



## **Fund “Nauka” Project № 20006 Resume – Competition-Based Session 2020:**

“Investigation of polycyclic aromatic hydrocarbons in medicinal plants extracts and evaluation of their safety as food additives and pharmaceuticals”

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Main **goal** of the project: Determination of polycyclic aromatic hydrocarbons (PAHs) in extracts of medicinal plants and evaluation of their safety as food additives and pharmaceuticals.

### **Scientific tasks:**

1. Development of an analytical method for determination of PAHs in extracts of medicinal plants.
2. Investigation of polycyclic aromatic hydrocarbons in different medicinal plants and herbal teas.
3. Safety assessment of medicinal plants used as food supplements and pharmaceuticals.
4. Promotion and dissemination of project results.

### **Methods:**

1. The determination of PAHs in extracts of medicinal plants will be performed by gas chromatography using the analytical equipment available in the Department of Chemistry: Gas chromatograph GC Focus/ Polaris Q, as well as standard laboratory equipment.
2. The obtained results will be processed statistically and data will be used to calculate parameters for assessing the safety of medicinal plants by consumption of herbal teas and dietary supplements.
3. Daily intake (EDI) will be estimated by determining the possible transfer of PAHs into the human body by consumption of medicinal plants and dietary supplementation.

### **Expected results:**

1. Scientific data on the presence of polycyclic aromatic hydrocarbons in medicinal plants and herbal teas will be obtained.
2. A highly efficient ecological method for the determination of polycyclic aromatic hydrocarbons in medicinal plants will be developed by means of a gas chromatograph with mass spectrometric detector (GC/ MS).
3. An assessment of the safety of medicinal plants as food and as a resource for food additives and pharmaceuticals will be made.

### **Achieved results:**

1. Analytical procedures for sample preparation of dried herbal teas, their water and ethanol extracts have been developed. In aim the qualitative identification and quantification of polycyclic aromatic hydrocarbons (PAHs).
2. A new analytical method for sample preparation and gas chromatographic determination of 13 congeners PAHs in medicinal plants, dried herbal teas, water and ethanol extracts has been developed, which expands scientific knowledge in the field of analytical chemistry.
3. Dried herbal teas traditionally used in Bulgaria, as well as their water and ethanol extracts, were analyzed. The chemical analyzes were performed using a gas chromatograph with massspectrometry detection.
4. A theoretical safety assessment model has been developed, which enables, on the basis of the obtained results, to assess the potential exposure to polycyclic aromatic hydrocarbons when people taking medicinal plants as food supplements or when consuming herbal teas.
5. Evaluated Daily Intake (EDI) estimates how much PAHs can enter the human body when consuming herbal tea and taking supplements.
6. The results of the chromatographic analyzes for the content of PAHs in medicinal plants are summarized, the data are systematized and compared with literature data.
7. A summary assessment of the potential exposure when consuming herbal teas was made by calculating the Daily Intake (DI) and Hazard Quotient (HQ) using the average concentrations for the levels of PAHs in the aqueous extract of herbal teas.
8. The obtained results for PAHs content in ethanol extracts were used to evaluate the safety of herbal tinctures by applying the theoretical model.
9. The safety assessment of medicinal plants and nutritional supplements in relation to the investigated chemical pollutants shows that the intake of dried herbs in the form of teas or tinctures does not pose a danger to human health, and this is related to improving the quality of people's lives.
10. The results of the conducted research have been published in three full-text publications – two have been published and one has been submitted for publication.

### **Project Contributions:**

1. The results contribute to the enrichment of scientific knowledge by obtaining data on the levels of persistent pollutants such as PAHs in medicinal plants, nutritional supplements and herbal teas.
2. The developed highly efficient ecological method for the determination of polycyclic aromatic hydrocarbons in medicinal plants can also be applied in the analysis of other plant products.
3. The results achieved contribute to public health, because the safety assessment of medicinal plants and nutritional supplements is related to improving the quality of people's lives.
4. The scientific results were used to develop a PhD student's dissertation.