Agricultural Sci. J. 50 : 3 (Suppl.) : 111-114 (2019) ว. วิทย. กษ. 50 : 3 (พิเศษ) : 111-114 (2562)

ผลของการจุ่มน้ำร้อนต่อการรักษาคุณภาพของผักชี
Effect of Hot Water Dip Treatment on Quality Maintaining of Coriander

จิรัชฌา ศุภชูชัย[1] โคเฮอิ นากาโนะ[2] ไดมอนท์ ซูครี[3] นภัสวรรณ เลี่ยมนิมิตร[4] และ ผ่องเพ็ญ จิตอารีย์รัตน์[1]
Jirutcha Supphachuchai [1], Nakano Kohei [2], Daimon Syukri [3], Napasawan Liamnimitr [4] and Pongphen Jitareerat [1]

Abstract

This research aimed to study the effect of hot water (HW) dip on quality of coriander. Corianders were washed, cut and divided into 3 groups: 1) dipped in hot water at 45°C for 90 seconds (45°C /90 sec), 2) dipped in hot water at 50°C for 90 seconds (50°C /90 sec), and 3) non-dipped (control). HW dipped corianders were then immersed in cold water at 15°C for 1 min before draining the excessed water, and packed in perforated polyethylene (PE) bag. All samples were stored at 5°C for 14 days. Hot water dipping could delay the change of yellowing as indicated by b* value and chlorophyll content when compared with the control. Particularly, dipping in HW at 45°C /90 sec could delay the decrease of antioxidant capacity (diphenylpi-cryhydrazyl, DPPH) of coriander during storage. However, HW dip of both temperatures resulted to reduce total phenolic compounds.
Keywords: Coriander, Chlorophyll, Hot water

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลของการจุ่มน้ำร้อนต่อคุณภาพของผักชีตัดแต่ง นำผักชีมาล้าง ตัดแต่งและแบ่งออกเป็น 3 กลุ่ม 1) จุ่มน้ำร้อน อุณหภูมิ 45 องศาเซลเซียส เป็นเวลา 90 วินาที (45°C /90 sec) 2) จุ่มน้ำร้อน อุณหภูมิ 50 องศาเซลเซียส เป็นเวลา 90 วินาที (50°C /90sec) และ 3) ไม่จุ่มน้ำร้อน (ชุดควบคุม) ผักชีที่จุ่มน้ำร้อนจะทำการลดอุณหภูมิโดยจุ่มในน้ำเย็นอุณหภูมิ 15 องศาเซลเซียส เป็นเวลา 1 นาที และสะเด็ดน้ำก่อนบรรจุลงในถุง polyethylene (PE) ที่ เจาะรู จากนั้นเก็บที่อุณหภูมิ 5 องศาเซลเซียส นาน 14 วัน พบว่าผักชีที่จุ่มในน้ำร้อน สามารถชะลอการเปลี่ยนแปลงค่าสีเหลือง (b* value) และชะลอการลดลงของปริมาณคลอโรฟิลล์ได้เมื่อเทียบกับชุดควบคุม โดยเฉพาะการจุ่มน้ำร้อนที่ 45°C/90 sec มีผลชะลอการลดลงของฤทธิ์การต้านอนุมูลอิสระ DPPH ของผักชีในระหว่างการเก็บรักษาได้ แต่การจุ่มน้ำร้อนทั้งสองอุณหภูมิมีผลทำให้ปริมาณสารประกอบฟีนอลลดลง
คำสำคัญ: ผักชี คลอโรฟิลล์ การจุ่มน้ำร้อน

Introduction

Coriander (*Coriandrum sativum*) is known as “Pak-Chii”, it is a popular herb used in Thai cuisine, such as Tom-Yam-Kung. When adding coriander to dishes, it won't just enhance the flavor, but also provided health benefits. It has been reported that coriander contains high antioxidants, such as total phenolic, tannin, and vitamin c (Fan *et al*., 2003; Chanwitheesuk *et al*., 2005). However, the coriander has shorter shelf-life due to the occurrence of yellowing caused by the chlorophyll degradation (Watkins, 2006). Moreover, the reduction of antioxidant and the occurring of off-odor were also observed during storage, especially if coriander was exposed to improper handling and poor storage condition. Nowadays, hot water treatment (HWT) has been reported to

[1] สาขาเทคโนโลยีหลังการเก็บเกี่ยว คณะทรัพยากรชีวภาพและเทคโนโลยี มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี (บางขุนเทียน) กรุงเทพฯ 10150
[1] Division of Postharvest Technology, School of Bioresources and Technology, King Mongkut's University of Technology Thonburi (Bangkhuntien), Bangkok, Thailand 10150
[2] สหบัณฑิตวิทยาลัยวิทยาศาสตร์การเกษตร มหาวิทยาลัยกิฟุ ประเทศญี่ปุ่น 501-1193
[2] The United Graduate School of Agricultural Science, Gifu University, 1-1 Yanagido, Gifu 501-1193, Japan
[3] คณะเทคโนโลยีผลิตภัณฑ์การเกษตร มหาวิทยาลัยราชมงคลศรีวิชัย มหาวิทยาลัยอันดาลาส ประเทศอินโดนีเซีย 25163
[3] Department of Agricultural Product Technology, Faculty of Agricultural Technology, Andalas University, Padang 25163, Indonesia
[4] คณะเกษตรศาสตร์ มหาวิทยาลัยราชมงคลศรีวิชัย (ไสใหญ่) นครศรีธรรมราช 80110
[4] Faculty of Agriculture, Rajamangala University of Technology Srivijaya (Saiyai), Nakorn Sri Thammarat, Thailand 80110

extend postharvest life of fresh produce such as banana treated hot water immersion at 51°C for 20 minutes inhibiting ethylene synthesis (Marisa, 2004) and the mei fruits treated with hot water at 47-53°C for 3 minutes inhibited activity of enzyme involved in chlorophyll (Lua, 2006) and mangoes treated hot water immersion at 50°C for 18 minutes can extending shelf life of through the regulation of a myriad of metabolic parameter including patterns of antioxidant and cell wall hydrolase genes and protein expression (Yimyong *et al*., 2011). Therefore, this research aimed to study the effect of hot water on the quality of coriander.

Materials and Methods

Corianders were purchased the wholesale market, Pathumthani province, Thailand. Corianders were washed with running tap water and the roots were removed by sharp scissors. Corianders were divided into 3 groups 1) non-dipping (control), 2) hot water dipping at 45°C for 90 sec (45°C/90 sec), and 3) hot water dipping at 50°C for 90 sec (50°C/90 sec). The treated samples were cooled down in cool water at 15°C for 60 sec., and removed the excessive water by hand spinner and then packed in perforated polyethylene (PE) bag with 8 holes (∅ 0.5 cm). All samples were stored at 5°C for 14 days. The quality of sample were conducted on day 0, 2, 6, 10 and 14. The yellow color (b* value), chlorophyll content (AOAC, 1990), total phenolic compounds (Swain and Hillis, 1959), diphenylpi-cryhydrazyl (DPPH) radical scavenging assay (modified from Pan *et al*., 2009; Bersuder *et al*.,1998; Li *et al*., 2007) were investigated. Each treatment had 5 replications and data were analyzed by duncan's multiple range tests (DMRT) with SAS.

Results and Discussion

The most important factor for decision to decline to buy the coriander is yellowness color of leaves can be detected and presented as b*value. Figure 1A shows the change of b*value (color) in coriander treated with different temperature of hot water. Hot Water dipping suppressed the increase of b* value (yellowness) comparing to non-dipping. This result was related to chlorophyll degradation. Chlorophyll content of HW treated samples was higher than the non-dipping samples (control) (Fig. 1B). This is in agreement with the previous findings show that heat treatment can preserve the chlorophyll content in green onion (Cantwell *et al*. (2001), broccoli heads (Dong *et al*. (2004) and Thai lime (Kaewsuksaeng *et al*. (2015). These results showed that HWT had the potential for retarding yellowing in fresh-cut coriander, especially HWT with 50°C for 90 sec in last day of storage. Figure 2 part of the phytonutrient we suggest that HWT with 50°C is significant when compare with non-dipping and after treated HWT the changes of total phenolic content and DPPH radical scavenging was slower. Hot water treatment is type of heating. (Howard, 1994) - When applying heat to the temperature will affect nutritional values and antioxidant properties. HWT is a process of applying heat with by using hot-water as an intermediary to stimulate the effect of enzyme lipoxygenase and enzyme polyphenol oxidase. If using hot temperature with longer time, heat accumulation will increase in the product. Hence, the most important key of HWT is to use right temperature and appropriate timing. Based on experiments, data showed that total phenolic was slightly decreased in day 2 after HWT treatment, which it was corresponding to the research of Pokorny *et al*. (2000). The reduction of the phenolic compounds can be occurred during the hydrolyzation when the compounds exposed to heat. Considering the antioxidant activity of DPPH, it could be observed that the use of HWT can slow down the loss of antioxidant compounds with a range of 6 days. In view of various plants, there are many kinds of antioxidant in form of covalent bond that are water-insoluble polymer (Peleg *et al*., 1991). For that reason, the use of HWT may result in cell wall destruction and a discharge of antioxidants, which increase the capacity of antioxidant properties. After day-6, the produces began the decay process and resulting in depreciation of total phenolic and antioxidant activity.

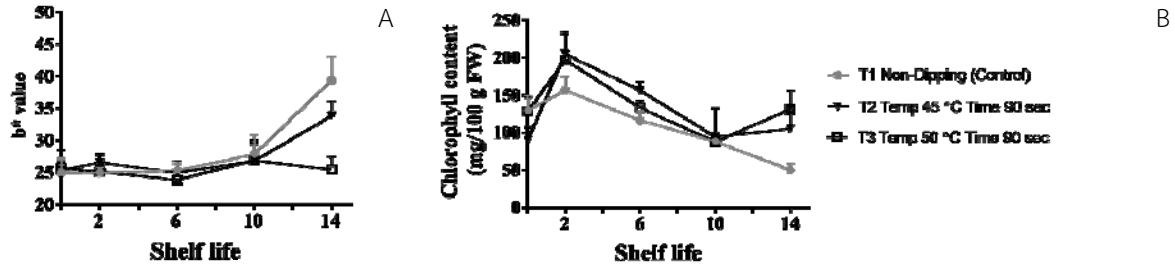

Figure 1 The color (b* value) and changes in chlorophyll content of fresh-cut coriander hot-water treatment under various conditions (1: Non-Dipping (control), 2: Dipping 45 ºC/60 sec, 3: Dipping 50 ºC/60 sec) were stored at 5 ºC for 14 days.

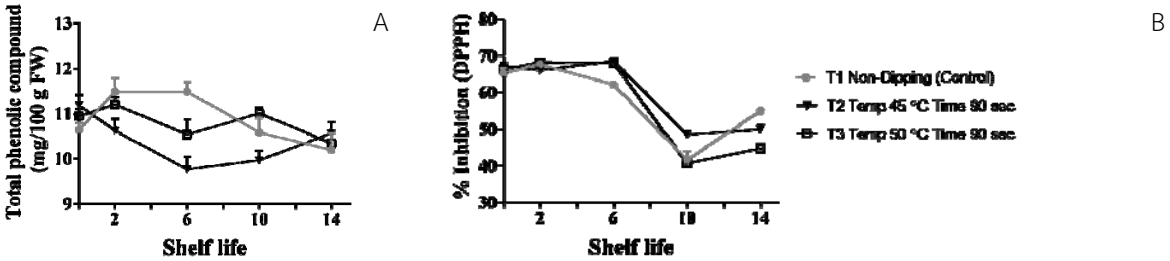

Figure 2 Total phenolic compound and Diphenylpi-cryhydrazyl (DPPH) radical scavenging assay of fresh-cut coriander hot-water treatment under various conditions (1: Non-Dipping (control), 2: Dipping 45 ºC/60 sec, 3: Dipping 50 ºC/60 sec) were stored at 5ºC for 14 days.

Summary

Hot-water treatment (HWT) for coriander at 50°C for 90 seconds, the stored at display shelf at temperature of 5°C, the results showed that the b*value remained relatively stable. This treatment could prolong chlorophyll content of the produce for 14 days. While the decaying of antioxidants, total phenolic and DPPH radical scavenging were slowing down after storage of 10 days and 6 days, respectively. Obviously, the above appropriate temperature in HWT process could extend the shelf- life and provided a highly positive relationship between antioxidant capacity and total phenolic content. The manufacturer can be applied this minimally process, because it could store shelf-life for 14 days, while maintaining excellent quality of trade and preserving the phytochemicals that are beneficial to consumers as well.

Acknowledgements

This research was financially supported by a grant from The United Graduate School of Agricultural Science (UG-SAS), Postharvest Engineering Laboratory, Gifu University, Japan and School of Bioresources and Technology, Postharvest Technology Division, King Mongkut's University of Technology Thonburi, Thailand.

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