W. Roslon, E. Osinska and J.L. Przybyl

Warsaw University of Life Sciences – SGGW
Faculty of Horticulture and Landscape Architecture
Department of Vegetable and Medicinal Plants

Nowoursynowska 159, Warsaw
http://krwil.sggw.pl
* ✉ wieslawa_roslon@sggw.pl

Effect of Drying Method on Quality of Herb of Southern Sweet-grass (*Hierochloë australis* (Schrad.) Roem. & Schult.)

INTRODUCTION

Southern sweet-grass (*Hierochloë australis* (Schrad.) Roem. & Schult.) is a plant occurring in the undergrowth of light mixed forests.The raw material of this species (herb) has been collected for many years due to the spicy properties and pleasant smell. In Poland the main mass of raw material is bought by the spirit industry, for the production of liqueurs and flavored vodkas, besides recipients of Southern sweet-grass herb are food, tobacco and cosmetics industries. Nowadays in our country a large part of the Southern sweet-grass stuff is collected from half cultivation and from cropping. After harvesting, stabilization of herb is recomendent in 30-40°C using drying chamber. Under this conditions the best reveals the characteristic smell of hay, which is associated with the presence of coumarins. Coumarins are the most important biologically active component of Southern sweet-grass herb. They have direct influence not only on aroma properties but also on its medicinal activities for the digestive, circulatory and nervous system.

AIM OF STUDY

The aim of study was to investigate the effect of different drying conditions on the content and chemical composition of chosen group of biologically active components (with particular emphasis on coumarins) of the Southern sweet-grass raw material (*Hierochlöe australis* (Schrad.) Roem. & Schulz).

MATERIAL AND METHODS

The plantations of Southern sweet-grass were performed on the mapped out experimental plots of the Department of Vegetable and Medicinal Plants, on the heavy alluvial soil with a 1.9-2.3% content of organic matter. Plantations were established in a slightly shady place by growing near the trees. The seedlings were set into the field on second decade of April 2006 and 2007, on 5m^2 area plots at the spacing 40 × 40 cm. Seeds for producing of Southern sweet-grass seedlings were collected from natural sites located in south-eastern Poland. The harvest of herb was performed in the first decade of July 2009 and 2010 (three years plants) by cutting them 5 cm over the ground. After harvesting the raw material was divided for four parts. First part of raw material was dried in natural conditions (herb was distributed in a shady, airy place, where the average temperature was 20-23°C). Second part was dried in dryer chamber at temperature of 35°C, the third part of herb was dried in dryer chamber at temperature of 70°C. For fourth part of raw material there was carried out chemical analysis directly after collecting (fresh staff). In the fresh and air-dry raw material the content of phenolic acids, flavonoids, coumarins and assimilate pigments (chlorophyll and carotenoids) were determined. For coumarins their qualitative-quantitative analysis using HPLC system was performed. For the determination of coumarins composition, methanol extract of the Southern sweet grass herb was used. Coumarins composition was analyzed by Shimadzu consist of the vacuum degasser, 2 pumps, oven and a diode-array detector SPD-M10A VP. The column used was a Phenomenex Luna C18 (2) 250 mm × 4.6 mm 5 µm. Solvent A was 10% HPLC grade acetonitrile with 90% ultra-pure water, and solvent B was 55% acetonitrile with 45% ultra-pure water. The flow rate was 1 ml×min^{-1}. The linear gradient used was a minor modification of one previously developed: 0.1 min (85% A, 15%B), 30 min (25% A, 75% B), 30.01 min (0%A, 100%B), 35 min (0%A, 100%B), 35.01 (85A, 15%B), 40 min (end of analyzis). Data were collected using CLASS VP 7.3 program (Shimadzu). All results were calculated on dry matter.

RESULTS

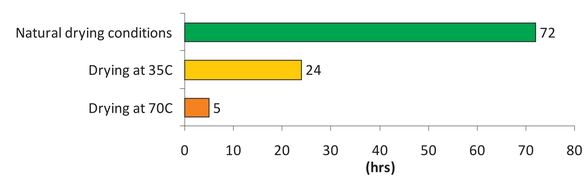

Figure 1. The duration of the drying process of Southern sweet-grass (hrs)

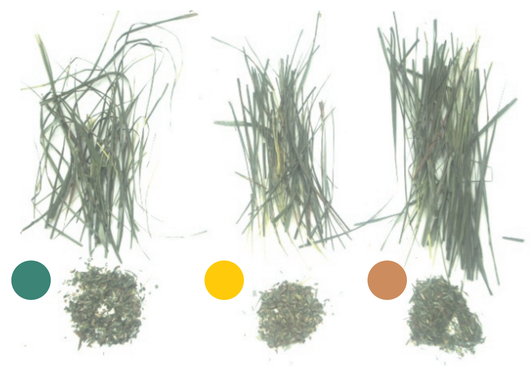

Table 1. Content of chlorophyll and carotenoids

Type of raw material	Chlorophyll content (mg×g^{-1})	Carotenoids content (mg×100g^{-1})
Fresh herb	11.12 a	3.50 a
Natural drying herb	4.60 c	1.94 c
Herb drying at 35°C	3.19 d	1.80 d
Herb drying at 75°C	5.32 b	2.59 b

Table 2. Content of phenolic acids, flavonoids and coumarin

Type of raw material	Phenolic acids content (mg×100g^{-1})	Flavonoids content (mg×100g^{-1})	Coumarins content (mg×100g^{-1})
Fresh herb	720.0 a	4850.0 a	8500.0 a
Natural drying herb	380.0 d	2530.0 b	2230.0 b
Herb drying at 35°C	460.0 b	1950.0 c*	760.0 d
Herb drying at 75°C	420.0 c	1990.0 c	1070.0 c

* Means marked with the same letters do not differ according to Tukeys HSD test at p.=0.05

Table 3. Content of coumarin, 3-4 dihydrocoumarin and coumaric acid (mg×100g-1)

Compound	Fresh herb	Natural drying herb	Herb drying at 35°C	Herb drying at 75°C
Coumarin	7950.08 a	1790.30 b	1246.69 d	1592.36 c
3-4 dihydrocoumarin	379.89 e	125.07 f	120.91 g	119.78 h
Coumaric acid	101.14 i	19.21 k*	36.26 j	19.40 k

* Means marked with the same letters do not differ according to Tukeys HSD test at p.=0.05

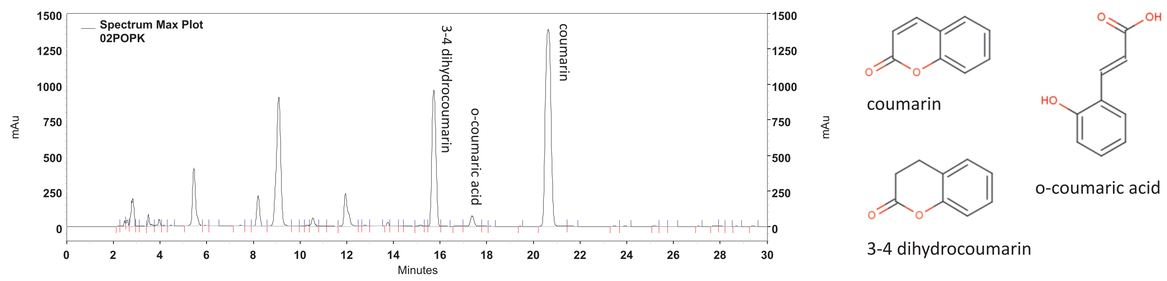

Figure 2. Sample chromatogram of the Southern sweet grass herb methanol extract

CONCLUSIONS

The obtained results indicate that, irrespectively of the method of stabilization, content of all marked active compounds in the Southern sweet-grass herb distinctly reduced. The smallest loss of coumarins (most important of the usable point of view group of compounds) and flavonoids occur in the raw material dried in natural conditions. In this variant of stabilization raw material also has satisfactory assimilate pigment content. Therefore this way of Southern sweet-grass herb stabilization has proved to be the best for that raw material, although it lasts longer than drying in closed ovens and high temperature.