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Influence of Different Comestible Coatings and Wrapping Material on Shelf Life of Bell Pepper

Gurleen Kaur

Department of Agriculture, D. A. V. College, Abohar-152116

Abstract: ***The influence of different comestible coatings and wrapping material on various characters of Bell pepper determined during post-harvest storage at room temperature. Different coatings used were Aloe vera gel, cornstarch, mustard oil and control. After coating samples were stored at room temperature under polythene and newspaper wrapping. Several parameters viz. firmness, fungal attack, texture, skin integrity and moisture content were analyzed till spoilage. Results disclosed that the quality of bell pepper was boosted by different coatings. Aloe vera gel demonstrated superiority over the other coatings. It yields a significant positive impact on firmness, texture, skin integrity and preventing fungal attack under polythene wrapping eventually leading to increased shelf life. Therefore, the present study results suggested that shelf life of bell pepper can be increased by using aloe vera gel with polythene wrapping.***

Keywords: Bell pepper, Coatings, Firmness, Texture, Wrappings

1. Introduction

Bell pepper also known as Capsicum (*Capsicum annum* L.) is a solanaceous vegetable. It is a good source of vitamins and minerals, rich in Vitamin A, Vitamin B6 and Vitamin C and also possesses minerals like folate, potassium, magnesium and iron. It contains good amount of water which makes it a hydrating food. Once it is harvested it continues to respire and transpire which leads to loss of metabolites and moisture. Its hydrating nature also invites the microorganism which spoils it and degrades its quality. To prevent this deterioration and losses, proper sanitation measures should be adopted and also post harvest treatments should be used that have potential to reduce respiratory losses and spoilage. The choice of treatment depends on the financial condition of the producer and also the choice of consumers as now day's people prefer organic products. The coatings extracted from the plants are applied on the fruits or vegetables which sticks strongly to the pores of fruit or vegetable skin and helps to prevent the exchange of gases. Choosing the right wrapping material is also necessary, although a variety of wrapping materials are available in the market. The choice depends on the nature of the produce, type of storage, duration of storage, distance of transportation. Mostly plastics bags are used for packaging or wrapping due to their affordability, easy availability and heat resistivity.

2. Materials and Methods

Location:
The experiment was conducted at agriculture laboratory, D. A. V. College, Abohar.

Experiment details:
The experiment was conducted to study the influence of different comestible coatings and wrapping materials on firmness, texture, skin integrity, moisture content and susceptibility to fungal attack of bell peppers under room temperature conditions.

Different treatments to be used:
Wrappings:
W_1- Newspaper
W_2- Polythene

Coatings:
T_1- Cornstarch
T_2- Aloevera gel
T_3- Mustard oil
T_4- Control

Preparation of samples:
The capsicums were brought to the agriculture lab, D. A. V. College, Abohar. Capsicums were washed and divided into 8 groups for each treatment and each group consisted of 8 capsicums. Coatings of cornstarch, aloevera gel, and mustard oil were applied to 16 fruits and 16 fruits were kept untreated. Then out of each 16, 8 were wrapped with newspaper and other 8 were wrapped with polythene. The whole experiment was conducted at room temperature.

Preparation of aloe vera gel coating:
Fresh aloe vera leaves were taken. Leaves were washed and trimmed. The gel matrix was separated from the outer cortex of leaves and this colorless hydroparenchyma was ground in a blender. The resulting mixture was then filtered to remove the fibres.

Preparation of cornstarch coating:

Ingredients
- Cornstarch: 25 gm
- Water: 100 ml

Procedure:
25 gm of cornstarch was slowly mixed with 100 ml of cold water; stirring was done continuously to prevent the formation of lumps. The mixture was heated while stirring constantly. As it was heating up, the cornstarch started to thicken. When it reached a smooth and thick consistency, it was removed from heating process and allowed it to cool before use.

Firmness:
It was assessed by touching the fruit by the 3 judges. Hedonic rating test was used and scores were given, the maximum being 10 and the minimum being 0.

Texture:
It was evaluated by sensory evaluation, on the basis of its stiffness and hardness. Hedonic rating test was used and scores were given according to texture profile, the maximum being 10 and minimum being 0.

Skin Integrity:
It was evaluated by judging bruises, cuts, firmness and texture of the fruit and scores were given according to its overall appearance out of 10, by the 3 judges using hedonic rating test.

Fungal attack:
Fungal attack was assessed visually by the external visible symptoms including soft spots or lesions, mold, slimy texture, discoloration and unpleasant odour.

Moisture content
Segment of 10 gm capsicum was taken from each group and placed in hot air oven for 72 hours at 70°C, when it was fully dried, it was again measured. The loss in moisture content was measured by using the formula:

$$\frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100\%$$

3. Results and Discussion

Firmness
It has been observed that treatment T_2 got the maximum scores (9.00, 8.83) at 3rd and 6th day under W_2 wrapping. Minimum firmness rating (0.50) was recorded in the fruits treated with T_1 at 10th day under W_1 wrapping. Similar results were obtained by Yimtoe *et al* (2014), Singh (2017) on sweet peppers. The findings of A'yun and Bintoro (2021) were also similar.

Table 1: Effect of different post- harvest treatments on firmness of fruits

Treatments	W_1			W_2		
	3 Days	6 Days	10 Days	3 Days	6 Days	10 Days
T_1	7.16	3.83	0.50	8.50	7.16	4.00
T_2	7.83	5.00	1.33	9.00	8.83	3.83
T_3	5.83	5.00	2.66	8.83	7.16	4.33
T_4	7.50	4.16	1.00	7.83	7.50	3.66
Mean	7.08	4.49	1.37	8.54	7.66	3.95

Texture
Maximum texture rating (9.16, 8.66) was recorded in fruits treated with treatment T_2 at 3rd and 6th day under W_2 wrapping. Minimum rating (0.66) was recorded in the fruits treated with mustard and in control at last day under W_1 wrapping. Similar results were obtained by Nair *et al* (2018) on capsicums. The findings of Jati *et al* (2022) also showed similar results on tomato.

Table 2: Effect of different post-harvest treatments on texture of fruits

Treatments	W_1			W_2		
	3 Days	6 Days	10 Days	3 Days	6 Days	10 Days
T_1	7.00	4.50	0.66	8.83	7.66	3.66
T_2	8.00	5.50	1.66	9.16	8.66	4.16
T_3	6.50	5.30	3.16	8.60	7.33	5.00
T_4	7.16	3.83	0.66	8.00	7.33	4.00
Mean	7.16	4.78	1.53	8.60	7.70	4.20

Skin integrity
The highest rating (9.16) for skin integrity was recorded in the fruits treated with treatment T_2 under W_2 wrapping at 3rd day. The lowest rating (0.66) for skin integrity was recorded in the fruits treated with treatment T_1 at last day under W_1 wrapping. The findings of Bisen *et al* (2012) were similar on kagzi lime fruits. Similar results were founded by Hazarika *et al* (2019) on strawberry fruits.

Table 3: Effect of different post-harvest treatment on skin integrity of fruits

Treatments	W_1			W_2		
	3 Days	6 Days	10 Days	3 Days	6 Days	10 Days
T_1	7.00	3.66	0.66	8.66	7.50	4.16
T_2	7.16	5.16	1.33	9.16	8.60	3.83
T_3	6.00	4.66	3.00	8.50	7.00	3.16
T_4	7.66	4.66	1.50	8.66	7.16	3.66
Mean	6.95	4.53	1.62	8.74	7.50	3.70

Fungal attack

Table 4: Effect of different post-harvest treatments of fungal attack on fruits

Treatments	W_1			W_2		
	3 Days	6 Days	10 Days	3 Days	6 Days	10 Days
T_1	No	No	Yes	No	No	Yes
T_2	No	No	No	No	No	No
T_3	No	Yes	Yes	No	No	Yes
T_4	No	No	Yes	No	No	Yes

In this case, it has been observed that fungal attack occurred on the last days. Treatment T_2 served best under both wrappings as it prevented fungal attack. Treatment T_3 showed fungal attack earlier than other treatments under W_1 wrapping. The findings Ullah *et al* (2017) were similar on bell pepper. Similar results were obtained by Kumari *et al* (2024) on chilli.

Moisture content (%)

Table 1: Effect of different post harvest treatments on moisture content of fruit (%)

Treatments	W_1			W_2		
	3 Days	6 Days	10 Days	3 Days	6 Days	10 Days
T_1	94.0	92.0	91.0	97.0	97.0	97.0
T_2	95.0	94.0	93.0	96.0	95.0	95.0
T_3	93.0	92.0	88.0	95.0	95.0	95.0
T_4	95.0	93.0	85.0	95.0	95.0	-
Mean	94.2	92.7	89.2	95.7	95.5	95.6

Cornstarch served best among the 4 treatments in retaining maximum moisture content (97%) of bell pepper under polythene wrapping and least amount of moisture content (85%) has been observed in uncoated bell pepper under newspaper wrapping at 10th day. Onyegbula *et al* (2023) found similar results on tomato fruits and Okpara (2024) founded similar results on cucumber. The coatings effectively reduced moisture content.

4. Conclusion

The present investigation showed the ability of different comestible coatings and wrapping material on the quality retention and shelf life extension of bell peppers. Maximum rating for firmness was recorded in fruits treated with aloevera gel under polythene wrapping. Maximum rating for texture was recorded in the fruits treated with aloevera gel with polythene wrapping. Maximum rating for skin integrity was recorded in aloevera gel treated fruits in the polythene wrapping. Fungal attack was prevented by aloevera gel under both wrappings. Maximum moisture was found in the fruits coated with the coating of cornstarch under polythene wrapping. Coatings of aloevera gel have a good effect on maintaining firmness, texture, skin integrity and prevention of fungal attack. It can be concluded that aloevera gel's coating and polythene wrapping helped in maintaining the quality and enhanced the shelf life of bell pepper.

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