Original Research Article

“Effect of Different Edible Film Coatings on Microbial Analyses and Organoleptic Attributes of Fresh Cut Kiwi (*Actinidia Deliciosa*) Green Kiwi Cv. Hayward”

ABSTRACT

The current study aimed to evaluate the effect of different edible film coating of carboxymethylCarboxymethyl cellulose and aloeAloe vera gel on microbial and sensorial properties of fresh-cut kiwi fruit stored at 4 ^{o}C for 20 days. The slices of kiwi fruit were covered with carboxymethylCarboxymethyl cellulose and Aloe vera gel while the uncoated samples were served as control. The kiwi fruit slices were packaged and cold stored at refrigerator condition and it was conducted with the appropriate methodology at the post-harvest laboratory of the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, during 2022. The experiment was laid out during December month of 2022 in a completely randomized design with Nine treatments and three replications. The treatment details viz., Control, Carboxymethyl Cellulose 1.0 %, Carboxymethyl Cellulose 1.5 %, Aloe vera gel 30%, Aloe vera gel 40%, Carboxymethyl Cellulose 1.0 % + Aloe vera gel 30%, Carboxymethyl Cellulose 1.5 % + Aloe vera gel 30%, Carboxymethyl Cellulose 1.0 % + Aloe vera gel 40% and Carboxymethyl Cellulose 1.5 % + Aloe vera gel 40%. It is concluded that the effect of Treatment T_3 i.e., AVG 3 was found to be best in terms of microbial analyses i.e., Yeast and mould count (log CFU/g) (2.07), Total bacterial count (log CFU/g) (3.38) and Spoilage (%) (13.34%) and Sensory evaluation i.e., Colour score (6.17), Taste score (6.19), Odour score (6.13), Texture score (4.89) and Overall acceptability (5.85) i.e., T_3. The results highlighted that Aloe vera gel 30% coating improved the quality of stored fresh-cut kiwi fruit slices.

Keywords:: Kiwi fruit, edible coatings, Carboxymethyl Cellulose, Aloe vera gel, microbial and sensorial properties.

INTRODUCTION

The kiwifruit (also shortened to kiwi) is the edible berry of a woody vine in the genus Actinidia, being the 'Hayward' the most common kiwi cultivar **Park *et al.* (2014).** Botanically the kiwifruit develops from a multi-~~carpellary~~capillary ovary and is classified as a berry. The peel is light brownish green and completely covered by small filaments. The pulp (pericarp) surrounding the central zone of the fruit (columella) is a bright green colour having included hundreds of small black seeds **Barros *et al.* (2007).** Kiwi is very nutritious and rich in bioactive components, being particularly rich in vitamin C (one kiwi is equivalent to five lemons), minerals (Na, K, Ca, Mg, Mn, Fe, Cu, Zn) and organic hydroxy acids that are involved in the acid-base balance of the body **Peticila *et al.* (2004).**

Ready-to-eat food products are the most requested on the market in recent years. The market for fresh-cut fruit in Europe began in the early 1980s and has been characterized by double-digit growth in the last decade. These products are characterized for their convenience, but, on the other hand, they have a very short shelf life due to the damage of peeling, cutting and storage. These processes alter the physicochemical characteristics of the fruit, with a consistent acceleration of ripening.

Fresh-cut kiwi is usually used in different salads as peeled and sliced fruits. Consequently, these procedures may cause physical damage to the fruit and increase ethylene production with ageing. In addition, the cutting of fruits may cause an increase in the microbial content, leading to a less stable product. Poor postharvest practices result in loss of quality through the development of physiological disorders like weight loss, pathological disorders through microbial attack, and fruit rot **Iqbal *et al.* (1996).**

Among these various techniques, food coating has gained great interest for fresh and minimally processed fruits and vegetables not only due to the possibility of keeping certain quality characteristics (texture, firmness, and dehydration) but also because coatings can carry useful additives like antimicrobial and anti-browning agents **Oms-Oliu *et al.* (2008).** ~~Carboxymethylcellulose~~Carboxymethyl cellulose (CMC) is a cellulose derivative extracted from plant cell walls composed of linear anionic chains of glucopyranosyl units with high molecular weight. CMC has many food industry applications because it is nontoxic, nonallergenic, odourless, tasteless, biocompatible, and biodegradable **Chen *et al.* (2017) and Candido *et al.* (2016).** CMC-based

coatings are also transparent and slightly permeable to O_2, CO_2, and moisture. Edible coatings based on CMC have been effective in preserving the postharvest quality of papaya (*Carica papaya*) **Malmiri *et al.* (2013),** mandarin (*Citrus reticulata*) **Arnon *et al.* (2015),** and plum (*Prunus domestica*) **Panahirad *et al.* (2019).** *Aloe vera* (L.) Burm.f. (synonym *Aloe barbadensis* Miller) belongs to the plant family Liliaceae. It is widely used in pharmaceuticals, cosmetics, and the food industry since it contains biologically active compounds with antimicrobial and antioxidative properties **(Vega-Gálvez *et al.* 2011).**

Certain compounds within *A. vera* have been identified as bioactive molecules, such as soluble sugars, mineral salts, proteins, fibres, organic acids, amino acids, minerals, phenolic compounds, and vitamins **(Boudreau and Beland, 2006).** Recent research has demonstrated the efficacy of *A. vera* extracts against several types of diseases of vegetables and fruits which are caused by fungal pathogens **(Castillo *et al.* 2010).**

Recently, coatings containing *A. vera* pulp have been studied for their ability to sustain the quality of, and reduce microorganism growth on, several fruits **(Benítez *et al.* 2015 and Vieira *et al.* 2016).** The sensory evaluation of chitosan-coated fresh-cut fruits is needed to know consumer satisfaction and support research and development **(Fattahi and Babri, 2010)**.

Sensory evaluation is an analytical tool that clarifies how products are perceived through the human senses (hearing, touch, sight, taste, and smell). It plays a major role in food quality control and new product development can be categorized into effective and descriptive analysis.

Conventionally, consumer scores for all the sensory attributes like flavour, colour, aroma, etc., involved in the sensory study were analyzed statistically. But the sensory scores obtained by human senses are imprecise and uncertain **(Martinez *et al.* 2007)**. This makes the sensory analysis critical to understanding involving retaining knowledge. The strength and weaknesses of a food product with defined quality attributes determine the acceptance or rejection of the product in the marketplace.

MATERIALS AND METHODS

The current study, entitled **"Effect of Different Edible Film Coatings on Microbial Analyses and Organoleptic Attributes of Fresh Cut Kiwi (*Actinidia Deliciosa*) Green Kiwi Cv. Hayward"** was conducted with the appropriate methodology at the post-harvest laboratory of the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, during 2022. The experimental site is situated on the left side of Allahabad-Rewa Road, near the river Yamuna and is approximately 8 km from Allahabad city. It lies at 25.57° N latitude and 81.51°E longitude. The cultivar of Kiwi which was used for the study was Hayward. The experiment was laid out during December month of 2022 in a completely randomized design with nine treatments and three replications.

Table 1:- Treatment Combination

S. No.	Symbols	TREATMENTS
1.	T_0	Control
2.	T_1	Carboxymethyl Cellulose 1.0 %
3.	T_2	Carboxymethyl Cellulose 1.5 %
4.	T_3	Aloe vera gel 30%
5.	T_4	Aloe vera gel 40%
6.	T_5	Carboxymethyl Cellulose 1.0 % + Aloe vera gel 30%
7.	T_6	Carboxymethyl Cellulose 1.5 % + Aloe vera gel 30%
8.	T_7	Carboxymethyl Cellulose 1.0 % + Aloe vera gel 40%
9.	T_8	Carboxymethyl Cellulose 1.5 % + Aloe vera gel 40%

The details of the sum of sensory scores, number of judges, and triplets accompanied by the sensory scale were used to calculate the triplets of specific quality attributes.

The edible coating materials (~~carboxymethyl~~Carboxymethyl cellulose and Aloe vera gel) are to be dissolved in a water base with 1.5% citric acid. Kiwi fruits were washed in tap water and then immersed in chlorinated water (0.5%) for 10 min. Afterwards, the kiwis were hand-peeled and then cut with a sterilized stainless-steel knife into 1 cm round slices into 5. One kilogram of mature leaves of *Aloe vera* were,

washed in tap water and immersed in 100 µL of sodium hypochlorite for 5 min. The gelatinous parenchyma was separated through a stainless-steel knife removing the external epidermis and grinded in a mixer grinder, the resulting mixture was filtered through a tea strainer to remove the fibrous portion and the extract is obtained and collected, pasteurized at 70 ^{o}C for 45min. And allowed to cool at room temperature.

The coating of the fruits was performed by dipping twice the peeled fruits after pretreatment and slices were air-dried for 1 hour at room temperature. All the utensils and surfaces in contact with the fruit during processing were washed and sanitized with 200 µL of sodium hypochlorite solution to have a maximum sanitizing effect.

The coated kiwi slices were packaged in plastic containers (250 mL capacity) and stored at 4°C. The quality of the fresh-cut kiwi slices was evaluated during storage (up to 20 days) by measuring changes in colour, texture, and chemical composition.

The microbiological analyses of kiwi slices were carried out including total bacterial count (TC) and count of yeasts and mould (Yeast & Mould) **(Benitez *et al.* 2013).** Results were expressed as log CFU/g The number of visibly diseased, rotten, over-ripped fruits were counted and expressed as a percentage over the total number of fruits from the 10th day and 20th- intervals of the storage period.

The data recorded du ng the investigation was subjected to statistical analysis using CRD (Complete Randomized Design) as per the method of "Analysis of variance" technique **(Panse and Sukhatme, 1967)**. The Significant between the treatment was tested at a 5% level of significance.

- **Sensory qualities of ready-to-eat fresh kiwi fruit estimation**

The judges subjected the ready-to-eat product made from **fresh-cut kiwi (Actinidia deliciosa) Green kiwi cv. Hayward** to organoleptic examination, or (Taste, Aroma, Color, Texture), based on **Ranganna's** nine-point hedonic rating test. **(1997).** The taste, colour, and texture of the goods were examined. The characteristics with an acceptable average score of 1 or more out of 9 were those.

The mean scores from all the characteristics examined during the analysis were used to determine the product's general acceptability. Calculations were made using the average scores that various goods received.

Figure 1 :- Display and judging of products at P.G Lab of the horticulture department with faculty members.

Chart 1 : The Hedonic scale is given as follows:

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like nor dislike	5
Dislike slightly	4

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Dislike moderately	3
Dislike very	2
Dislike extremely	1

RESULTS AND DISCUSSION

1.Microbial Analyses

The results on yeast and mould count (log CFU/g), total bacterial count (log CFU/g) and spoilage percentage of fresh cut kiwi cv Hayward as influenced by different treatments of edible film coating are presented in Table 2.

1.1 Yeast and Mould Count (YMC)

It is evident from the data that significantly, the minimum yeast and mould count (log CFU/g) in freshly cut kiwi (1.34) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and Carboxymethyl cellulose (CMC) 1% + Aloe vera Gel 40%. Whereas the maximum yeast and mould count (log CFU/g) (4.15) was found in control at 0 Days.

At 10 Days, it is evident from the data that significantly, the minimum yeast and mould count (log CFU/g) in freshly cut kiwi (1.83) was noted the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1% + Aloe vera Gel 40%

At 20 Days, it is evident from the data that significantly, the minimum yeast and mould count (log CFU/g) in freshly cut kiwi (2.07) was noted the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1% + Aloe vera Gel 40%.

1.2 Total Bacterial Count (TBC)

It is evident from the data that significantly, the minimum total bacterial count in fresh cut kiwi (1.21) (log CFU/g) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1% + Aloe vera Gel 40%. Whereas the maximum total bacterial count (log CFU/g) (2.44) was found in control at 0 Days.

At 10 Days, it is evident from the data that significantly, the minimum total bacterial count in fresh cut kiwi (2.52) (log CFU/g) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1% +Aloe vera Gel 30% and Carboxymethyl cellulose (CMC) 1.5% + Aloe vera Gel 30%.

At 20 Days, it is evident from the data that significantly, the minimum total bacterial count in fresh cut kiwi (3.38) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with the treatment Aloe vera Gel 40%.

Aloe vera extract was also reported to have antimicrobial functions, significantly reducing mesophilic bacteria, and especially have antifungal activity **(Valverde *et al.* 2005 and Martinez-Romero *et al.* 2006)**. According to the HACCP guidelines, food <4 log^{10}cfu/g of organisms is rated "good" and those containing 8 log^{10}cfu/g as spoiled food.

1.3 Spoilage Percentage (%)

It is evident from the data that significantly, the minimum spoilage percentage in fresh cut kiwi (6.67) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5%. Whereas the maximum spoilage percentage (80.00) was found in control at 10 Days.

At 20 Days, it is evident from the data that the minimum spoilage percentage in fresh-cut kiwi (13.33) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1%, (CMC) 1% + Aloe vera Gel 30% and (CMC) 1.5% + Aloe vera Gel 40%. Whereas the maximum spoilage percentage (93.33) was found in control T_0 at 20 Days.

2. Sensory Evaluation

The results on sensory attributes of fresh cut kiwi cv. Hayward are influenced by different treatments of edible film coating presented in Tables 3 and 4.

2.1 Colour Score

It is evident from the data that significantly, the maximum colour score in fresh cut kiwi (8.92) was noted in the edible film coating with treatments Aloe vera

Gel 30% (T_3). Which was at par with treatment Carboxymethyl cellulose (CMC) 1% + Aloe vera Gel 30%. Whereas the minimum colour score (7.88) was found in control at 0 Days.

At 5 Days, it is evident from the data that the maximum colour score in fresh cut kiwi (8.61) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1% + Aloe vera Gel 30% and Aloe vera Gel 40%. Whereas the colour score (6.28) was found in control at 5 Days.

At 10 Days, it is evident from the data that the maximum colour score in fresh-cut kiwi (7.44) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1.5%.

At 15 Days, it is evident from the data that the maximum colour score in fresh-cut kiwi (6.45) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with the treatment Aloe vera Gel 40%.

At 20 Days, it is evident from the data that significantly, the maximum colour score in freshly cut kiwi (6.17) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3) and Aloe vera Gel 40% (T_4). Which was at par with treatment (CMC) 1% +Aloe vera Gel 30%.

2.2 Taste Score

It is evident from the data that significantly, the maximum taste score in fresh cut kiwi (8.94) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% and (CMC) 1% +Aloe vera Gel 30%. Whereas the maximum taste score (7.71) was found in control at 0 Days.

At 5 Days, it is evident from the data that the maximum taste score in fresh cut kiwi (8.65) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1% + Aloe vera Gel 30%.Whereas the taste score (6.29) was found in control at 5 Days.

At 10 Days, it is evident from the data that the maximum taste score in fresh cut kiwi (7.79) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment Aloe vera Gel 40% and (CMC) 1.5%.

At 15 Days, it is evident from the data that the maximum taste score in fresh cut kiwi (6.47) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1% + Aloe vera Gel 40% and Aloe vera Gel 40%.

At 20 Days, it is evident from the data that significantly, the maximum taste score in freshly cut kiwi (6.19) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3) and Aloe vera Gel 40% (T_4). Which was at par with treatment (CMC) 1% + Aloe vera Gel 30% and (CMC) 1.5% + Aloe vera Gel 40%.

2.3 Odour Score

It is evident from the data that significantly, the maximum Odour score in fresh cut kiwi (8.88) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5%. Whereas the maximum Odour score (7.25) was found in control at 0 Days.

At 5 Days, it is evident from the data that the maximum odour score in fresh cut kiwi (8.57) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% + Aloe vera Gel 40%.Whereas the Odour score (6.22) was found in control at 5 Days.

At 10 Days, it is evident from the data that the maximum Odour score in fresh cut kiwi (7.73) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5%.

At 15 Days, it is evident from the data that the maximum odour score in fresh cut kiwi (6.41) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1% + Aloe vera Gel 40% and (CMC) 1.5% + Aloe vera Gel 30%.

At 20 Days, it is evident from the data that significantly, the maximum odour score in freshly cut kiwi (6.13) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3) and Aloe vera Gel 40% (T_4). Which was at par with treatment (CMC) 1.5% + Aloe vera Gel 40% and (CMC) 1.5%.

2.4 Texture Score

It is evident from the data that significantly, the maximum texture score in fresh cut kiwi (8.84) was noted in the edible film coating with treatments Aloe vera

Gel 30% (T_3). Which was at par with treatment (CMC) 1.5%. Whereas the maximum texture score (7.22) was found in control at 0 Days.

At 5 Days, it is evident from the data that the maximum texture score in fresh cut kiwi (8.53) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1% + Aloe vera Gel 30% and (CMC) 1.5% + Aloe vera Gel 40%.Whereas the texture score (6.17) was found in control at 5 Days.

At 10 Days, it is evident from the data that the maximum texture score in fresh-cut kiwi (6.37) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% + Aloe vera Gel 30% and (CMC) 1% + Aloe vera Gel 40%.

At 15 Days, it is evident from the data that significantly, the maximum texture score in freshly cut kiwi (6.09) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3) and Aloe vera Gel 40% (T4). Which was at par with treatment (CMC) 1% and (CMC) 1% + Aloe vera Gel 30%.

At 20 Days, it is evident from the data that the maximum texture score in fresh-cut kiwi (4.89) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% +Aloe vera Gel 40% and (CMC) 1%.

2.5 Overall Acceptability Score

It is evident from the data that significantly, the maximum overall acceptability score in fresh cut kiwi (8.90) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5%. Whereas the maximum overall acceptability (7.52) was found in control at 0 Days.

At 5 Days, it is evident from the data that the maximum overall acceptability in fresh cut kiwi (8.59) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% + Aloe vera Gel 40%. Whereas the overall acceptability (6.24) was found in control at 5 Days.

At 10 Days, it is evident from the data that the maximum overall acceptability in fresh cut kiwi (7.42) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with the treatment Aloe vera Gel 40%.

At 15 Days, it is evident from the data that the maximum overall acceptability in fresh cut kiwi (6.36) was significantly noted in the edible film coating with treatments Aloe vera Gel 30% (T_3). Which was at par with treatment (CMC) 1.5% + Aloe vera Gel 30% and (CMC) 1% +Aloe vera Gel 40%.

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At 20 Days, it is evident from the data that significantly, the maximum overall acceptability in freshly cut kiwi (5.85) was noted in the edible film coating with treatments Aloe vera Gel 30% (T_3) and Aloe vera Gel 40% (T_4). Which was at par with treatment (CMC) 1.5% and (CMC) 1.5% + Aloe vera Gel 40%.

Higher sensory quality of Aloe vera gel-coated apple slices compared to the uncoated ones was also reported by **Chauhan *et al.* (2011)** and **Song *et al.* (2013)** and in kiwi fruits slices **(Benitez *et al.* 2013)** and freshly cut orange **(Radi *et al.* 2017)**.

The colour, taste, odour, texture and overall acceptability of these cut slices of fruits were relatively maintained good up to 20 days of storage period. This may be due to the protective, antifungal and barrier effects of Aloe vera, however, the non-coated samples received fewer scores which may be due to high shrinkage, less colour, low quality and fungal deterioration after 5 days of storage.

Table 2:- Effect of different edible film coating to extend the shelf life on Yeast and Mould Count, Total Bacterial Count (log CFU/g) and spoilage percentage of fresh cut kiwi cv. (Hayward) during storage at 4 ^{o}C refrigerator condition at 0 days, 10 days and 20 days.

Treatment No.	Treatments Details	Yeast and Mould Count (log CFU/g)			Total bacterial count (log CFU/g)			Spoilage percentage (%)		
		0 Days	10 Days	20 Days	0 Days	10 Days	20 Days	0 Days	10 Days	20 Days
T_0	Control	4.15	4.59	5.17	2.44	5.83	7.82	0.00	80.00	93.33
T_1	Carboxymethyl cellulose 1%	2.25	3.06	3.46	2.26	5.12	6.09	0.00	26.67	33.33
T_2	Carboxymethyl cellulose 1.5%	2.74	3.74	3.99	2.07	4.27	5.19	0.00	33.33	40
T_3	**Aloe vera Gel 30%**	**1.34**	**1.83**	**2.07**	**1.21**	**2.52**	**3.38**	**0.00**	**6.67**	**13.33**
T_4	Aloe vera Gel 40%	1.48	2.07	2.31	1.35	2.86	3.41	0.00	13.33	20
T_5	Carboxymethyl Cellulose 1% + Aloe vera Gel 30%	2.17	2.74	3.09	1.96	3.27	5.07	0.00	26.67	33.33
T_6	Carboxymethyl Cellulose 1.5% + Aloe vera Gel 30%	2.00	2.44	2.74	1.82	3.07	4.74	0.00	13.33	26.66
T_7	Carboxymethyl Cellulose 1% + Aloe vera Gel 40%	1.79	2.17	2.63	1.43	2.91	4.32	0.00	13.33	26.66
T_8	Carboxymethyl Cellulose 1.5% + Aloe vera Gel 40%	2.52	3.24	3.52	2.16	5.21	5.29	0.00	20.00	33.33
F-Test		**S**	**S**	**S**	**S**	**S**	**S**	**-**	**S**	**S**
S.Ed. (+)		**0.079**	**0.103**	**0.121**	**0.055**	**0.238**	**0.155**	**-**	**9.162**	**8.607**
C.D. at 0.5%		**0.168**	**0.218**	**0.257**	**0.116**	**0.504**	**0.329**	**-**	**19.424**	**18.245**
C.V.		**4.276**	**4.384**	**4.611**	**3.605**	**7.477**	**3.796**	**-**	**43.28**	**29.64**

Table 3:- The mean score for sensory evaluation of different edible film coating of fresh cut kiwi cv. (Hayward) during storage at 4 ^{o}C refrigerator condition.

Treatment No.	Colour score					Taste score				
	0 Days	5 Days	10 Days	15 Days	20 Days	0 Days	5 Days	10 Days	15 Days	20 Days
T_0	7.88	6.28	-	-	-	7.71	6.29	-	-	-
T_1	8.75	8.27	6.93	5.97	5.49	8.78	8.29	6.96	6.00	5.52
T_2	8.42	8.22	7.27	5.75	5.63	8.44	8.24	7.29	5.77	5.65
T_3	**8.92**	**8.61**	**7.77**	**6.45**	**6.17**	**8.94**	**8.65**	**7.79**	**6.47**	**6.19**
T_4	8.83	8.60	7.42	6.31	6.17	8.85	8.62	7.44	6.34	6.19
T_5	8.57	8.48	7.02	6.06	5.94	8.60	8.51	7.04	6.08	5.97
T_6	8.68	8.15	7.06	6.10	6.01	8.72	8.18	7.09	6.14	6.05
T_7	8.75	8.21	7.14	6.18	6.12	8.78	8.25	7.18	6.22	6.16
T_8	8.68	8.38	6.91	5.82	5.74	8.71	8.40	6.94	5.86	5.77
F-Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
S.Ed. (±)	**0.165**	**0.042**	**0.182**	**0.073**	**0.127**	**0.165**	**0.047**	**0.208**	**0.124**	**0.181**
C.D. at 0.5%	**0.349**	**0.088**	**0.386**	**0.154**	**0.270**	**0.349**	**0.101**	**0.441**	**0.263**	**0.385**
C.V.	**2.372**	**0.628**	**3.488**	**1.642**	**2.969**	**2.361**	**0.626**	**3.473**	**1.635**	**2.954**

Table 4:- The mean score for sensory evaluation of different edible film coating of fresh cut kiwi cv. (Hayward) during storage at 4 ^{o}C refrigerator condition.

Treatment No.	Odour score					Texture score					Overall acceptability				
	0 Days	5 Days	10 Days	15 Days	20 Days	0 Days	5 Days	10 Days	15 Days	20 Days	0 Days	5 Days	10 Days	15 Days	20 Days
T_0	7.25	6.22	-	-	-	7.22	6.17	-	-	-	7.52	6.24	-	-	-
T_1	8.71	8.23	6.89	5.93	5.45	8.66	8.18	5.88	5.40	4.59	8.73	8.24	6.67	5.83	5.26
T_2	8.38	8.18	7.23	5.71	5.59	8.33	8.14	5.67	5.54	5.01	8.39	8.20	6.87	5.69	5.47
T_3	**8.88**	**8.57**	**7.73**	**6.41**	**6.13**	**8.84**	**8.53**	**6.37**	**6.09**	**4.89**	**8.90**	**8.59**	**7.42**	**6.36**	**5.85**
T_4	8.79	8.55	7.38	6.27	6.13	8.74	8.51	6.23	6.08	4.79	8.80	8.57	7.12	6.25	5.82
T_5	8.53	8.44	6.98	6.02	5.90	8.49	8.40	5.97	5.86	4.64	8.55	8.46	6.75	6.01	5.61
T_6	8.64	8.10	7.01	6.06	5.97	8.60	8.06	6.02	5.93	4.66	8.66	8.12	6.80	6.06	5.67
T_7	8.71	8.17	7.10	6.14	6.08	8.66	8.13	6.10	6.04	4.72	8.73	8.19	6.88	6.15	5.77
T_8	8.63	8.34	6.86	5.78	5.69	8.59	8.30	5.74	5.65	4.57	8.65	8.36	6.61	5.78	5.44
F-Test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
S.Ed. (±)	**0.210**	**0.089**	**0.212**	**0.114**	**0.156**	**0.213**	**0.058**	**0.158**	**0.127**	**0.225**	**0.203**	**0.112**	**0.182**	**0.109**	**0.146**
C.D. at 0.5%	**0.445**	**0.189**	**0.449**	**0.242**	**0.331**	**0.452**	**0.124**	**0.334**	**0.270**	**0.478**	**0.430**	**0.237**	**0.385**	**0.231**	**0.308**
C.V.	**2.384**	**0.631**	**3.508**	**1.655**	**2.991**	**2.396**	**0.635**	**3.571**	**1.666**	**3.012**	**2.379**	**0.630**	**3.496**	**1.650**	**2.981**

Conclusion

It is concluded that the effect of Treatment T_3 i.e., AVG 30% were found to be best in terms of physical attributes i.e., It is concluded that effect of Treatment T_3 i.e., AVG 30%weres found to be best terms i.e., Yeast and mould count (log CFU/g) (2.07), Total bacterial count (log CFU/g) (3.38) and Spoilage (%) (13.34%) i.e., sensory attributes i.e., Colour score (6.17), Taste score (6.19), Odour score (6.13), Texture score (4.89) and Overall acceptability (5.85) Aloe vera gel coating **T_3** preserved the fresh like quality of kiwi fruits. Extending the shelf life of fresh-cut Kiwi fruits up to 20 days at 4ºC refrigerator condition was achieved.

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Abbreviations:- CMC - Carboxymethyl Cellulose, AVG - Aloe vera gel