₁	24.16	24.26	24.21	22.31	22.44	22.37	21.07	21.21	21.14	19.50	19.60	19.55	18.44	18.54	18.49
W ₂ S ₂	24.46	24.57	24.51	23.34	23.43	23.39	22.45	22.22	22.33	21.97	22.06	22.01	20.50	20.67	20.58
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CD 1%	0.03	0.04	0.03	NS	NS	NS	0.03	0.03	0.03	0.05	0.05	0.05	0.03	0.03	0.03
C ₁ W ₁ S ₁	23.31	23.39	23.35	22.48	22.73	22.61	21.68	21.78	21.73	19.31	19.46	19.39	18.61	18.74	18.68
C ₁ W ₁ S ₂	24.47	24.57	24.52	23.69	23.84	23.77	22.26	22.34	22.30	21.74	21.86	21.80	20.39	20.46	20.43
C ₁ W ₂ S ₁	24.43	24.57	24.50	22.75	22.89	22.82	21.79	21.88	21.84	20.42	20.54	20.48	19.64	19.73	19.69
C ₁ W ₂ S ₂	24.49	24.62	24.56	23.82	23.91	23.87	23.43	23.56	23.50	22.88	22.97	22.93	21.45	21.57	21.51
C ₂ W ₁ S ₁	24.06	24.20	24.13	22.41	22.67	22.54	21.46	21.60	21.53	19.24	19.33	19.29	18.50	18.65	18.58
C ₂ W ₁ S ₂	24.45	24.51	24.48	23.45	23.74	23.60	22.12	22.26	22.19	21.61	21.74	21.68	20.28	20.34	20.31
C ₂ W ₂ S ₁	24.36	24.43	24.40	22.57	22.83	22.70	21.71	21.84	21.78	19.35	19.47	19.41	19.44	19.51	19.48
C ₂ W ₂ S ₂	24.47	24.58	24.53	23.70	23.85	23.78	22.32	22.45	22.39	21.78	21.84	21.81	21.27	21.48	21.38
C ₃ W ₁ S ₁	23.16	23.27	23.22	22.46	22.69	22.58	21.62	21.76	21.69	19.27	19.38	19.33	18.58	18.67	18.63
C ₃ W ₁ S ₂	24.46	24.57	24.52	23.62	23.78	23.70	22.20	22.32	22.26	21.66	21.78	21.72	20.33	20.41	20.37
C ₃ W ₂ S ₁	24.41	24.51	24.46	22.64	22.83	22.74	21.74	21.85	21.80	19.83	19.89	19.86	19.47	19.54	19.51
C ₃ W ₂ S ₂	24.48	24.59	24.54	23.74	23.87	23.81	23.10	23.24	23.17	22.51	22.68	22.60	21.32	21.49	21.41
C ₄ W ₁ S ₁	23.53	23.61	23.57	21.55	21.41	21.48	20.19	20.33	20.26	18.91	19.07	18.99	17.18	17.27	17.23

C ₄ W ₁ S ₂	23.38	23.51	23.45	22.52	22.40	22.46	21.04	21.13	21.09	21.34	21.44	21.39	19.39	19.44	19.42
C ₄ W ₂ S ₁	23.96	24.08	24.02	21.66	21.76	21.71	20.40	20.57	20.49	19.14	19.24	19.19	17.37	17.41	17.39
C ₄ W ₂ S ₂	24.43	24.54	24.49	22.75	22.64	22.70	21.96	20.03	21.00	21.54	21.63	21.59	19.65	19.84	19.75
C ₅ W ₁ S ₁	23.86	23.89	23.88	21.62	21.47	21.55	20.28	20.37	20.33	19.01	19.16	19.09	17.22	17.34	17.28
C ₅ W ₁ S ₂	23.41	23.52	23.47	22.57	22.42	22.50	21.85	21.95	21.90	21.40	21.48	21.44	19.45	19.57	19.51
C ₅ W ₂ S ₁	23.82	23.87	23.85	21.66	21.72	21.69	20.37	20.52	20.45	19.11	19.23	19.17	17.32	17.47	17.40
C ₅ W ₂ S ₂	24.42	24.53	24.48	22.73	22.62	22.68	21.89	21.99	21.94	21.52	21.59	21.56	19.57	19.76	19.67
C ₆ W ₁ S ₁	23.73	23.78	23.76	21.62	21.68	21.65	20.32	21.47	20.90	19.05	19.18	19.12	17.28	17.35	17.32
C ₆ W ₁ S ₂	24.41	24.52	24.47	22.64	22.56	22.60	21.85	21.97	21.91	21.43	21.55	21.49	19.50	19.69	19.60
C ₆ W ₂ S ₁	23.99	24.11	24.05	22.57	22.59	22.58	20.43	20.58	20.51	19.17	19.25	19.21	17.41	17.56	17.49
C ₆ W ₂ S ₂	24.44	24.55	24.50	23.32	23.68	23.50	21.99	22.05	22.02	21.56	21.67	21.62	19.72	19.88	19.80
SEm (±)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02
CD 1%	0.08	0.10	0.08	0.08	0.07	NS	0.08	0.08	0.07	0.13	0.12	0.12	NS	0.08	0.07
Treated	24.08	24.18	24.13	22.69	22.77	22.73	21.58	21.66	21.62	20.53	20.64	20.59	19.18	19.30	19.24
Control	24.03	24.15	24.09	19.94	20.07	20.01	19.17	19.29	19.23	18.45	18.56	18.51	9.29	9.35	9.32
SEm (±)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.02	0.02
CD 1%	0.05	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.08	0.07	0.07	0.05	0.04	0.04

Continue.

	10 days			12 days			14 days			16 days			18 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	18.16	18.27	18.21	17.39	17.26	17.33	15.70	15.80	15.75	15.06	14.93	14.99	14.09	14.19	14.14
C ₂	17.52	17.61	17.56	16.28	16.19	16.24	15.11	15.74	15.43	13.76	13.50	13.63	12.96	13.10	13.03
C ₃	17.64	17.73	17.68	16.37	16.24	16.31	15.16	15.25	15.20	14.01	14.10	14.05	13.39	13.46	13.42
C ₄	16.30	16.42	16.36	13.84	13.76	13.80	12.95	13.02	12.99	12.73	12.68	12.71	12.23	12.34	12.29
C ₅	16.34	16.41	16.37	14.12	14.08	14.10	12.42	12.52	12.47	11.74	11.89	11.82	-	-	-
C ₆	16.53	16.62	16.58	14.29	14.17	14.23	13.89	14.02	13.95	12.78	12.90	12.84	12.40	12.51	12.46
SEm (±)	0.01	0.02	0.02	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.04	0.08	0.06	0.04	0.04	0.04	-	-	-	-	-	-	-	-	-
W ₁	16.61	16.71	16.66	14.37	14.27	14.32	13.57	13.93	13.75	13.32	13.37	13.34	12.74	12.83	12.78
W ₂	17.55	17.64	17.59	16.39	16.30	16.35	14.96	15.04	15.00	14.01	13.90	13.96	13.57	13.68	13.62
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.02	0.04	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
S ₁	16.30	16.40	16.35	13.95	13.86	13.90	13.26	13.60	13.43	12.60	12.67	12.63	12.40	12.48	12.44
S ₂	17.87	17.95	17.91	16.82	16.71	16.76	15.19	15.29	15.24	14.81	14.64	14.73	13.40	13.51	13.45
SEm (±)	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.02	0.04	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
C ₁ W ₁	17.07	17.18	17.13	16.72	16.60	16.66	14.59	14.71	14.65	13.99	13.62	13.80	13.17	13.24	13.21
C ₁ W ₂	19.25	19.36	19.30	18.07	17.92	17.99	16.81	16.90	16.86	16.13	16.24	16.18	14.56	14.67	14.61
C ₂ W ₁	16.96	17.06	17.01	15.56	15.49	15.52	14.53	15.70	15.11	12.96	13.39	13.17	12.51	12.65	12.58
C ₂ W ₂	18.08	18.15	18.11	17.01	16.90	16.95	15.70	15.78	15.74	14.57	13.61	14.09	13.41	13.55	13.48
C ₃ W ₁	17.11	17.22	17.16	15.67	15.54	15.60	14.56	14.65	14.60	13.01	13.11	13.06	12.53	12.59	12.56
C ₃ W ₂	18.16	18.25	18.21	17.08	16.95	17.01	15.76	15.85	15.80	15.01	15.09	15.05	14.24	14.33	14.29
C ₄ W ₁	15.92	16.02	15.97	12.25	12.18	12.21	10.31	10.39	10.35	-	-	-	-	-	-
C ₄ W ₂	16.68	16.82	16.75	15.43	15.35	15.39	14.27	14.34	14.30	12.73	12.68	12.71	12.23	12.34	12.29
C ₅ W ₁	16.31	16.37	16.34	12.94	12.87	12.90	11.49	11.57	11.53	-	-	-	-	-	-
C ₅ W ₂	16.38	16.45	16.41	15.29	15.29	15.29	12.89	13.00	12.94	11.74	11.89	11.82	-	-	-
C ₆ W ₁	16.32	16.42	16.37	13.09	12.94	13.02	13.01	13.28	13.15	-	-	-	-	-	-
C ₆ W ₂	16.75	16.83	16.79	15.49	15.40	15.45	14.33	14.39	14.36	12.78	12.90	12.84	12.40	12.51	12.46
SEm (±)	0.01	0.03	0.02	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.06	0.11	0.08	0.05	0.06	0.05	-	-	-	-	-	-	-	-	-
C ₁ S ₁	17.12	17.27	17.19	15.93	15.77	15.85	14.14	14.27	14.21	13.71	13.81	13.76	12.40	12.48	12.44
C ₁ S ₂	19.21	19.27	19.24	18.86	18.75	18.81	17.26	17.34	17.30	16.41	16.05	16.23	14.94	15.05	14.99
C ₂ S ₁	16.44	16.52	16.48	15.32	15.24	15.28	13.57	14.72	14.14	12.62	12.65	12.64	-	-	-
C ₂ S ₂	18.60	18.69	18.65	17.25	17.15	17.20	16.66	16.77	16.71	14.91	14.34	14.62	12.96	13.10	13.03
C ₃ S ₁	16.62	16.73	16.67	15.41	15.28	15.35	13.60	13.70	13.65	12.65	12.74	12.69	-	-	-
C ₃ S ₂	18.66	18.74	18.70	17.33	17.21	17.27	16.71	16.79	16.75	15.37	15.46	15.42	13.39	13.46	13.42
C ₄ S ₁	15.70	15.82	15.76	12.24	12.16	12.20	13.10	13.16	13.13	-	-	-	-	-	-
C ₄ S ₂	16.91	17.02	16.96	15.44	15.37	15.40	12.87	12.96	12.91	14.07	13.91	13.99	12.23	12.34	12.29
C ₅ S ₁	15.83	15.90	15.86	12.25	12.27	12.26	10.50	10.65	10.58	-	-	-	-	-	-
C ₅ S ₂	16.86	16.92	16.89	15.99	15.89	15.94	13.38	13.46	13.42	11.74	11.89	11.82	-	-	-
C ₆ S ₁	16.09	16.18	16.13	12.55	12.46	12.50	13.16	13.21	13.19	11.44	11.53	11.49	-	-	-
C ₆ S ₂	16.97	17.07	17.02	16.04	15.88	15.96	14.25	14.43	14.34	14.12	14.27	14.20	12.40	12.51	12.46
SEm (±)	0.01	0.03	0.02	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.06	0.11	0.08	0.05	0.06	0.05	-	-	-	-	-	-	-	-	-
W ₁ S ₁	16.03	16.15	16.09	12.51	12.40	12.46	13.48	14.30	13.89	12.30	12.38	12.34	-	-	-
W ₁ S ₂	17.19	17.27	17.23	16.23	16.13	16.18	13.62	13.74	13.68	14.34	14.35	14.35	12.74	12.83	12.78

W ₂ S ₁	16.56	16.65	16.61	15.38	15.32	15.35	13.15	13.25	13.20	12.78	12.84	12.81	12.40	12.48	12.44
W ₂ S ₂	18.54	18.63	18.58	17.40	17.28	17.34	16.76	16.84	16.80	15.05	14.78	14.92	13.80	13.92	13.86
SEm (±)	0.01	0.02	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
CD 1%	0.03	0.06	0.05	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₁	16.52	16.67	16.60	15.18	15.01	15.10	13.51	13.67	13.59	12.66	12.78	12.72	-	-	-
C ₁ W ₁ S ₂	17.62	17.69	17.66	18.26	18.18	18.22	15.66	15.74	15.70	15.32	14.45	14.89	13.17	13.24	13.21
C ₁ W ₂ S ₁	17.71	17.86	17.79	16.67	16.52	16.60	14.77	14.87	14.82	14.75	14.83	14.79	12.40	12.48	12.44
C ₁ W ₂ S ₂	20.79	20.85	20.82	19.46	19.32	19.39	18.85	18.93	18.89	17.50	17.64	17.57	16.71	16.85	16.78
C ₂ W ₁ S ₁	16.40	16.48	16.44	14.98	14.89	14.94	13.46	15.67	14.57	12.49	12.54	12.52	-	-	-
C ₂ W ₁ S ₂	17.52	17.64	17.58	16.13	16.08	16.11	15.59	15.73	15.66	13.43	14.23	13.83	12.51	12.65	12.58
C ₂ W ₂ S ₁	16.47	16.56	16.52	15.65	15.58	15.62	13.67	13.76	13.72	12.75	12.76	12.76	-	-	-
C ₂ W ₂ S ₂	19.68	19.74	19.71	18.36	18.22	18.29	17.72	17.80	17.76	16.38	14.45	15.42	13.41	13.55	13.48
C ₃ W ₁ S ₁	16.64	16.79	16.72	15.04	14.94	14.99	13.48	13.57	13.53	11.74	11.83	11.79	-	-	-
C ₃ W ₁ S ₂	17.58	17.64	17.61	16.29	16.13	16.21	15.63	15.72	15.68	14.27	14.38	14.33	12.53	12.59	12.56
C ₃ W ₂ S ₁	16.59	16.67	16.63	15.78	15.62	15.70	13.72	13.83	13.78	13.55	13.64	13.60	-	-	-
C ₃ W ₂ S ₂	19.73	19.83	19.78	18.37	18.28	18.33	17.79	17.86	17.83	16.47	16.54	16.51	14.24	14.33	14.29
C ₄ W ₁ S ₁	15.06	15.18	15.12	9.65	9.58	9.62	-	-	-	-	-	-	-	-	-
C ₄ W ₁ S ₂	16.78	16.85	16.82	14.84	14.77	14.81	10.31	10.39	10.35	-	-	-	-	-	-
C ₄ W ₂ S ₁	16.33	16.45	16.39	14.82	14.74	14.78	13.10	13.16	13.13	11.39	11.45	11.42	-	-	-
C ₄ W ₂ S ₂	17.03	17.19	17.11	16.03	15.96	16.00	15.43	15.52	15.48	14.07	13.91	13.99	12.23	12.34	12.29
C ₅ W ₁ S ₁	15.79	15.86	15.83	9.95	9.87	9.91	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₂	16.82	16.87	16.85	15.93	15.86	15.90	11.49	11.57	11.53	-	-	-	-	-	-
C ₅ W ₂ S ₁	15.86	15.93	15.90	14.54	14.67	14.61	10.50	10.65	10.58	-	-	-	-	-	-
C ₅ W ₂ S ₂	16.89	16.96	16.93	16.04	15.91	15.98	15.27	15.34	15.31	11.74	11.89	11.82	-	-	-
C ₆ W ₁ S ₁	15.79	15.90	15.85	10.25	10.13	10.19	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₂	16.84	16.93	16.89	15.93	15.75	15.84	13.01	13.28	13.15	-	-	-	-	-	-
C ₆ W ₂ S ₁	16.39	16.45	16.42	14.84	14.79	14.82	13.16	13.21	13.19	11.44	11.53	11.49	-	-	-
C ₆ W ₂ S ₂	17.10	17.21	17.16	16.14	16.01	16.08	15.49	15.57	15.53	14.12	14.27	14.20	12.40	12.51	12.46
SEm (±)	0.02	0.04	0.03	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-
CD 1%	0.08	0.15	0.12	0.07	0.08	0.07	-	-	-	-	-	-	-	-	-
Treated	17.08	17.18	17.13	15.38	15.28	15.33	14.36	14.56	14.46	13.77	13.71	13.74	13.29	13.39	13.34
Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Continue.

	20 days			22 days			24 days		
	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled	Trial I	Trial II	Pooled
C ₁	13.98	14.05	14.02	13.20	13.36	13.28	12.96	13.07	13.02
C ₂	-	-	-	-	-	-	-	-	-
C ₃	12.97	13.05	13.01	12.91	13.03	12.97	-	-	-
C ₄	-	-	-	-	-	-	-	-	-
C ₅	-	-	-	-	-	-	-	-	-
C ₆	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
W ₁	-	-	-	-	-	-	-	-	-
W ₂	13.48	13.55	13.51	13.06	13.20	13.13	12.96	13.07	13.02
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
S ₁	-	-	-	-	-	-	-	-	-
S ₂	13.48	13.55	13.51	13.06	13.20	13.13	12.96	13.07	13.02
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
C ₁ W ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₂	13.98	14.05	14.02	13.20	13.36	13.28	12.96	13.07	13.02
C ₂ W ₁	-	-	-	-	-	-	-	-	-
C ₂ W ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₂	12.97	13.05	13.01	12.91	13.03	12.97	-	-	-
C ₄ W ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-

C ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₁ S ₂	13.98	14.05	14.02	13.20	13.36	13.28	12.96	13.07	13.02
C ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₃ S ₁	-	-	-	-	-	-	-	-	-
C ₃ S ₂	12.97	13.05	13.01	12.91	13.03	12.97	-	-	-
C ₄ S ₁	-	-	-	-	-	-	-	-	-
C ₄ S ₂	-	-	-	-	-	-	-	-	-
C ₅ S ₁	-	-	-	-	-	-	-	-	-
C ₅ S ₂	-	-	-	-	-	-	-	-	-
C ₆ S ₁	-	-	-	-	-	-	-	-	-
C ₆ S ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
W ₁ S ₁	-	-	-	-	-	-	-	-	-
W ₁ S ₂	-	-	-	-	-	-	-	-	-
W ₂ S ₁	-	-	-	-	-	-	-	-	-
W ₂ S ₂	13.48	13.55	13.51	13.06	13.20	13.13	12.96	13.07	13.02
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₁ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₁ W ₂ S ₂	13.98	14.05	14.02	13.20	13.36	13.28	12.96	13.07	13.02
C ₂ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₂ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₂ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₂ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₃ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₃ W ₂ S ₂	12.97	13.05	13.01	12.91	13.03	12.97	-	-	-
C ₄ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₄ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₄ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₅ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₅ W ₂ S ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₁ S ₂	-	-	-	-	-	-	-	-	-
C ₆ W ₂ S ₁	-	-	-	-	-	-	-	-	-
C ₆ W ₂ S ₂	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-
Treated	13.48	13.55	13.51	13.06	13.20	13.13	12.96	13.07	13.02
Control	-	-	-	-	-	-	-	-	-
SEm (±)	-	-	-	-	-	-	-	-	-
CD 1%	-	-	-	-	-	-	-	-	-

C₁: Hexanal (3%) C₂: Hexanal (4%) C₃: Hexanal (5%) W₁: Wax emulsion (6%) S₁: Ambient temperature

C₄: Salicylic acid (2mM) C₅: Salicylic acid (3mM) C₆: Salicylic acid (4mM) W₂: Wax emulsion (8%) S₂: Cold storage (13°C ±1)

Conclusion

From the experiment on effect of post-harvest treatment of chemicals, wax emulsion and storage conditions on shelf life of banana it can be concluded that chemicals, wax emulsion and storage conditions improve the shelf life of banana fruits. The physiological loss in weight (%), ripening (%), pulp to peel ratio and spoilage (%) were found minimum while firmness (N), days taken to colour break, overall acceptability were maximum in the treatment combination of C₁W₂S₂ i.e. hexanal @ 3% + wax emulsion @ 8% + cold storage at the end of storage life. The shelf life of banana cv. Grand Naine could be extended up to 18 days at ambient conditions and 24 days at cold storage (13 °C +1) when treated with hexanal @ 3% and wax emulsion @ 8%.

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