探討海藻酸鹽可食膜對保存蔬果品質之成效

江少槿(5129)

1/7/2015

大綱

一、前言

二、海藻酸鹽可食膜對採收後四品種李子的品質維持效果

三、以抗菌及抗酵素性褐變膜作為提升竹筍品質之包膜

四、以海藻酸鹽為基底之多層抗菌可食膜來提升切片西瓜保質期

五、結論

摘要

可食膜（edible film）可以降低採收後蔬果及切片水果於運送、儲存及販賣期間的品質損失及保持外觀的完整性，並延長保質期。而褐藻萃取物–海藻酸鹽(alginate)，因其獨特的膠體特性能有良好的包覆能力，可用來作為可食膜材料。因此，本篇報告將探討海藻酸鹽製成可食膜包覆於蔬果表面，在不影響其品質特性下延長蔬果保質期的成效。將採收後的四種不同品種李子浸潤於 1% 及 3% 海藻酸鹽溶液中，並分別儲存在 2°C 下 7、14、21、28、35 天及 20°C 下 3 天，可發現以 3% 海藻酸鹽處理的組別，其乙烯生成量明顯較低，而海藻酸鹽能明顯延緩李子重量降低及酸度損失、軟化、顏色改變等成熟現象。而混合不同比例的海藻酸鹽及澱粉 (2:0 (F_1)、2:1 (F_2)、1:1 (F_3)、1:1.5 (F_4)、1:2 (F_5)、0:2 (F_6))，同時添加與澱粉相同量的 15% 羧甲基纖維素 (carboxymethyl cellulose, CMC) 以製成可食膜溶液，並探討相關物化特性。其中以 F_5 組別有最佳阻隔性、機械性及熱穩定性，進一步於 F_5 組別中添加抗氧化及抗菌萃取物，並包覆於竹筍表面儲存五天。實驗中觀察到此膜可以有效降低竹筍表面的褐變，對於表面抑菌能力也有良好成效，而且相較於未包覆的組別有較少的水分損失。而利用層疊的浸潤技術，將切片西瓜分別依次浸潤於海藻酸鹽 (0.5、1、2 g/100 g)、天然抗菌劑 β-環狀糊精 (β-cyclodextrin) 及反式肉桂醛 (*trans*-cinnamaldehyde)、果膠、乳酸鈣中，儲存於 4°C 下 15 天，於每 1、3、7、12 及 15 天觀察切片西瓜質地、顏色、重量損失、微生物生長量及消費者接受性。結果發現，浸泡海藻酸鈉 1、2 g/100 g 的組別皆能使切片西瓜保質期從原本的 7 天增加至 12-15 天，而消費者接受性的部分除了以海藻酸鈉 2 g/100 g 處理的組別外，都有很高的接受度。由以上結果可得知，以海藻酸鹽製成的可食膜包覆於採收後及切片的蔬果表面，可以有效延長蔬果的保質期，而不會影響其品質。

參考文獻

Alandes, L., Perez-Munuera, I., Llorca, E., Quiles, A., & Hernando, I. (2009).Use of calcium lactate to improve structure of “Flor de Invierno” fresh-cut pears. *Postharvest Biology and Technology, 53*, 145–151.

Cevallos-Casals, B. A., Byrne, D., Okie, W. R.,&Cisneros-Zevallos, L. (2006).Selecting new peach and plum genotypes rich in phenolic compounds and enhanced functional properties. *Food Chemistry, 96*, 273–280.

Daniel V., Huertas M. D., Pedro J. Z., Fabian G., Domingo M., Salvador C.,&Maria S. (2013).Effects of alginate edible coating on preserving fruit quality in four plum cultivars during postharvest storage.*Postharvest Biology and Technology*, *77*,1–6.

Das, D. K., Dutta, H., & Mahanta, C. L. (2013). Development of a rice starch-based coating with antioxidant and microbe-barrier properties and study of its effect on tomatoes stored at room temperature. *LWT – Food Science and Technology, 50*, 272–278.

Diaz-Mula, H. D., Serrano, M.,& Valero, D. (2012). Alginate coatings preserve fruit quality and bioactive compounds during storage of sweet cherry fruit. *Food and Bioprocess Technology, 5*, 2990–2997.

Garcia, M. A., Martino, M. N.,&Zaritzky, N. E. (1998). Starch-based coatings: effect on refrigerated strawberry (Fragariaananassa) quality. *Journal of the Science of Food and Agriculture, 76*, 411–420.

Gilbert, R. J., de Louvois, J., Donovan, T., Little, C., Nye, K., Ribeiro, C. D., et al. (2000). Guidelines for the microbiological quality of some ready-to-eat foods sampled at the point of sale. A working group of the PHLS Advisory Committee for Food and Dairy Products.*Communicable Disease and Public Health (CDPH), 3*, 163-167.

Maftoonazad, N., Ramaswamy, H. S., & Marcotte, M. (2008). Shelflife extension of peaches through sodium alginate and methyl cellulose edible coatings. *International Journal of Food Science and Technology, 43*, 951-957

Laxmikant S. B.,Pallab K. B., & Sankar C. D. (2014).Antimicrobial and enzymatic antibrowning film used as coating for bamboo shoot quality improvement.*Carbohydrate Polymers, 103*, 213– 220.

Park, E. J., & John, D. Y. (2010). The antioxidant, angiotensin converting enzymeinhibition activity, and phenolic compounds of bamboo shoot extracts. *LWT –Food Science and Technology, 43*, 655–659.

Rachtanapun, P., & Tongdeesoontorn, W. (2009). Effect of antioxidants on propertiesof rice flour/cassava starch film blends plasticized with sorbitol. *KasetsartJournal(Natural Science), 43*, 252–258.

Reinoso, E., Mittal, G. S.,& Lim, L. T. (2008). Influence of whey protein composite coatings on plum (Prunusdomestica L.) fruit quality. *Food and Bioprocess Technology, 1*, 314–325.

Rojas-Grau, M. A., Soliva-Fortuny, R., & Martin-Belloso, O. (2009). Edible coatings to incorporate active ingredients to fresh-cut fruits: a review. *Trends in Food Science and Technology, 20*, 438–447.

Ruoyi, K., Zhifang, Y.,& Zhaoxin, L. (2005).Effect of coating and intermittent warming on enzymes, soluble pectin substances and ascorbic acid of Prunuspersica (cv. Zhonghuashoutao) during refrigerated storage.*Food Research International, 38*, 331–336.

SipahiR.E., Castell-Perez M.E., Moreira R. G., Gomes C., &Castillo A. (2013).Improved multilayered antimicrobial alginate-based edible coating extends the shelf life of fresh-cut watermelon (Citrulluslanatus). *LWT - Food Science and Technology, 51*, 9-15.

Tapia, M. S., Rojas-Grau, M. A., Carmonac, A., Rodriguez, F. J., Soliva-Fortuny, R., & Martin-Belloso, O. (2008).Use of alginate- and gellan-based coatings for improving barrier, texture and nutritional properties of fresh-cut papaya.*Food Hydrocolloids, 22*, 1493e1503.

Valero, D.,& Serrano, M. (2010).*Postharvest Biology and Technology for Preserving Fruit Quality.*CRC-Taylor & Francis, Boca Raton, USA.

Wild D., H. P. J., Balk, P. A., Fernandes, E. C. A., & Peppelenbos, H. W. (2005). The action site of carbon dioxide in relation to inhibition of ethylene production in tomato fruit.*Postharvest Biology and Technology, 36*, 273–280.

Zapata, P. J., Guillen, F., Martinez-Romero, D., Castillo, S., Valero, D., & Serrano, M. (2008). Use of alginate or zein as edible coatings to

delay postharvest ripening process and to maintain tomato (Solanum lycopersicon Mill) quality. *Journal of the Science of Food and Agriculture , 88*, 1287–1293.