POSTHARVEST PHYSIOLOGY OF SOME VEGETABLE CROPS

By

MONA IBRAHIM ABD EL-REHIM IBRAHIM

B.Sc. Agric. Sc. (Horticulture), Ain Shams University, 2003

M.Sc. Agric. Sc. (Vegetable Crops), Ain Shams Univ., 2008

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This thesis for Ph.D. degree has been approved by:

Dr. Samir Kamel El-Seifi .....……..…….
Prof. Emeritus of Production, Handling and Storage of Vegetable Crops, Faculty of Agriculture, Suez Canal University

Dr. Ibrahim Ibrahim Eloksh ……..…….
Prof. Emeritus of Vegetable Crops, Faculty of Agriculture, Ain Shams University

Dr. Ahmed Abou El-Yazied Abd El-Hafiez ……..…….
Prof. of Vegetable Crops, Faculty of Agriculture, Ain Shams University

Dr. Mamdouh Mohamed Fawzy Abdallah …..…..…….
Prof. Emeritus of Vegetable Crops, Faculty of Agriculture, Ain Shams University

Date of Examination: 12 / 11 / 2015

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Under the supervision of:

Dr. Mamdouh Mohamed Fawzy Abdallah

Prof. Emeritus of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University (Principal Supervisor)

Dr. Ahmed Abou El-Yazied Abd El-Hafiez

Prof. of Vegetable Crops, Department of Horticulture, Faculty of Agriculture, Ain Shams University

Dr. Rawia El-Bassiouny Ibrahim

Head of Research Emeritus of Vegetable Handling, Vegetable handling Research Dept., Horticulture Research Institute, Agricultural Research Center

ABSTRACT

Mona Ibrahim Abd El-Rehim: Postharvest Physiology of some Vegetable Crops. Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2015.

Baby pea (*Pisum sativum* L.) shoots and baby spinach (*Spinacia oleracea* L.) leaves as a new ready to eat baby leaf vegetable sprouts has a little information available about it, and since it is a fresh herb it have very short storage period after harvest. In this context we determined the effects of different passive modified atmosphere packaging applications for prolonging the shelf life of baby - pea shoots and baby spinach leaves. For baby pea shoot experiment, the performances of modified atmosphere packaging based on low density polyethylene (LDPE) film with different perforations (zero, 4 and 8 perforations/package) and different package sizes (size 1 25 × 20 cm and size 2 30 × 20 cm) was examined at different storage temperatures (0°C and 5°C) with 90-95% RH for 4, 8, 12, 16 and 20 days during storage.

As for baby spinach leaf experiment, the performances of modified atmosphere packaging based on low density polyethylene (LDPE) film or smart film in different package sizes (size 1 25 × 20 cm and size 2 30 × 20 cm) was examined at different storage temperatures (0-1°C and 4-5°C) with 90-95% RH for 4, 8, 12, 16 and 20 days during storage.

Some quality parameters, such as visual quality (graded to scale), decay, and off-odor, were evaluated. Vitamin C, carotenoid content, chlorophyll reading, dry matter, protein and fiber were also analyzed. In addition, the atmosphere composition inside the packages was measured at each observation.

Our findings suggest that baby pea shoots packaged in LDPE film bags stored at 0ºC in both package sizes (size 1 and 2) without perforations or with 4 and 8 perforations maintained good quality and shelf life throughout 12 days. Baby pea shoots stored at 5ºC in both package sizes (size 1 "25 cm length × 20 cm width" and size 2 "30 cm length × 20 cm width") without perforations or with 4 and 8 perforations maintained good quality and shelf life throughout 8 days.

Baby spinach leaves could be stored for 16 days with good quality at 0ºC and 95% RH in bags prepared from LDPE film and for 12 days in smart film in both package sizes (size 1 and size 2). Also, it could be stored for 8 days at 5ºC in the same package materials (LDPE film and smart film) and sizes.

Keywords:

Baby pea (*Pisum sativum* L.) shoots, baby spinach (*Spinacia oleracea* L.) leaves, modified atmosphere packaging (MAP), storage temperature, package, low density polyethylene (LDPE), perforations, smart film, gas composition, quality parameters, chlorophyll reading, vitamin C, carotenoid, dry matter, protein and fiber.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPREVIATIONS

MAP	Modified atmosphere packaging
LDPE	Low density polyethylene
OTRs	Oxygen transmission rates
MA	Modified atmosphere
PE	Polyethylene
POPP	Perforated oriented polypropylene

1. INTRODUCTION

In recent years, the minimally processed food industry has increased due to a consumer trend toward healthier eating. Consumers today demand products that are convenient to purchase, convenient to prepare and convenient to eat. They also seek products that are visually appealing, great tasting, flavorful, fully prepared, varied, nutritious and fresh.

Minimally processed baby leaves are very popular with consumers for nutritional reasons and due to their convenience. Moreover, freshness is the main quality factor desired for leafy greens. Tenderness, cleanliness, and uniformity of green color are also desirable **(Wright, 2004)**. They must be handled carefully to avoid mechanical damage and water loss.

The consumption of green leafy vegetables is recommended due to their high content of vitamins, minerals and antioxidant phytochemicals, as well as low content of fat and carbohydrates **(Rico *et al*., 2007)**. Minimally processed vegetables sold as ready-to-eat salads are a convenient way to include vegetables in the diet. To increase variety and attract even more consumers, the fresh-cut producers seek for new varieties of leafy vegetables to add to ready-to-eat salad mixtures **(Martínez-Sánchez *et al*., 2012)**.

Fresh green sprouts (at cotyledonary stage) are tender baby vegetables high in chlorophyll, may substitute green-leafy vegetables **(Abdallah, 2008)**. Pea-shoots are a new option as ready-to-eat baby-leaf vegetable **(Santos *et al*., 2014)**. Pea shoots were recently presented as a ready-to-eat vegetable, and are recognized as a popular specialty vegetable in some parts of Asia and Africa that is gaining popularity in the United States and Europe **(Miles and Sonde, 2003)**.

Spinach is known to be a healthy product and contains relatively high concentrations of bioactive compounds **(Gil *et al*., 1999; USDA,**