

POSTHARVEST PHYSIOLOGY OF SOME VEGETABLE CROPS

By

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

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

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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 Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2015.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 0°C 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 5°C 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 0°C 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 5°C 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

	Page
LIST OF TABLES	IV
LIST OF FIGURES	VII
APPREVIATIONS	VIII
1. INTRODUCTION	1
2. REVIWE OF LITERATURE	4
2.1. Edible pea shoots.	4
2.2. Baby spinach leaves.	5
2.3. Modified atmosphere packaging (MAP).	7
2.4. Effect of modified atmosphere packaging (MAP) on O ₂ and CO ₂ composition.	9
2.5. Effect of modified atmosphere packaging on leafy vegetable quality and storability.	12
2.5.1. Effect on quality and storability.	12
2.5.2. Effect on ascorbic acid and carotenoid contents.	17
2.6. Effect of storage temperature and storage period on leafy vegetable quality and storability	18
2.6.1. Effect on quality and storability	18
2.6.2. Effect on ascorbic acid and carotenoid contents	19
3. MATERIALS AND METHODS	20
4. RESULTS AND DISCUSSION	27
4.1. Baby pea shoots experiment	27

4.1.1. Effect of different storage temperatures, package sizes and passive MAP treatments on gas composition inside packages.	27
4.1.2. Effect of different storage temperatures, package sizes and passive MAP treatments on general appearance (score) of baby pea shoots.	33
4.1.3. Effect of storage temperatures, package sizes and passive MAP treatments on decay (score) of baby pea shoots.	37
4.1.4. Effect of different storage temperatures, package sizes and passive MAP treatments on off-odor (score) of baby pea shoots.	41
4.1.5. Effect of different storage temperatures, package sizes and passive MAP treatments on chlorophyll reading (SPAD) of baby pea shoots.	45
4.1.6. Effect of different storage temperatures, package sizes and passive MAP treatments on vitamin C (L. ascorbic acid) of baby pea shoots.	49
4.1.7. Effect of different storage temperatures, package sizes and passive MAP treatments on dry matter percent of baby pea shoots.	53
4.1.8. Protein and fibers of baby pea shoots before and after storage.	57
4.2. Baby spinach leaves experiment.	56
4.2.1. Effect of different storage temperatures, package films and sizes on gas composition inside packages.	59
4.2.2. Effect of different storage temperatures, package films and sizes on general appearance (score) of baby spinach leaves.	65
4.2.3. Effect of different storage temperatures, package films and sizes on decay (score) of baby spinach leaves.	68
4.2.4. Effect of different storage temperatures, package films and sizes on off - odor (score) of baby spinach leaves.	72
4.2.5. Effect of different storage temperatures, package films and sizes on chlorophyll reading (SPAD) of baby spinach leaves.	75
4.2.6. Effect of different storage temperatures, package films and sizes	79

on vitamin C (L. ascorbic acid) of baby spinach leaves.	
4.2.7. Effect of different storage temperatures, package films and sizes on carotenoids content of baby spinach leaves.	82
4.2.8. Effect of different storage temperatures, package films and sizes on dry matter percent of baby spinach leaves.	85
4.2.9. Protein and fibers of baby spinach leaves before and after storage.	85
5. SUMMARY AND CONCLUSION	89
6. REFERENCES	96
ARABIC SUMMEARY	

LIST OF TABLES

No.		Pages
1.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on oxygen (%) inside packages of baby pea shoots (combined analysis of 2013 & 2014 seasons).	28
1.	Continued.	29
2.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on carbon dioxide (%) inside packages of baby pea shoots (combined analysis of 2013 & 2014 seasons).	30
2.	Continued.	31
3.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on general appearance (score) of baby pea shoots (combined analysis of 2013 & 2014 seasons).	35
3.	Continued.	36
4.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on Decay (score) of baby pea shoots (combined analysis of 2013 & 2014 seasons).	39
4.	Continued.	40
5.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on off-odor (score) of baby pea shoots (combined analysis of 2013 & 2014 seasons).	43
5.	Continued.	44
6.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on chlorophyll reading (SPAD) of baby pea shoots (combined analysis of 2013 & 2014 seasons).	47
	Continued.	48
7.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on vitamin C (L. ascorbic acid) mg/100 fresh weight of baby pea shoots (combined analysis of 2013 & 2014 seasons).	51

7.	Continued.	52
8.	Effect of different storage temperatures, package sizes, passive MAP treatments and their interactions on dry matter percent of baby pea shoots (combined analysis of 2013 & 2014 seasons).	55
8.	Continued.	56
9.	Protein and fibers %, on dry weight basis of baby pea shoots before and after storage.	58
10.	Effect of different storage temperatures, package films, package sizes and their interactions on oxygen (%) inside packages of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	60
10.	Continued.	61
11.	Effect of different storage temperatures, package films, package sizes and their interactions on carbon dioxide (%) inside packages of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	62
11.	Continued.	63
12.	Effect of different storage temperatures, package films, package sizes and their interactions on general appearance (score) of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	66
12.	Continued.	67
13.	Effect of different storage temperatures, package films, package sizes and their interactions on decay (score) of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	70
13.	Continued.	71
14.	Effect of different storage temperatures, package films, package sizes and their interactions on off – odor (score) of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	73
14.	Continued.	74
15.	Effect of different storage temperatures, package films, package sizes and their interactions on chlorophyll reading (SPAD) of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	76
15.	Continued.	77

16.	Effect of different storage temperatures, package films, package sizes and their interactions on vitamin C (L. ascorbic acid) mg/100 fresh weight of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	80
16.	Continued.	81
17.	Effect of different storage temperatures, package films, package sizes and their interactions on carotenoids content of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	83
17.	Continued.	84
18.	Effect of different storage temperatures, package films, package sizes and their interactions on dry matter percent of baby spinach leaves (combined analysis of 2013 & 2014 seasons).	86
18.	Continued.	87
19.	Protein and fibers % on dry weight basis of baby spinach leaves before and after storage.	88

LIST OF FIGURES

No.		Pages
1.	A) Soaking pea seeds in jars before planting; B) plots after planting seeds; C) pea shoots 2 weeks age (just before harvest).	21
2.	A) Plots after preparation; B) plots after 3 weeks of planting spinach seeds; C) baby spinach plants 3 weeks age (just before harvest).	23

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,**