



Effect of Controlled Storage Method on Essential Oil and Carotenoids in Dill (*Anethum graveolens* L.)

INTRODUCTION

Dill (*Anethum graveolens* L.) is an annual plant originally native to Mediterranean area. The fresh Dill has been used in folk medicine for many kind of aches specially stomach. Fresh and dry dill is used in salads, sauces and as spice in pickles. Storage in a control condition atmosphere in which gases concentrations as well as temperature and humidity are regulated is one of the best methods of preventing plants from unwanted biochemical changes during after harvest. Attractiveness and high quality of product depends also on chemical compositions such as carotenoids and essential oil. During traditional storage in regular air they are oxidized. In leafy vegetable this losses are high noticeable.

The aim of the experiment was to evaluate the influence of storage conditions on the content of carotenoids and essential oil of dill.

MATERIAL AND METHODS

The experiment was carried out in 2010-2012, on the Experimental Field and at the Vegetable Storage Lab of the Department of Vegetable and Medicinal Plants SGGW. The study included three cultivars of dill. i.e. 'Moravan' 'Turkus' and 'Szaragad' designed for all year cultivation. The cultivation was taken from 10th July to 29th September. Before stored, material was harvested early morning. The whole plants without roots were stored in boxes for two weeks in 1- C, 98% humidity under the following conditions: RA (Regular Air) 21.0 % O₂, 0.3 % CO₂, ULO (Ultra Low Oxygen) 1.5 % O₂, 1.5 % CO₂, CA (Controlled Atmosphere) 3% O₂, 1.5% CO₂.

The experiment was set on three replications. The results were analyzed statistically with the two factor analysis of variance at the level of significance $\alpha=0.05$ (ANOVA 2). Sampling prepared for analyses ranged among 0.25-0.26 g for total carotenoids. In case of essential oils it was 100 g.

Total carotenoids were extracted with usage of 80% acetone and determined according of spectrophotometric method and essential oil content was determined by the Deryng apparatus and then evaluated by gas chromatography (GC).

RESULTS

The best quality of dill's essential oil was preserved in Regular Air. The main composition of essential oil was α -phellandren (49.23%) and p-cymene (24.05%). CA maintains a high level of monoterpenes content in essential oil. The highest losses of chlorophylls was observed in condition of RA. Results shown significant influence of conditions of storage (RA, CA) on content of carotenoids. The highest concentration of total carotenoids was observed in cv. 'Moravan'.

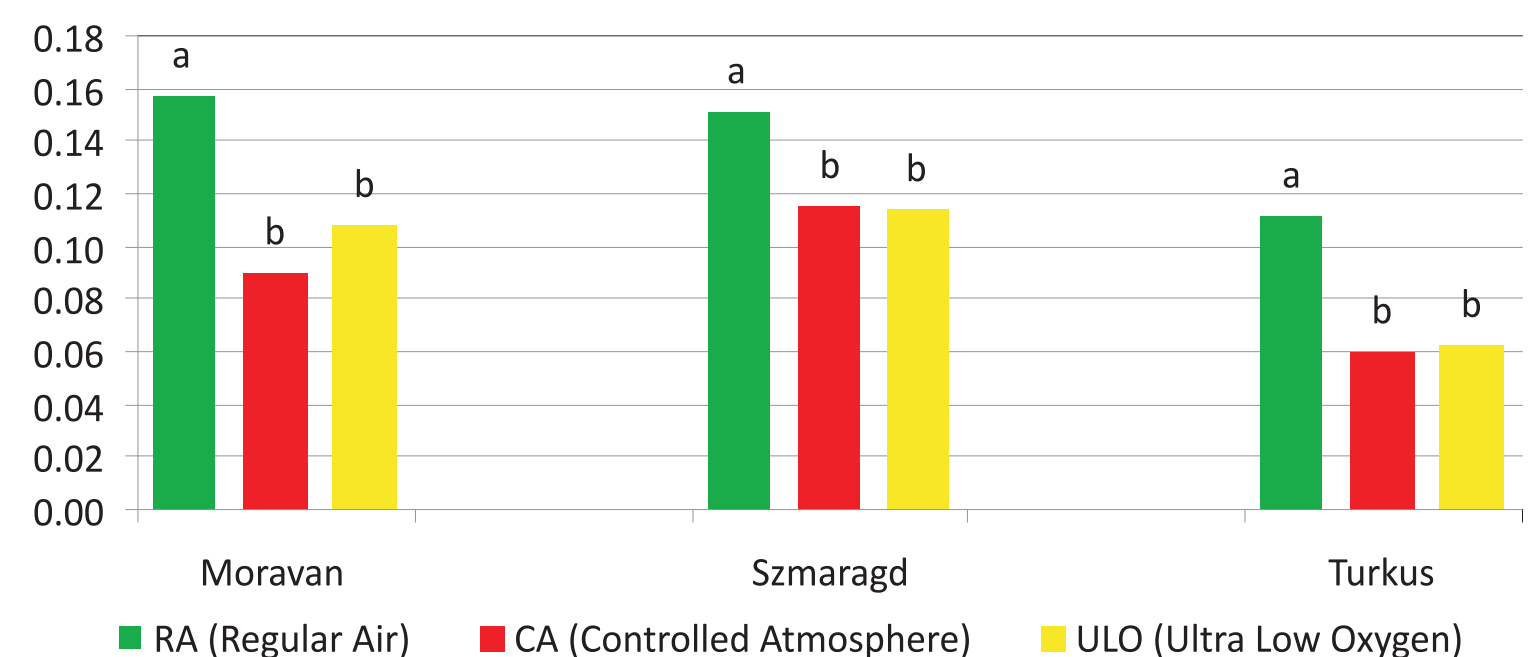


Figure 1. Influence of storage conditions on the content of essential oil in Dill [%]

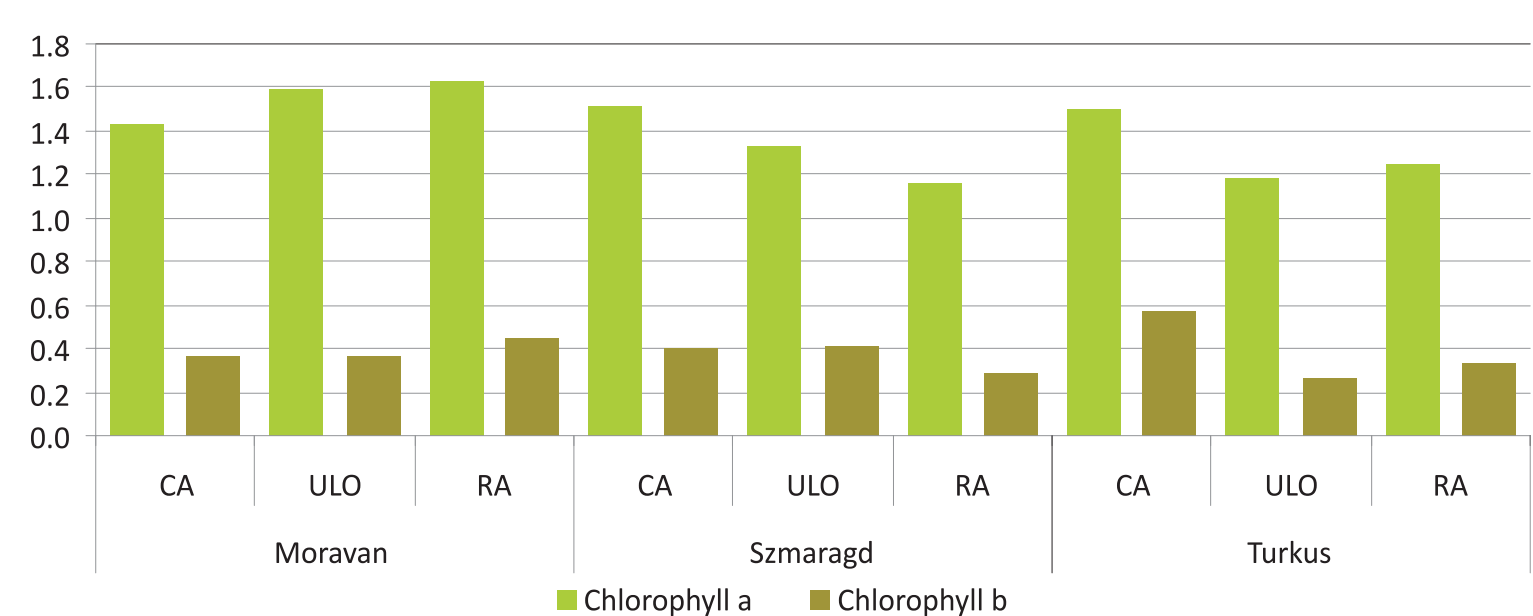


Figure 3. Influence of storage conditions on the content of chlorophyll a and chlorophyll b in Dill (ug*1 g⁻¹)

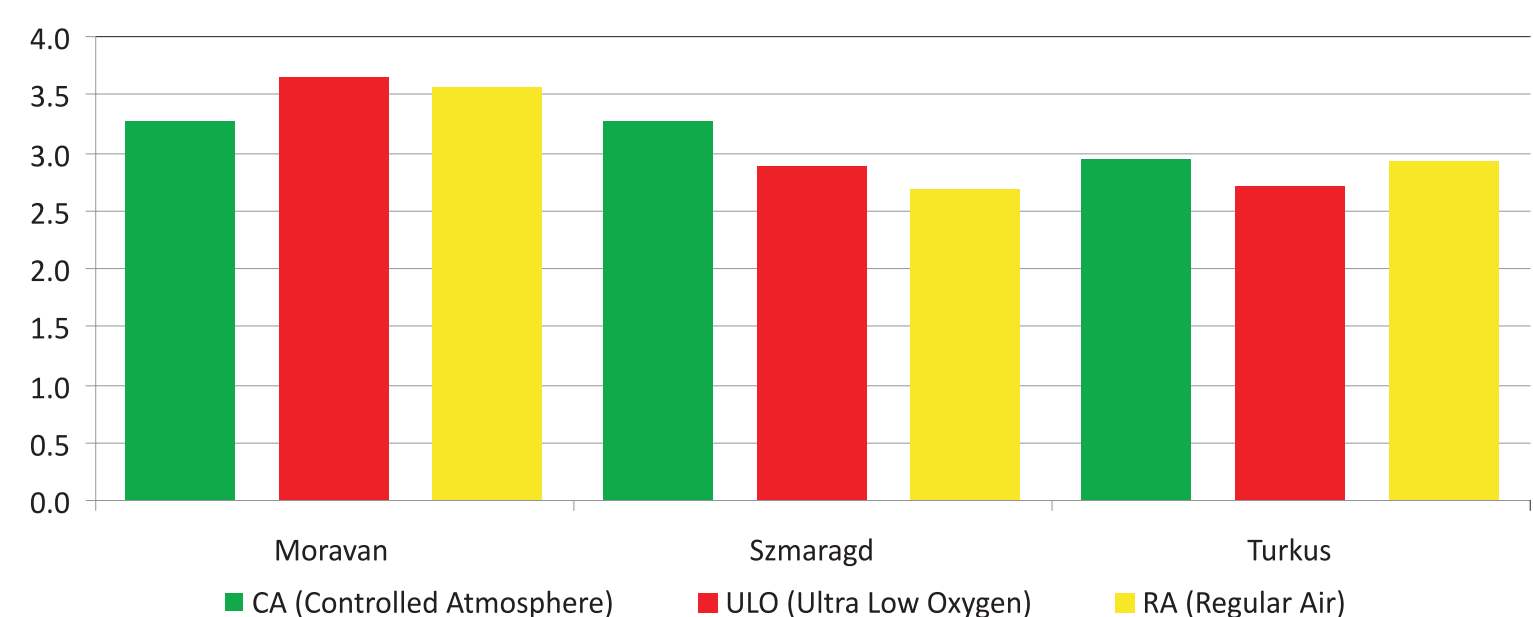


Figure 4. Influence of storage conditions on the content of total carotenoids in Dill (ug*100 g⁻¹)

Figure 2. Influence of storage conditions on the content of chemical compound in essential oil of Dill [%]

chemical compound	cultivar									mean
	Moravan			Szaragad			Turkus			
	RA	CA	ULO	RA	CA	ULO	RA	CA	ULO	
α -Pinene	0.77	1.25	0.90	1.22	1.56	0.64	0.87	1.48	0.71	1.04
α -Phellandrene	30.08	49.23	32.32	3.62	8.55	42.65	6.36	26.75	21.38	24.55
1,8-Cineole	3.03	2.99	2.99	2.55	2.83	2.27	2.68	2.66	2.77	2.75
Limonene	6.69	7.80	6.76	6.12	7.04	7.34	6.22	7.42	6.70	6.90
p-Cymene	9.53	6.10	9.48	24.05	23.88	8.25	21.71	16.11	15.34	14.94
Decanal	6.66	7.11	8.86	17.76	14.98	16.93	17.83	13.75	15.38	13.25
Nerol	0.89	0.52	0.80	10.71	1.30	0.51	1.60	1.04	1.05	2.05
Anethole	4.65	2.50	4.56	2.56	8.86	1.32	9.92	7.05	6.96	5.38
Thymole	2.03	0.71	1.66	2.52	4.17	0.71	2.51	2.31	0.97	1.95
Myristicin	15.59	10.06	14.95	2.52	1.96	2.22	3.4	1.17	7.16	6.56

CONCLUSIONS

1. The RA storage in Controlled Atmosphere restricts loss of secondary metabolites such as carotenoids.
2. Regular Air as well as Controlled Atmosphere allows maintaining high amount of total carotenoids in cv. 'Moravan'.
3. Regular Air positively affects the amount of essential oil.

