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Original Article

Comparative Study of the Active Ingredients Content *Plantago lanceolata* L.

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Abstract

This paper tries to capture the differences that may arise regarding the content in active principles of medicinal plants cultivated, studied compared with their corresponding wild flora.

Keywords: spontaneous flora, active principles, phenols.

1. Introduction

The paper tries to capture the differences that may arise regarding the content in active principles of medicinal plants cultivated their corresponding comparative studies of spontaneous and establish the extent to which application of appropriate technologies and differentiated affect their quality [1].

2.Material and Method

In this paper, we studied *Plantago lanceolata* (plantain narrow). Content of active ingredients harvested from spontaneous flora variants were studied in comparison with variants harvested from culture.

Plantago lanceolata is a species of herbaceous perennial with short rhizome, which grows leaves arranged in rosettes and flowering stems right scapiphorm, complete with a flower (simple ear) leaves are linear - lanceolate, pubescent, acuminate tip and long petiole.

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It blooms from late June to September. Plant is Eurasian origin, but is now widespread in all continents [1]. In our country, narrow plantain is widespread in the wild flora of the plains to the mountains, along with two other related species (*Plantago major* and *Plantago media*).

Use leaves (*Plantaginis lanceolate folium*) containing: aucubozidă (aucubină, riniantină) at a rate of 1-3%, catalpozină (catalpol) poliglucide, mucilage (arabogalactani and xylan), pectin (5-10%), organic acids (phenolic etc.), flavonoids, carotenoids, tannins, waxes, amino acids, vitamins, minerals etc. [1]. *Plantago lanceolata* (plantain narrow) was harvested from Dorna Depression, Suceava county, city Dorna Candrenilor from a meadow to exhibit east (second mowing), September 2010.

Cultivated variant was collected in the same period of collection of medicinal plants of crop discipline. Culture was established by direct sowing at a distance of 50 cm between rows and 25 cm between plants in the row. During vegetation to soil was maintained clean by two hoeing weeds.

Leaf harvesting was done before inflorescence emergence, after which the material

was immediately dried naturally. In *Plantago lanceolata* determined phenols content and chromatographic separation of phenolic compounds by high performance liquid chromatography (HPLC) for both of spontaneous origins and those from the culture. Analyses were performed in the subject of Chemistry, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca.

3.Results and Discussions

A. Determination of total polyphenols in samples of *Plantago lanceolata*

The principle of the method consists in the determination of polyphenols from plant sources by measuring the optical density of a primary extract, which by complexation with Folin-Ciocalteu Vis absorption in the wavelength λ = 750 nm.

Dry sample was repeatedly extracted with 10 ml of 40 % ethanol by sonication 15 min. After 2 hours the absorbance was read at λ = 750 nm sample compared to the control (blank). From the calibration equation was calculated amount of polyphenols (expressed in mg/ml plant extract).

The results for the two samples of *Plantago lanceolata* are presented in table 1.

Table 1.The amount of polyphenols in samples of *Plantago lanceolata*

No. crt.	Name	Quantity polyphenols sample (mg /100 g sample)
1.	*Plantago lanceolata* 1 (spontaneous)	950
2.	*Plantago lanceolata* 2 (culture)	1000

B.Chromatographic separation of phenolic compounds by high performance liquid chromatography (HPLC)

Plantago lanceolata samples were prepared as follows: 1 g sample was extracted in 10 ml 95% methanol acidified with conc. 1% HCl. The extract was filtered through qualitative filter paper and filter milipor for injection into the HPLC system.

Chromatographic separation. HPLC separation of phenolic compounds in methanolic extracts was performed in an Agilent 1200 HPLC system with UV-Vis detector. Mobile phase gradient was used (table 2) flow of 1ml/min follows:

Table 2.The proportion of solvents A and B mL/minute

	Time				
	0	10	30	45	55
Solvent A %	100	85	50	15	100
Solvent B %	0	15	50	85	0

Solvents: A - methanol/glacial acetic acid/water in a ratio of 02/10/88; B - methanol/glacial acetic acid/water in a ratio of 90/3/7. Separation was done on a Supelcosil LC 18 Collar size 250mm x 4.6 mm x 5 mm. For each injection were used 20 ml extract,temp., 25 ° C. Separation was done at the wavelength λ = 280 nm.

Identification of phenolic compounds. Identification of phenolic compounds (fig. 1) was made by comparing the retention times with the retention times of the standards of evidence.

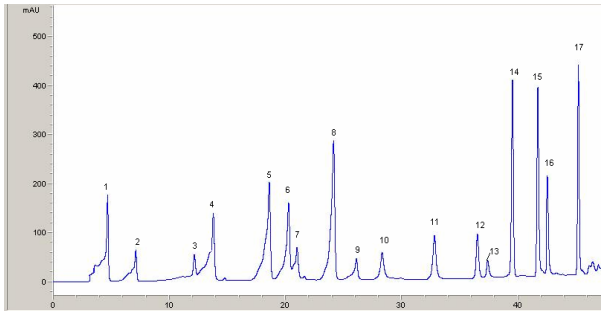

Figure 1. Chromatogram of standard phenolic compounds

Phenolic compounds identified in sample 1

No. peak	Standard Name peak	Retention time (tR)
1.	Gallic acid	4,662
2.	**acid protocatecuic**	7,114
3.	**chlorogenic acid**	12,155
4.	**caffeic acid**	13,755
5.	p-cumaric acid	18,569
6.	ferulic acid	20,271
7.	sinapic acid	20,993
8.	o-cumaric acid	24,091
9.	**routine**	26,096
10.	miricetina	28,275
11.	quercetin	32,782
12.	kemferol	36,486
13.	izorhamnetin	37,359
14.	pinocembrin	39,525
15.	chrysin	41,675
16.	galangin	42,544
17.	pinostrobin	45,182

For samples of *Plantago lanceolata* the following chromatograms were recorded (figs. 2 and 3):

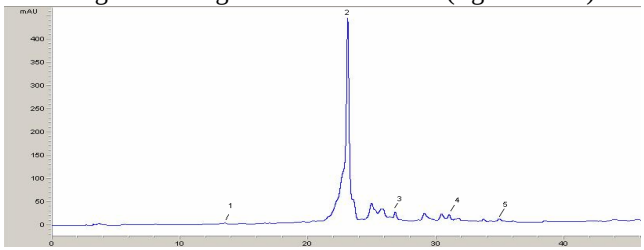

Figure. 2. Chromatogram of methanolic extract *Plantago lanceolata* 1 (fingerprint recognition)

Table 4. Phenolic compounds identified in sample *Plantago lanceolata* 1

Nr. peak	Name phenolic compound peak	Retention time (tR)
1.	cafeic acid	13,755
2.	**acid o-cumaric**	**24,091**
3.	routine	26,096
4.	quercetin	32,782
5.	kemferol	36,486

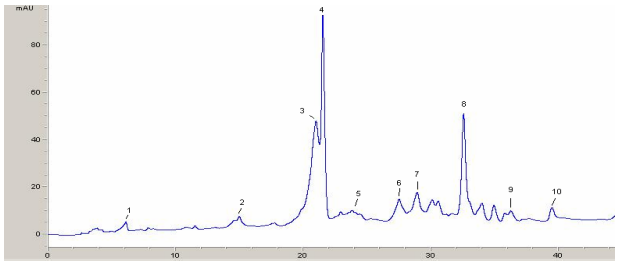

Figure 3. Chromatogram of methanolic extract *Plantago lanceolata* 2

Table 5. Phenolic compounds identified in sample 2

Nr. peak	Name phenolic compound peak	Retention time (tR)
1.	acid protocatecuic	7,114
2.	cafeic acid	13,755
3.	**ferulic acid**	**20,271**
4.	**sinapic acid**	**20,993**
5.	o-cumaric acid	24,091
6.	routine	26,096
7.	miricetina	28,275
8.	**quercetin**	**32,782**
9.	kemferol	36,486
10.	pinocembrin	39,525

4.Concusions

It is found that *Plantago lanceolata* sample of spontaneous (table 4) has o-coumaric acid composition as major phenolic compound, while *Plantago lanceolata* sample obtained from culture has a varied composition (table 5), rich in acid o-coumaric (major) and ferulic acid (phenolic acid) and quercetin (flavonoid).

Consequently, *Plantago lanceolata* grown sample is high, both in terms of quality (various phenolic compounds with antioxidant character) and quantitative (1000 mg/100 g) than of spontaneous version. It is advisable to take the culture of this species (although it is frequently and spontaneous flora) for several reasons:

- Quality combined with high production through growing and climatic conditions suitable location and correct application of technology culture;
- Avoid contamination at harvest material of uncertain origin, which devalues their quality;
- Can harvest the best time in phenophase the maximum content of active principles;
- Is drying and conditioning them to optimal standards.

References

[1] Muntean L., M.Tamaş, S. Muntean, L.Muntean, M. Duda, D.I. Varban , S**.** Florian, 2007, Tratat de plante medicinale cultivate şi spontan*e,* Ed. Risoprint, Cluj-Napoca