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Profile of lavender oil from second harvest

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Abstract. *In 2010 years in Institute for roses and aromatic plants was made first analysis of lavender oil from second yield. The results have shown that obtained oil correspond to BDS/ISO 3515:2005 for Lavender oil. The investigated oil is easy moving, light yellow liquid with typical blossom's smell with light grassy and camphoric notes. Its gas chromatography profile is characteristic of lavender oil. The oil of second yield keeps the rates of linalool and linalylacetate near to this of the first's yield oil respectively 19.46% and 32.46%. α-pinene, camphene, cis-β-ocimene, 1,8 cineole, 3-octanon and trans- β-ocimene increase while mircene, lavandulol and α-terpineol decrease. The main difference, which brings intensification of grassy, camphoric notes, is terpinen – 4 ol and camphor increasing. The shown variations don't affect to lavender oil's quantity from second harvest and it can be use successfully for mixture with another lavender oil and directly in perfumery.*

Keywords: second harvest lavender oil, gas chromatography, perfumery

Introduction

Lavender is main essential oil bearing crop, which search and popularity have increased in this years. It has been grown mainly for essential oil, which used in perfumery, cosmetics, in culinary, in folk medicine and nowadays in the aromatherapy. The lavender oil has been obtained by steam distillation from inflorescences and stem in 50 – 100% level of blossom.(Georgiev, 1995; Nedkov et al., 2005).

The plantations of lavender in Bulgaria have been presented mainly by six varieties – "Druzhba", "Hemus", "Hebar", "Raya", "Sevtopolis" and "Iubileina". The essential oil contains predominately linalool (19.1-43.8%) and linalylacetate (35.6-43.8%). Terpinen – 4 ol has more substantial distinction and it's value is to 1,5% and it reaches 6.8% in "Iubileina" only. 3-octanone has moved at 1.3% to 2.6% but "Druzhba" contains 0.1%. The average of other characteristic ingredients vary and they are: limonene (0.2-0.8%), 1,8 cineol + β-philandren (0.2-2.2), cis-β ocimene (3.0-9.0%), trans-β ocimene (0.9-4.5%), camphor (0.1-0.2%), lavandulol (0.4-1.3%), lavandulyl acetate (0.7-4.7%) and α-terpineol (0.7-0.9%). Commercial lavender oils are typing batch obtained by mixture of lavender oils with different origin and variety in dependence of their organoleptic, physical and chemical property (Georgiev and Stoianova, 2006; Zhekova and Nedkov, 2010; Konakchiev, 2004).

There are many reports about time of harvesting (level of blossoming), the effect of meteorology factors, the diurnal dynamic, the special features of variety, quality and quantity composition of essential oil. (Stoianova, 2009; Ognianov, 1984; Zhekova and Nedkov, 2010). Appropriate conditions have been created for normal second flowering of lavender in certain years whit heavy summer rainfall. By the moment, autumn harvest lavender and its essential oil haven't been investigated. The aim of the present work is to investigate whether the essential oil from autumn yield is identical to the essential oil of generally accepted July.

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Material and methods

Lavender inflorescences were used from village Hrishtene, Stara Zagora, collected like a second harvest, autumn haymaking, September, 2010 year. The essential oil was obtained in industrial distillery in regulation of lavender oil production. The essential oil was investigated by gas-chromatography analysis ISO 11024-1 and ISO 11024-2.

Physicochemical parameters were measured as follow: density (BSS ISO 279), refraction (BSS/ ISO 280), acid number (BSS ISO 1242), ester number (BSS ISO709) and solubility in 70% ethanol. The received results are compared with BSS/ ISO 3515:2002 Lavender oil (*Lavandula angustifolia Mill*.) and lavender oil harvest 2010 year.

Results and discussion

Essential oil from second harvest is easy moving, light yellow liquid with typical blossom's smell with light grassy and camphoric notes. The results of the made gas chromatography analysis showed that the oil has typical lavender profile. The dates of 16 main components sufficient of its characterization are given in Table 1. The date of convectional lavender and eligible value of BSS/ ISO 3515:2002 are indicated as a comparison. The table shows that the first and second harvest essential oils have minimal deviation of some BDS/ISO 3515:2002 parameters but overall the profile is typical and we can accept that the oil respond to the standard. The second harvest essential oil has normally ester contend (37.15%) and low decrease of linalool comparison to the first harvest oil. The hydrocarbons: α-pinene and camphene show more substantial modification and decrease four times but cis-β ocimene eight times. The quantities of 1,8 cineole, 3-octanone and trans-β ocimene are increase while mircene, lavandulol and α- terpineol decrease. This

Table 1. Chemical components of Lavender oil

№	Components	Essential oil second harvest	Essential oil first harvest	BSS/ISO 3515:2002
1	α-pinene	0.577	0.133	0.2 - 1.6
2	camphene	0.569	0.167	
3	3-octanone	0.802	2.024	Max 2
4	mircene	0.591	0.973	at 3 to 9
5	1,8 cineole	4.078	1.964	at 2 to 5
6	cis - β ocimene	9.589	1.624	at 22 to 34
7	trans - β ocimene	4.234	2.262	max 0.6
8	linalool	19.462	21.695	
9	camphor	0.707	0.297	min 0.3
10	borneol	2.120		2 - 5
11	lavandulol	0.319	0.543	0.8 - 2
12	terpinen – 4 ol	4.553	1.087	30 - 42
13	α- terpineol	0.738	1.564	2 - 5
14	linalylacetate	32.639	32.176	
15	lavandulyl acetate	4.522	4.796	
16	β-caryopyillene	4.267	7.987	

Table 2. Physicochemical parametres

№	Index	Essential oil second harvest	Essential oil first harvest	BSS/ISO 3515:2002
1	Refraction	1.4615	1.4585	from 1.459 to 1.463
2	Density	0.8741	0.8762	from 0.879 to 0.888
3	Acid number	0.7	0.68	max. 1
4	Ester number	137.9	135.8	from 110 to 150
5	Solubility in 75% ethanol	1:3	1:2	1:2

indicates the changes by this moment don't effect upon oil's smell evaluation while linalool and linalylacetate keep their values. The most substantial modification, which change quality of obtained oils is second time increased camphor and four time increased terpinen – 4 ol. The increase is more sensible in comparison with Konakchiev investigation about most disseminated six lavender varieties in Bulagria where the values of camphor are 0.1–0.2% and the terpinen – 4 ol – 0.2-1.5%. The second harvest obtained oil has lavender smell with expressive herbaceous and terpene notes and smell lose nearly sweet and flowering sensation. The change is due namely of this components increasing which lead to strengthening at camphor smell and also at ground, grass and soil.

In this work were indicated gas-chromatography analyses and there are some physicochemical analyses for the second harvest essential oil characterization. The dates are shown in Table 2. The oil is compared with firs harvest lavender oil and standard BSS/ ISO 3515:2002 again. It can see from the table that physicochemical indexes of first and second harvest essential oil are closed and the only difference is the solubility in ethanol. Refraction, acid and ester number respond to the standard that is guarantee for the good quality of the oil. The values of physicochemical parameters of second harvest lavender oil characterize it as normal oil meeting to the requirements of the standard.

Conclusion

Second harvest lavender oil keeps the values of linalool and linalylacetat within the limits of first harvest lavender oil. The main difference in the second harvest lavender oil smell and grass rough strengthening are due of camphor and terpinenterpinen – 4 ol increasing. Physicochemical indicators are within the limits of standard BSS/ ISO 3515:2002 and also are closed to such of the first harvest lavender oil. The second harvest lavender oil can be used successfully for typified lots and directly in the perfumery.

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CONTENTS 1 / 2

Genetics and Breeding

Effect of the age at first calving on test day production traits in black-and-white cows 67
Zh. Gergovska

Egg production potential of Manchurian Golden quail breeders 73
A. Genchev

Variability and stability of yield and quality of grain of several bread wheat cultivars 81
N. Tsenov, I. Stoeva, T. Gubatov, V. Peeva

Productive and quality characteristics of brown cotton 88
A. Stoilova, I. Saldzhiev , Zh. Terziev

Superovulation and embryo transfer in goats by using PMSG or FSH 94
A. Pampukidou, T. Alifakiotis, M. Avdi, R. Ivanova

Nutrition and Physiology

Effect of dietary amino acid concentration on nitrogen balance in PIC hybrid pigs 98
A. Ilchev, G. Ganchev

Comparative studies on some parameters of innate resistance and metabolic profile of sheep and their offspring depending on the ration 103
B. Bivolarski, E. Vachkova, S. Laleva, P. Slavova, I. Ivanov

Behaviour of cows in milking parlour 107
I. Varlyakov, V. Radev, T. Slavov, N. Grigorova

Production Systems

Feeding value of spring vetch *(Vicia sativa* L.) influenced by preparations with different biological effect 112
Y. Naydenova, N. Georgieva, I. Nikolova

Impact of mixtures between retardants and combined herbicides on the sowing properties of the durum wheat 117
G. Delchev

Profile of lavender oil from second harvest 121
G. Zhekova, N. Nedkov

Essential oil content and composition of Thyme "German winter" 123
G. Zhekova, A. Dzhurmanski, M. Nikolova

Effect of some agronomy factors on the cooking properties of lentil seeds *(Lens culinaris* Medic L.) 126
G. Milev

Comparative study of different varieties of red clover in Bulgarian conditions 130
Ts. Mihovski, B. Chourcova, D. Mitev

Study on the level of generated vacuum in the teat cup milking chamber as a factor for assessing liner suitability 134
V. Vlashev, G. Dineva

CONTENTS 2 / 2

Agriculture and Environment

Content of heavy metals and metalloids in bees and bee products from areas with different degree of anthropogenic impact 136
I. Zhelyazkova, S. Atanasova, V. Barakova, G. Mihaylova

Species composition of weeds in wheat and barley 143
M. Georgiev, D. Pavlov, G. Beev, M. Gerdzikova, R. Bazitov

Variability of some biologically active compounds of *Tribulus terrestris* L. 150
M. Nikolova, A. Ivanova, I. Lazarova, D. Peev, N. Valyovska

Organic matter status in reclaimed Technosols of Bulgaria 155
V. Tsolova, M. Banov

Product Quality and Safety

Use of nearinfrared spectroscopy technology with a remote reflectance fibre-optic probe for predicting of trace elements contents in tobacco 160
L. Dospatliev, S. Atanassova

Occurrence and distribution of *Fusarium* species in wheat grain 165
G. Beev, S. Denev, D. Pavlov

Influence the extraction acidity level on the amount and chemical composition of essential oil from *Rosa damascena* Mill. 169
A. Dobreva

Distribution of moisture in the soil profile in terms of two soil types 172
A. Stoyanova, M. Todorova

Slaughtering analysis and chemical composition of rabbit meat 176
A.Kuzelov, E. Atanasova, T. Angelkova

Grain sample quality assessment using Intechn and Unscrambler platforms 179
M. Mladenov, Ts. Draganova, R. Tsenkova

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