

DESCRIPTION FOR THE GENERAL PUBLIC

The aim of the project is evaluation of effectiveness of elicitation, a new modification used in plant cultivation, for improving bioactivity of obtained herbs and creating a knowledge base able to develop recipes for preparing food biofortified with herbs.

The growing consumer interest in quality and safety of food tends to look for new ways to improve the quality of products. This trend also involves plant-based foods consumed unprocessed, i.e. fresh fruits, vegetables or herbs.

The raw material quality could determine the quality of final products so there has been growing interest in methods increasing the quality and safety of fresh plant raw materials. There are three main ways to improve the quality and safety of plant production. In case of unprocessed food these treatments are limited to genetic modification (which are still poorly accepted by consumers), agronomical manipulation (especially fertilization) and elicitation. Elicitation, being a method of natural induction of plant resistance mechanisms by natural or chemical compounds treatment, could be proposed as a new alternative, non-conventional and ecologically-friendly approach for plant protection. The second context of using elicitation (consisting in soaking of seeds or spraying of plants) may be an induction of synthesis of compounds with health promoting properties (bioactive compounds). The proposed project focuses on investigating the mechanisms behind with increased biological activity of elicited herbs. Because lovage can be grown in greenhouses, in pots it is reasonable to use it as a model plant. However, the study also indicate many health-promoting properties of herbal plants, mainly due to occurring in them bioactive compounds i.e. vitamins, phenolic compounds or the components of the essential oil.

First stage of the project focuses on selection of lovage elicitation parameters, which most effectively induces the production of bioactive compounds and have not negative impact on the plant yield and quality. In this stage the health-promoting activities (antioxidative and anti-inflammatory activity) of tested herbs will be also determined. Plants will be grow in pots with a capacity of 600 ml under controlled conditions (temperature, humidity, lighting) in a growth chamber. Twenty one-day-old plants will be sprayed with a water solution of tested elicitors. 25 days after elicitation will be carried out assessment of yield plant. Next plants will be collected and used in the further analysis. In this step of project the effect of elicitation on the activity the selected enzymes of primary and secondary metabolism will be analyzed.

Then, herbs selected in the first stage of the cultivation will be analysed in more details using modern analytical methods (high-performance liquid chromatography (HPLC) - quantitative - qualitative analysis of phenolics; gas chromatography (GC) and GC/mass spectrometry (MS) - analysis of the composition of the essential oil). Additionally, these herbs will be multidirectionally tested for their health-promoting properties (antioxidant, antimicrobial, anti-inflammatory, antihypertensive, antidiabetic and anticancer activity). For determination bioavailability of bioactive compounds, digestion of studied herbs and proposed potential products in a simulated gastro-intestinal tract will be performed.

In addition to fresh herbs in human diets also the dried herbs used as spices are important. Furthermore, dried herbs are of paramount importance in food technology, as they can be used as additives in various products. Therefore, an important aspect of the proposed study is also to determine the effect of different drying methods on quality and biological activity of the tested herbs.

The designed research will expand the knowledge of food technology and nutrition by indication of the elicitation process as novel potential for biofortification of plant-origin food, mainly in the context of enrichment of plants with compounds determining their biological properties. The proposed line of the research may establish a new approach to providing health-essential bioactive nutrients, which will involve consumption of biofortified plants instead of application of dietary supplements.