The Dynamic of Essential Oil Accumulation in Hop Cones during 2012 Year

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Abstract. Hop cones have lupulin glands which occur on the outer lower surface of the bracteoles and the entire surface of the perianth. The constituents of these glands include bitter acids and essential oil components (Auerbach et.al., 2000). Dry hop contains 0.5-2.0% of essential oil. Hop essential oils consist of a large number of different components and although their composition is influenced by the environment (Čerenak *et.al.*, 2011). This study is a continuation of the research started in 2011 (Salanță et.al., 2012), where the dynamic of essential oil accumulation in hop cones during 2011 year, were reported. In this paper, samples from 2012 year crop were subjected to hydrodistillation in order to content in essential oils. All reported results will be used in a future research, to determine the gas chromatographic composition of essential oils extracted.

Keywords: essential oil, hop cones, pellets, hydrodistillation

Introduction. The female inflorescence of hops is known as the hop cone or strobile. Hop cones have lupulin glands which occur on the outer lower surface of the bracteoles and the entire surface of the perianth. The constituents of these glands include bitter acids and essential oil components (Auerbach et.al., 2000). Dry hop contains 0.5-2.0% of essential oil. Hop essential oils consist of a large number of different components and although their composition is influenced by the environment (Čerenak et.al., 2011).

Aims and objectives. This study is a continuation of the research started in 2011 (Salanță et.al., 2012), where the dynamic of essential oil accumulation in hop cones during 2011 year, were reported. In this paper, samples from 2012 year crop were subjected to hydrodistillation in order to content in essential oils. All reported results will be collected and used in a future research to determine the gas chromatographic composition of essential oils extracted and to distinguish the most relevant compounds in order to use them as markers in the authentication of plant variety.

Materials and method. The study of volatile oil dynamic accumulation in cones was carried out for three varieties of hop: Magnum (MG), Hüller Bitterer (HB) and Aroma (AR), in different phenophases: during the formation, ripening and harvesting. The samples of hop cones were collected from Seleuș farms from Mureș, a traditional Romanian hop grower, during 2012 year. The pellets samples were received from the farm, but the grower do not process Aroma cones into pellets, because this hop cultivar is grown on a small area and the cones are combined with the ones from other aromatic varieties. The samples were codified as follows: Ceo (essential oil from dried cones), Feo (essential oil from hop flower), Peo (essential oil from pellets). Samples of hop essential oil were isolated by hydrodistillation, method described by Salanta et.al., 2012. Relative accumulation is calculated from the total oil determined in cones, and it shows the percentage differences of oil accumulation during phenophases. Relative increase

shows the percentage growth between phenophases and is calculated by the difference between phenophase 2 and 1, respectively phenophase 3 and 2.

Results and discussions. The obtained results are presented in Tab. 1. Volatile oil relative accumulation in hop cones during phenophases is progressive in all three varieties of hops, achieving a maximum in phenophase III. The character of hop variety influence the accumulation in volatile oil, as it can be seen the Aroma variety accumulation in volatile oil is higher than the other two varieties. The volume of essential oils collected from hop flower is higher, in most of the samples, than the volumes extracted from dried cones, because a part of volatile oils is lost during drying. The volume of volatile oil from pellets is lower than the volume extracted from cones samples due to the pelleting process, the same was reported by Salanta *et al.*, 2012. Comparing the results obtained from the harvest year 2011 with those obtained in 2012, it can be seen a decrease in essential oil accumulation due the weather conditions in the growing season.

Tab. 1

The accumulation of volatile oil in hop cones and pellets

Crt. no	Phenophases	Date harvest	Sample weight (g)	Sample cod	ml/ 100g dry matter	Relative accumulation [% of total]	Relative increase [%]
1.	FN I	21.08.2012	50.1143	AR-Ceo	1.04	37.96	-
2.			51.0548	AR-Feo	0.82	28.17	-
3.	FN II	4.09.2012	50.6046	AR-Ceo	1.44	52.55	14.59
4.			51.5421	AR-Feo	2.16	74.23	46.06
5.	FN III	18.09.2012	50.9026	AR-Ceo	2.74	100	47.45
6.			50.1819	AR-Feo	2.91	100	25.77
7.	FN I	21.08.2012	50.0012	HB-Ceo	0.67	26.38	-
8.			52.4517	HB-Feo	0.90	31.91	-
9.	FN II	4.09.2012	50.5032	HB-Ceo	1.27	50.00	23.62
10.			59.2039	HB-Feo	1.19	42.19	10.28
11.	FN III	18.09.2012	50.0912	HB-Ceo	2.54	100	50.00
12.			51.2038	HB-Feo	2.82	100	57.81
13.	PELETI	08.01.2013	51.0531	HB-Peo	1.35	-	-
14.	FN I	21.08.2012	43.4701	MG-Ceo	0.39	13.59	-
15.			52.3047	MG-Feo	0.65	25.19	-
16.	FN II	4.09.2012	50.1023	MG-Ceo	1.27	44.25	30.66
17.			57.1037	MG-Feo	1.06	41.06	15.87
18.	FN III	18.09.2012	50.1945	MG-Ceo	2.87	100	55.75
19.			49.7328	MG-Feo	2.58	100	58.94
20.	PELETI	08.01.2013	51.1845	MG-Peo	1.71	-	-

Conclusion. The volume extracted is depending on the phenophase of the cones, the drying process and the industrial processing of cones in pellets, the results can be useful in the optimal harvesting period.

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