3rd International Scientific Virtual Conference
AGROECOSYSTEM SUSTAINABILITY
Links between Carbon Sequestration in Soils, Food Security and Climate Change
Vytautas Magnus University Agriculture Academy, Lithuania, 2–3 December, 2020

CHANGES IN THE MINERAL CONTENT OF WILD STINGING NETTLE (*URTICA DIOICA* L.) AS INFLUENCED BY THE HARVESTING TIME

Aurelija PAULAUSKIENĖ, Živilė TARASEVIČIENĖ, Vanesa ŠLIAŽAITĖ

Vytautas Magnus University Agriculture Academy,
Agricultural and Food Sciences Institute, Lithuania

INTRODUCTION

The human requires different amounts of vitamins and minerals to stay healthy, especially in the spring when the immunity becomes weaker. The diet can be supplemented with edible plants starting to grow in early spring. The nettle is considered a weed, but herewith can be used as a medical herb with a high content of minerals.

Object of the investigation was the leaves of wild stinging nettle's (*Urtica dioica* L.). Nettle leaves were collected once a month from April to September 2019 in the same place, Vytautas Magnus University Agriculture Academy orchard (54° 53′ N, 23° 50′ E) in Kaunas district.

The aim of this research was to determine effect of different harvesting time on stinging nettle mineral composition.

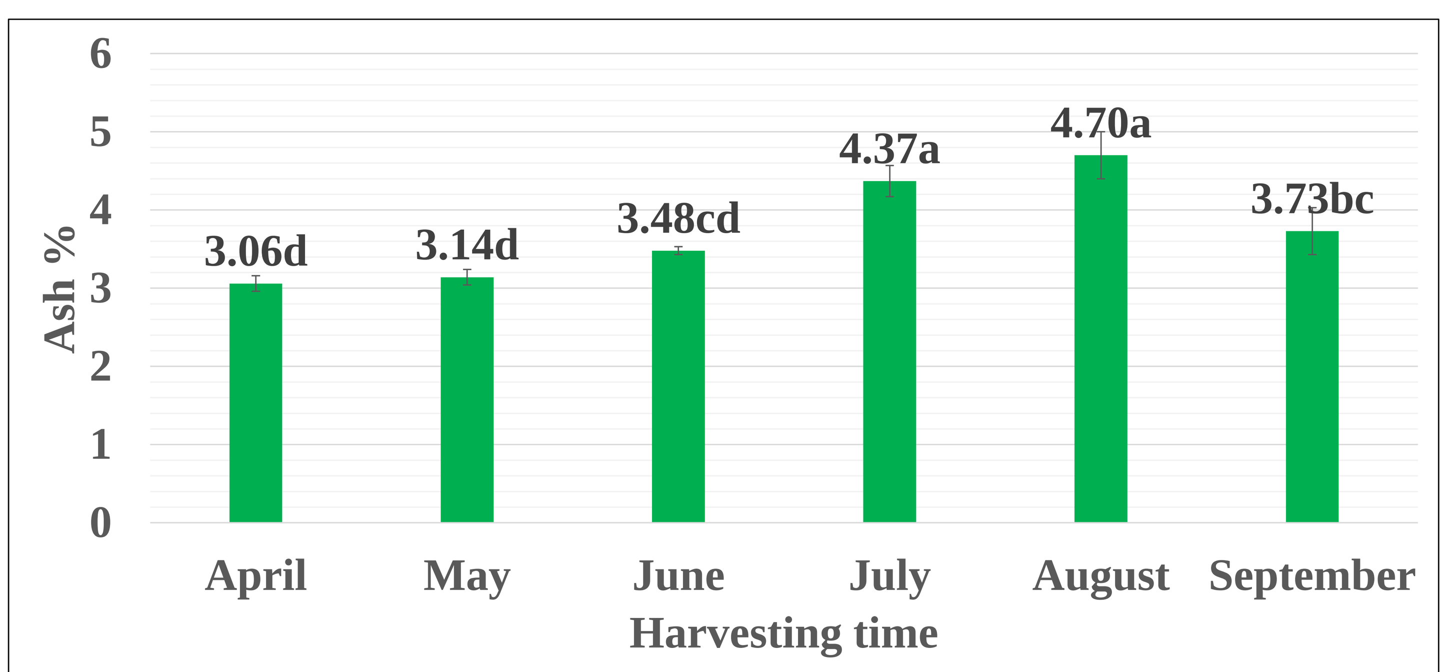
MATERIALS AND METHODS

The amount of crude ash in leaves was determined by dry burning samples at a temperature of 550 °C. The nitrogen content was established by the standard Kjeldalh method, phosphorus and potassium – by flame photometric method. Magnesium, iron, copper, manganese, zinc, boron was determined by atomic absorption method.

The data analysis was carried out with STATISTICA version 7 software. The results were analysed using one-way analysis of variance (ANOVA). Fisher's Least-Significant-Difference test (LSD) was applied to the experimental results to assess significant differences between mean values at the significance level of $p < 0.05$.

RESULTS

Essentially higher amounts of ash were distinguish in nettle leaves collected in July and August (Figure 1).



Significant differences ($p < 0.05$) are marked by different letters.

Figure 1. Ash content in the nettle leaves % DW

The nettles harvested in April characterized by a highest level of nitrogen (4.69%), phosphorus (1.02%), potassium (3.60%), iron, (526.20 mg kg^{-1}), and zinc (34.20 mg kg^{-1}) (Table 1 and Table 2). The highest amount of calcium (3.97%), magnesium (0.81%) and boron (62.13 mg kg^{-1}) was found in leaves of plants collected in September at the end of growth season. The highest amount of copper (18.43 mg kg^{-1}) was determined in plants harvested in June. Nettles leaves in July was distinguished by manganese (57.40 mg kg^{-1}) content.

Table 1. Mineral elements content in nettle leaves % DW

Minerals %	Harvesting time					
	April	May	June	July	April	September
Nitrogen	4.69 ± 0.01^{a*}	3.41 ± 0.01^{b}	2.95 ± 0.01^{c}	2.92 ± 0.01^{d}	2.70 ± 0.01^{e}	2.49 ± 0.01^{f}
Phosphorus	1.02 ± 0.01^{a}	0.83 ± 0.01^{b}	0.76 ± 0.01^{d}	0.72 ± 0.01^{e}	0.80 ± 0.01^{bc}	0.77 ± 0.02^{cd}
Potassium	3.60 ± 0.01^{a}	3.51 ± 0.01^{b}	2.98 ± 0.01^{d}	2.59 ± 0.01^{e}	3.41 ± 0.01^{c}	2.98 ± 0.00^{d}
Calcium	2.21 ± 0.01^{f}	2.85 ± 0.01^{d}	2.82 ± 0.01^{e}	3.32 ± 0.02^{b}	3.05 ± 0.01^{c}	3.97 ± 0.01^{a}
Magnesium	0.42 ± 0.01^{f}	0.46 ± 0.01^{d}	0.67 ± 0.01^{b}	0.68 ± 0.02^{b}	0.60 ± 0.01^{c}	0.81 ± 0.01^{a}

*Significant differences ($p < 0.05$) in lines are marked by different letters; for each measured parameter general mean ± SD is presented.

Table 2. Mineral elements content in nettle leaves % DW

Minerals mg kg^{-1}	Harvesting time					
	April	May	June	July	April	September
Iron	526.20 ± 0.12^{a}	148.37 ± 0.09^{e}	172.53 ± 0.09^{c}	165.40 ± 0.15^{d}	112.60 ± 0.12^{f}	223.60 ± 0.12^{b}
Copper	13.40 ± 0.15^{d}	17.53 ± 0.09^{b}	18.43 ± 0.12^{a}	13.87 ± 0.09^{c}	11.90 ± 0.12^{e}	10.23 ± 0.09^{f}
Manganese	40.90 ± 0.06^{e}	48.13 ± 0.09^{c}	48.87 ± 0.15^{b}	57.40 ± 0.06^{a}	30.50 ± 0.06^{f}	42.11 ± 0.02^{d}
Zinc	34.30 ± 0.12^{a}	17.93 ± 0.09^{b}	16.60 ± 0.12^{d}	17.40± 0.06^{c}	12.70 ± 0.12^{f}	14.20 ± 0.12^{e}
Boron	40.07 ± 0.12^{e}	31.93 ± 0.15^{f}	50.20 ± 0.12^{d}	58.40 ± 0.12^{b}	52.77 ± 0.09^{c}	62.13 ± 0.09^{a}

*Significant differences ($p < 0.05$) in lines are marked by different letters; for each measured parameter general mean ± SD is presented.

CONCLUSIONS

The research data have shown that the amount of crude ash and mineral elements in nettle leaves depends on harvest time. The biggest amount of ash was established in leaves harvested in August, but the higher average content of mineral elements in leaves was found in April. In April harvested leaves were the biggest concentration of nitrogen, phosphorus, potassium, iron and zinc.