

Program title: Development of tools and strategies for higher valorization of natural resources in improving their sustainable exploitation in bio-industries and preserving the functioning of ecosystems "BIODIVERS"

Objective: Identification, characterization, authentication of bioactive phytocomplexes of plants integrated in formulas of functional foods and food supplements with multiple uses

Program code 16-190401

Project title: „Obtaining bioactive substances by biological and pharmacognostical evaluation of plant species native to the Danube Delta, usable in new food supplements and for sustainable local agricultural development”.

The project aims:

- The study of local plant resources of the Danube Delta in order to identify and capitalize the active principles of scavenger type (scavenger of reactive oxygen species) – polyphenols, flavones, tannins, coumarins, triterpenes and phytosterols, oil / volatile fractions, polyholosides, carotenoids, tocopherols, vitamin C, minerals. These bioactive compounds may be used alone / purified or in combination, **to obtain new formulas / food supplements** that can be attributed exclusively as "local brands" that could be capitalized by local people.
- Our research focuses on two groups of plant species characterized by a valuable antioxidant ("scavenger") potential: **herbaceous plants** (*Erodium cicutarium*, *Scirpoides holoschoenus*, *Althaea officinalis*, *Mentha aquatica* and *Mentha viridis*, *Lavandula angustifolia* / lavender) and **shrubs and semi-shrubs**: *Crataegus* (*monogyna* and *pentagyna*), *Prunus spinosa*, *Rosa sp.*, *Hippophae rhamnoides*/ sea buckthorn and *Lycium barbarum*/goji.
- The **transfer into cultivation** of the species best adapted to the paedo-climatic conditions of the area, based on the correlation of data on soil-water-precipitation. We will evaluate the cultures already established into areas near to Danube Delta, especially the *Hippophae rhamnoides* (sea buckthorn) and *Lavandula angustifolia* (lavender) in order to obtain organic certification by beneficiaries.
- Collaborating with local people willing to establish conventional culture on some areas, especially ecological cultures, enabling the raise of additional revenue, especially during the period when fishing is prohibited in order to **develop a sustainable local agriculture**.
- **Development of new types of plant extracts (fluid, soft, dry)** that would represent the raw material for the processors of natural products in order to obtain food supplements with preventive / curative use and *antioxidant, remineralizing, vitaminizing, anti-inflammatory, tonic, anti-aging and immunostimulatory* actions.
- Novelty approach starts from unlocking the **potential of medicinal and aromatic plant species (PMA) from the neighboring area of the Danube Delta**, biologically and pharmacognostically investigated. The research aims the morpho-physiological, phytochemical (quantitative and qualitative) analysis of wild populations of following

plants genera: *Erodium*, *Scirpoides*, *Althaea*, *Mentha*, *Crataegus*, *Prunus*, *Rosa*, and cultures - *Hippophae rhamnoides*, *Lycium barbarum*, *Lavandula angustifolia*.

- One of the objectives of the project is **the prognosis of the bioproductivity of the wild populations** of *Erodium*, *Scirpoides*, *Althaea*, *Mentha*, *Crataegus*, *Prunus*, *Rosa*, *Hippophae* *Lycium* and *Lavandula*, collected from less anthropised areas.
- We will push for **close collaboration with local growers** to inform them on how to establish an ecological culture, starting with propagating material collected from the growing areas of the selected plant species (plowing, sowing, application of agricultural techniques, harvesting, drying / conditioning). It will thus achieve a permanent link between farmers / local producers and food supplements SMEs processors, willing to buy the plant material that can be integrated into new formulations / products, which will increase the income of local people.

The importance and innovative character of the project lies in the complexity of activities: highlighting the biosynthetic and bioproduative potential of some medicinal and aromatic plant species characteristic of Danube Delta areas, some of which have endemic character (*Scirpoides holoschoenus*); the transfer of valuable plant species in experimental fields, outside the protected area by working closely with local growers, prerequisite for sustainable development and sustainable local agriculture; realization of new types of plant extracts as raw material for obtaining *new formulas / food supplements*; *the drafting of a monography on traditional medicine / ethno-pharmacy of Danube Delta*.

The complexity of the project consists in the diversity of issues addressed that require the use of various modern techniques of analysis (thin layer chromatography, HPLC, GC-MS, the determination of antioxidant activity (scavenger) by DPPH and Trolox activity, vitamin C test), the study of plant variability at the morpho-biochemical and bioactive complex level and the evaluation of the bioproductivity of the natural populations. The data obtained will be analysed to develop predictions on the conservation of natural biodiversity and habitat restoration by keeping the genetic resources and transfer into conventional culture of phytochemically/phytotherapeutically valuable species (populations).

The research addresses these issues by interdisciplinary studies involving biology, biochemistry, physiology, genetics, ecology, geochemistry and bioinformatics.