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Application of Natural Polymer as a Fruit Coater to Reduce Post Harvest Losses of Grapes

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Abstract: ***The natural coater was prepared with the application of mucilage powder along with protein, lipid complexes. The natural coater prepared from Parkia biglandulosa, Bombax ceiba, Spathodea campanulata and Muntingia calabura mucilage improves the water content, relative water content, succulence and osmotic potential of grape fruits, this will helpful to maintain the turgidity of fruits. Turgidity is a sign quinon of freshness of vegetables and fruits. The application of various concentrations of natural coater to grape fruit significantly improves the turgidity and water content of fruits. This will helps to maintain the freshness and shelf life of grape berries. Thus, the application of mucilage as a natural polymers, extracted from the waste flowers, fruits and leaves of these avenue roadside plants would be helpful in maintaining the quality of harvested fruits as well as it might be helpful to reduce the losses caused during post harvest transport.***

Keywords: Osmotic Potential, Relative water content, Succulence

1. Introduction

The plant polysaccharides as mucilage are mostly applied in various industries such as paper, textile, food, pharmaceuticals, ink, cosmetics, petroleum (Carlin *et al*,.2001). In view of Rishabha *et al*,. (2011) the concentration of total tablet weight mucilage form 1 to 10% function as binder and above it they become effective as disintegrant, and this is used as an important parameter to determine the application of mucilage in particular formulation. According to Patil (2010), *Cydonia vulgaris* mucilage applicable as a super disintegrant in tablet configuration also utilized binder for the sake of its viscous drift at the time when comes in contact with water. Mucilage from *Asparagus racemosus* and *Cassia sophera* was applied as binding agents in tablet formulations and found suitable binders for tablets as compaired to uncoated tablets (Carlin *et al*,.2001). They reported that biological materials applied as packaging material include polysaccharides, proteins, lipids and their derivatives polysaccharides, cellulose derivatives, chitosan, starch, alginate, carrageenan and pectin. These are mostly preferred because of their film forming ability hence progress made in the area of food processing is noticeable (Carlin *et al*,.2001). Appropriate pre - cooling methods as well as appropriate storage temperature and humidity for a number of fruits and vegetables were already documented. The application of edible coatings is to extend the shelf life of fresh and primarily processed food products. It can be regulated by applying moisture, oxygen, carbon dioxide, in a food system. The nature of coatings improves the quality of food and prolongs shelf life of foods.

2. Material and Method

Coating of raisins was done as per the method of Carlin *et al., (*2001). The absolute alcohol (20 ml) and 2ml rapeseed oil were taken in beaker and keep it on a water bath until it is dissolved. The absolute alcohol (20 ml) and dry mucilage powder of inflorescence of *Parkia biglandulosa*, flowers of *Bombax ceiba*, *Spathodea campanulata* and fruits of *Muntingia calabura* were added to it slowly by stirring with a glass rod. The potassium meta bi - sulfate, ascorbic acid, benzoic acid (0.1 g of each) in different beakers were dissolved in the 10ml of absolute alcohol and slowly added all above solutions in a corn zein solution, cooled to room temperature. The grape berries were mixed in 500ml of beaker containing coating solution with slow shaking and dried on a blotting paper for half an hour. The coated fruits were kept at room temperature and at 10 ^{0}C in fridge for 1, 2, 4, 8, and 12 days. The dry weights were taken after every 1st day, 4th day, 8th day and 12th day and used for calculation of water content, Relative water content, Succulence and Osmotic potential were calculated according to method described by Water content Weatherly (1965), Succulence by (Klug and Ting 1978), Relative water content (RWC) by Slatyer (1955) and Osmotic potential by Janardhan and Krishnmoorthy (1975).

3. Result and Discussion

The effect of natural coating of mucilage on post harvest storage of Grape is shown in fig no 36 to 47 and table no 43, 44, 45 and 46. It is evident from table that the water content, relative water content, succulence and osmotic potential is signfiantly increased due to coating of mucilage. It is also noticed that the fresh fruits of grape coated with mucilage kept in fridge and room temperature maintain better turgidity and water relations, than the uncontrolled coated fruits. According to Wang et al. (2001), the edible coatings are considered as one of the potential approaches to avoid the losses of vegetables. The natural polymers as edible coatings, serves as a carrier for antimicrobial compounds and / or antioxidants compounds in order to maintain high concentrations of preservatives on the food surfaces (Tihminlioglu et al., 2010 and Wapnir et al., 1990). Use of antimicrobial protein films as an antimicrobial agents is incorporated into food. corn - zein film coating results in beneficial effects on internal O_2 composition for inhibitibg microbial growth in addition, edible coatings can carry functional ingredients such as antioxidants, antimicrobials, to enhance food stability, quality (Li - Chan 1996).

The natural coater was prepared with the application of mucilage powder along with protein, lipid complexes the natural coater prepared from *Parkia biglandulosa*, *Bombax ceiba*, *Spathodea campanulata* and *Muntingia calabura* mucilage improves the water content, relative water content, succulence and osmotic potential of grape fruits. This will helpful to maintain the turgidity of fruits. Turgidity is a sign quinon of freshness of vegetables and fruits the application of various concentrations of natural coater to grape fruit significantly improves the turgidity and water content of fruits. This will helps to maintain the freshness and shelf life of these fruits. Thus, the application of mucilage as a natural polymers, extracted from the waste flowers, fruits and leaves of these avenue roadside plants would be helpful in maintaining the quality of harvested fruits, as well as it might be helpful to reduce the losses caused during post harvest transport and it will post pond the deterioration of these fruits during storage and transport.

4. Conclusion

The natural polymers are cheaper, biodegradable and easily available which will reduce the biocompatibility and biomagnifications of synthetic chemicals. These polymers also increase the period of shelf life which will be found beneficial for the storage of post preserveable fruits and vegetables. Thus, the present work will be helpful to know the sources of plant based natural polymers, which can be very easily utilized by pharmaceutical, cosmetic, textile and agricultural industries.

5. Acknowledgement

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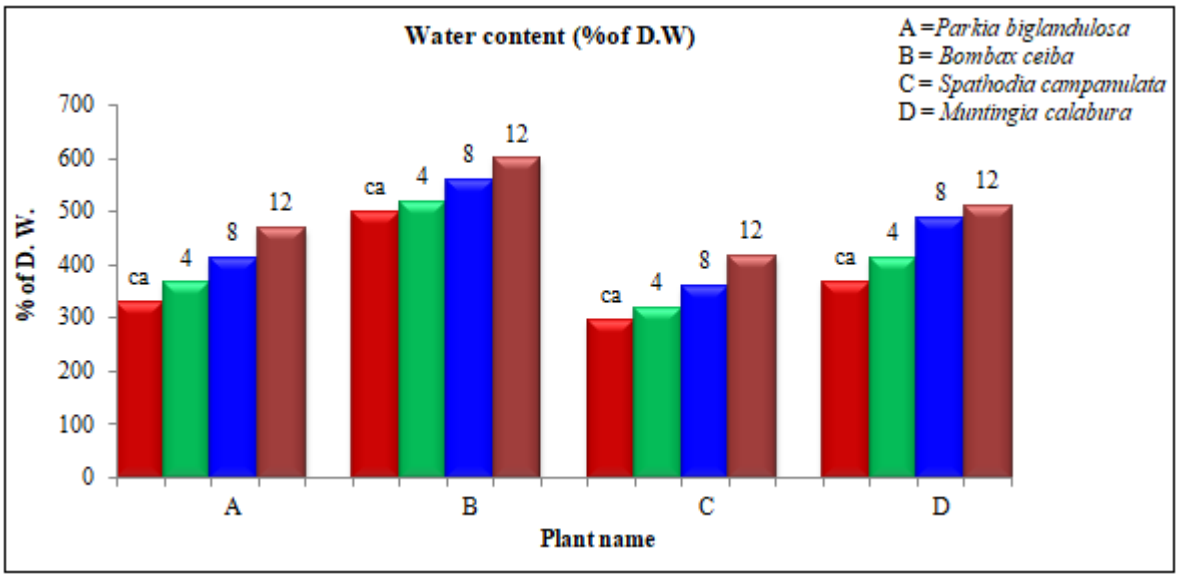

Figure 36: Effect of Mucilage extract on Post harvest shelf life of Grape berries stored in fridge

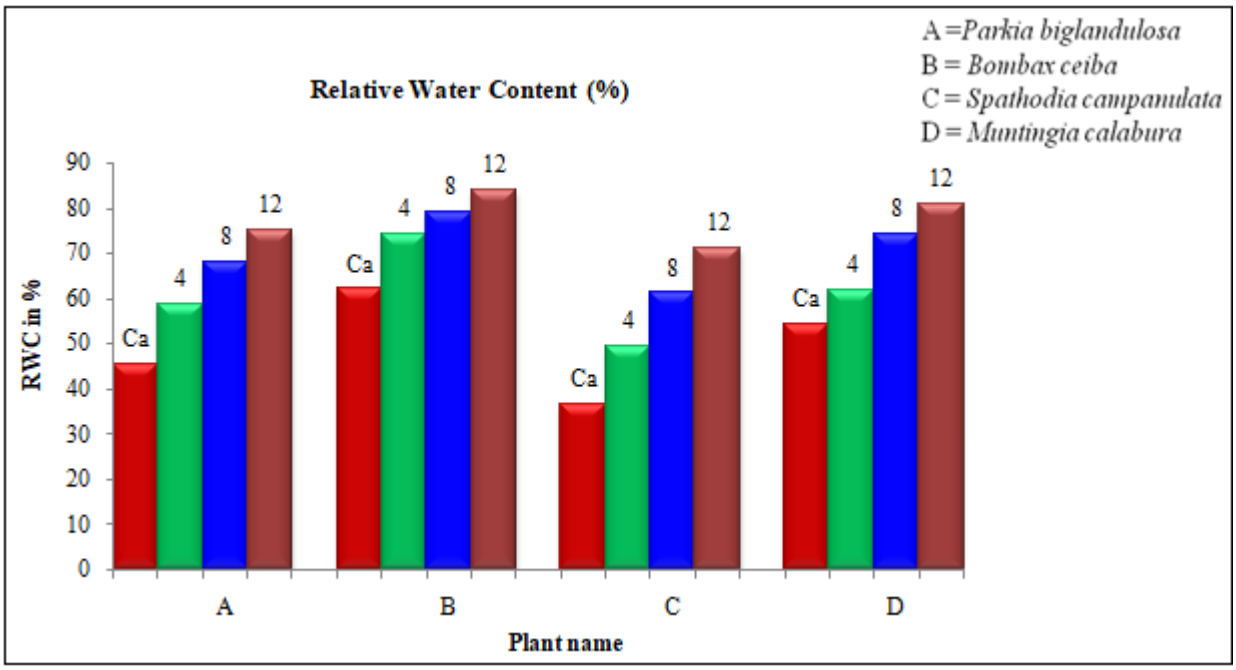

Figure 37: Effect of Mucilage extract on Relative water content of Grape berries stored in fridge

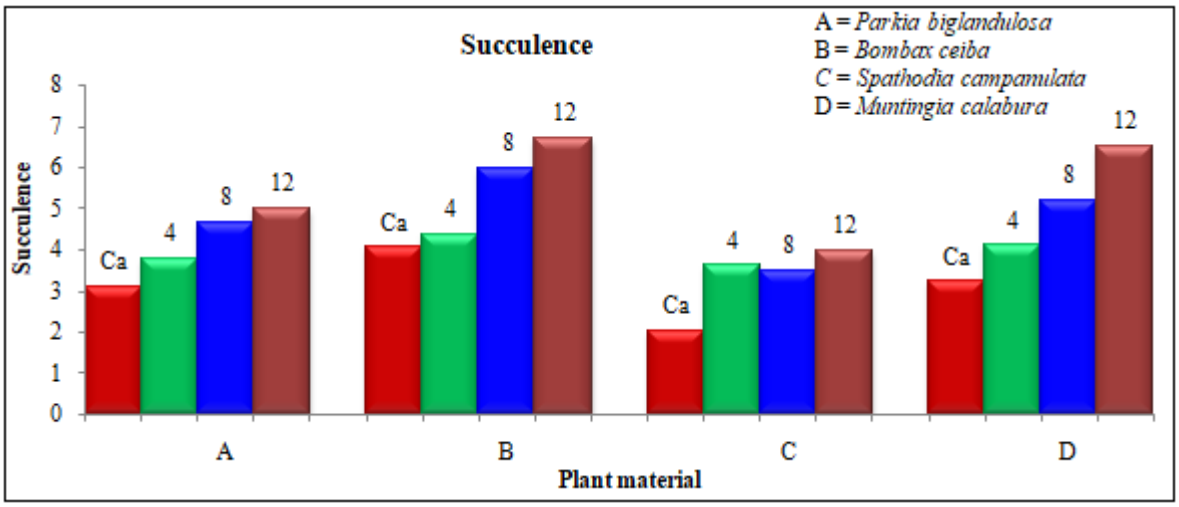

Figure 38: Effect of Mucilage extract on Succulence of Grape berries stored in fridge

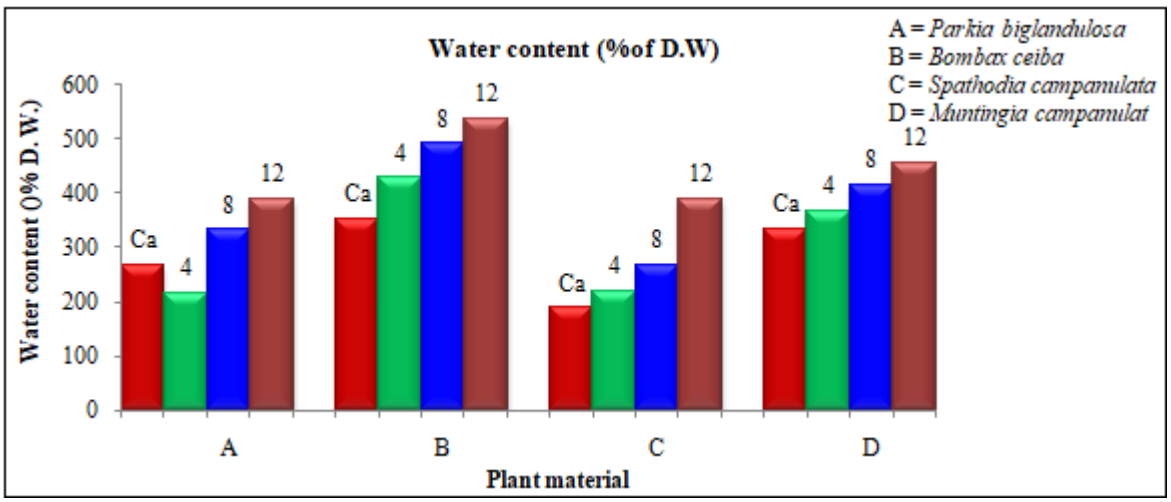

Figure 39: Effect of Mucilage extract on Post harvest shelf life of Grape berries stored at room temperature.

Figure 40: Effect of Mucilage extract on Relative Water content in Grape berries stored at room temperature.

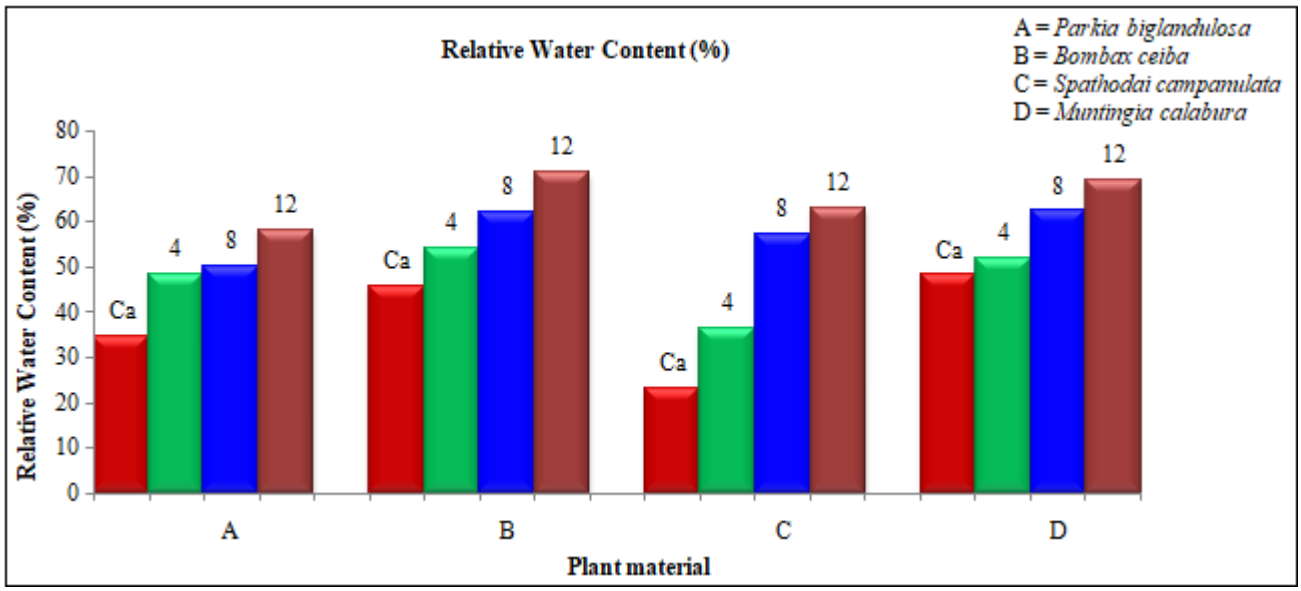

Figure 41: Effect of Mucilage extract on Succulence coating on Grapes berries stored at room temperature.

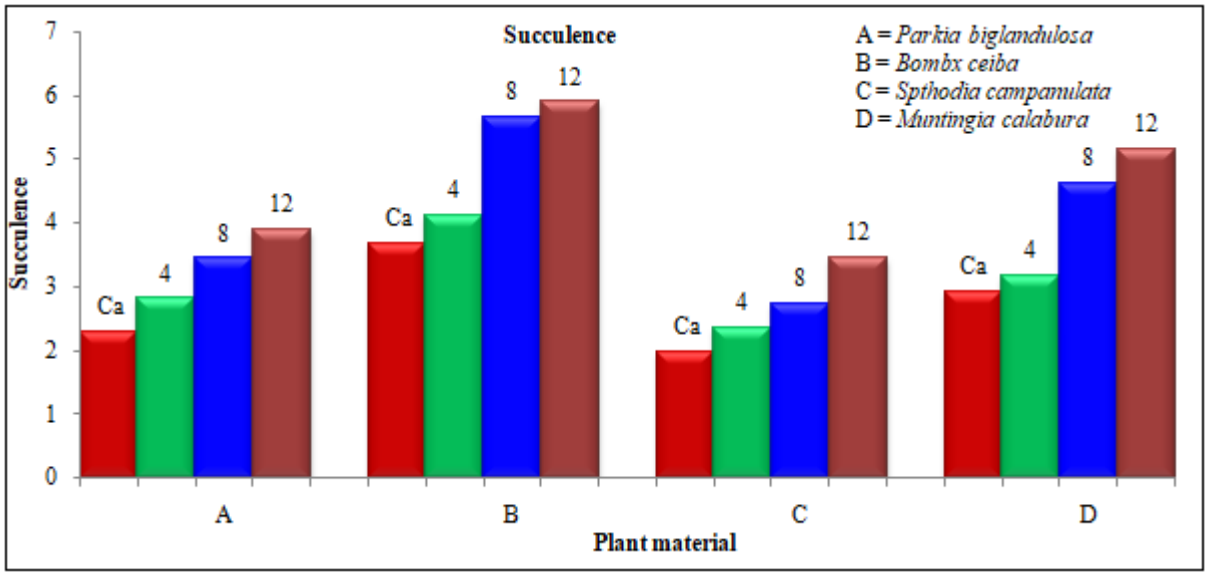

Figure 43: Effect of Mucilage extract coating on Grapes berries stored in fridge

Treatment EC (mS cm $^{-1}$)	*Parkia biglandulosa*				*Bombax ceiba*				*Spathodia campanulata*				*Muntingia calabura*			
	Control	4	8	12	Control	4	8	12	Control	4	8	12	Control	4	8	12
Water content (% of D. W.)	329	365	412	468	498	516	559	598	294	318	358	416	368	412	486	509
Relative Water Content (%)	45.52	58.60	68.01	75	62.02	74.36	79	84	36.55	49.28	61.22	71	54.32	62	74.19	81.04
Succulance	3.09	3.76	4.64	4.99	4.05	4.36	5.98	6.72	2.02	3.61	3.49	3.98	3.22	4.1	5.2	6.53
Osmotic potential	- 12.36	-12.54	-12.61	-12.74	-14.02	-13.07	-13.43	-13.79	-11.34	-11.67	-12.6	-12.48	-11.45	-12.18	-12.60	-13.01

Table 44: Effect of Mucilage extract coating on Grapes berries stored at room temperature.

Treatment EC (mS cm $^{-1}$)	*Parkia biglandulosa*				*Bombax ceiba*				*Spathodia campanulata*				*Muntingia calabura*			
	Control	4	8	12	Control	4	8	12	Control	4	8	12	Control	4	8	12
Water content (% of D. W.)	268	217	332	388	352	428	491	538	188	219	268	388	344	367	414	455
Relative Water Content (%)	34.60	48.17	50.02	58	45.61	54	62	71	23.12	36.28	57.32	62.87	48.12	52	62.19	69.06
Succulance	2.28	2.81	3.44	3.89	3.67	4.12	5.65	5.89	1.98	2.36	2.74	3.46	2.91	3.16	4.62	5.16
Osmotic potential	- 9.12	- 9.54	- 10.26	- 11.39	- 13.23	- 12.57	- 13.00	- 13.14	- 10.09	- 11.23	- 11.69	- 11.97	- 11.12	- 11.44	- 12.09	- 13.19