P 23: Comparison of five *Perilla frutescens* (L.) Britt. genotypes in Hungary

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Abstract

In our research work five *Perilla frutescens* (L.) Britt. accessions (GB, J3, JTD3, PS3, 588P) of different origin were evaluated in an open-filed experiment in 2014. Fresh biomass, number of glandular hairs, essential oil content and composition were studied. The dried herb was hydrodistilled and the oil analysed by GC-MS. The components were identified by MS libraries and their LRIs.

Highest fresh biomass was produced by the accession JTD3 (864 g·plant^{-1}) while the lowest fresh weight was measured in the population of 588P (396 g·plant^{-1}). The highest dlandular hair density (1130 hairs·100 mm^{-2}) and essential oil content (1.4 ml·100 g^{-1} d.w.) was detected in the population 588P while the lowest result were detected in J3 (22 hairs·100 mm^{-2}, 0.14 ml·100 g d.w.$^{-1}$). Based on the essential oil composition the investigated populations represent different chempotypes. In PS3 and GB the main components of the essential oil was *ß-dehydro- elsholtzia ketone* (54-76 %), they are belong to the elsholtzia ketone (EK) chemotype. The main components of the essential oil in J3, JTD3, 588P population were *perilla aldehyde* (60-78%), *limonene* (6-15%) and *ß- caryophyllene* (5-6%) (PA – perillaaldehyde chemotype).

Keywords: perilla aldehyde, elsholtzia ketone, Lamiaceae, glandular hair

Introduction

Perilla (*Perilla frutescens* L.), so called Chinese basil, is used traditionally for medical and flavouring purposes. The leaves of the plant are applied against bronchitis or other problems of the respiratory system as well as in the treatment of skin allergic reactions (Habegger et al., 2004). Recent publications have also pointed out its antiallergic, anticancer and immunstimulant properties. Because of the morphological variety of Perilla it can also be used for ornamental purposes cultivated as an annual plant. In the last decade the interest about the plant is increasing however till now we have a lack of information about the cultivation and genetical diversity. In our research work five *Perilla frutescens* L. accessions with purple leaves of different origin were evaluated in an open-field experiment in 2014.

Materials and Methods

Plant material and growth conditions

Five *Perilla frutescens* accessions from different oigins were cultivated in the in the Experimental Field of the Faculty of Horticulture in Budapest, in 2014. Source of the accessions were: GB (Japan), PS3 (Gene Bank of the University), J3 (Jelitto Staudensamen GmbH), JTD3 (JTDSeeds catalog), 588P (Evergreenseeds catalog). Plants were planted into 50×30 cm spacing. All accessions were harvested at the beginning of flowering (23.09.2014.).

Measured parameters

After harvesting the plants, the fresh mass was measured immediately in 6 replications per accession. Leaf samples were collected from the 3rd internode from the tip of the shoots and circles from the leaf blade with 5.5 mm diameter were cut out. The number of peltate type glandular hairs on the abaxial surface was counted under a stereo- microscope (type BMS 74959).

Plant material was dried in shade, on frames. After the drying, the essential oil content was determined according to the method described in the VII. Hungarian Pharmacopoeia (3 repetition). The main components of the essential oil were analysed with GC-MS method described formerly (SZABÓ et al. 2016).

The results were analysed with an IBM SPSS 22.0 statistical program. One-way ANOVA was applied, and for the pairwise comparisons of the variances, the Scheffe test was used with a confidence level of 5%.

Results

Signifficant differences were observed in the fresh biomass of the investigated *P. frutescens* accessions (Tab. 1.). Largest biomass production was measured in JTD3 while 588P produced only the half of that of this former one.

The studied genotypes showed extrem differences in the number of glandular hairs (Tab. 1.). In 100 mm^2 surface more than 50 fold larger number of glandular hairs was detected in the genotype 588P than in genotype J3. However, the number of glandular hairs of the other accessions varied on a large scale.

Highest essential oil content was detected in 588P while almos 10 fold lower essential oil content was measured in J3. Clear connection is visible between the glandular hairs and the essential oil content: higher number of hairs in the *Perilla frutescens* might result in higher essential oil content as well (Tab. 1.).

Two different chemotypes were identified among the 5 studied accessions. GB and PS3 belong to the *elsholtziaketone* chemotype while the other three accessories accumulated *perilla aldehyde* as the main essential oil component. The *elsholtziaketone* and *perilla aldehyde* chemotypes were formerly described by ITO and HONDA (1997).

Tab. 1 Effect of genotypes on the biomass production, glandular hair density, essential oil content and composition of Perilla frutescens (mean±standard deviation)

***P. frutescens* accession**	**Fresh weight (g·plant^{-1})**	**Glandular hair number (pc·100 mm^{-2})**	**Essential oil content (ml·100 g^{-1} dw.)**	**Main essential oil compound (area %)**
GB	523.00 ab ± 115.43	478.99 c ± 160.51	0.214 c ± 0.001	*ß-dehydro-elsholtzia ketone* (54%) *ß-caryophyllene* (10%) *elsholtzia ketone* (5%)
J3	501.34 b ± 190.89	21.80 d ± 22.66	0.144 c ± 0.031	*limonene* (6%) *perilla aldehyde* (78%) *ß-caryophyllene* (6%)
JTD3	864.67 a ± 349.80	162.72 d ± 149.71	0.412 b ± 0.031	*limonene* (13%) *perilla aldehyde* (70%) *ß-caryophyllene* (6%)
PS3	573.00 ab ± 84.52	661.37 b ± 196.74	0.359 b ± 0.041	*ß-dehydro-elsholtzia ketone* (76%) *elsholtzia ketone* (5%)
588P	396.67 b ± 115.43	1130.24 a ± 146.24	1.432 a ± 0.083	*limonene* (15%) *perilla aldehyde* (60%) *ß-caryophyllene* (5%)

Legends: Different letters in columns are for significantly different groups (α=0.05).

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