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SOIL MICROBIOME IN THE AGROECOSYSTEMS OF MEDICINAL PLANTS

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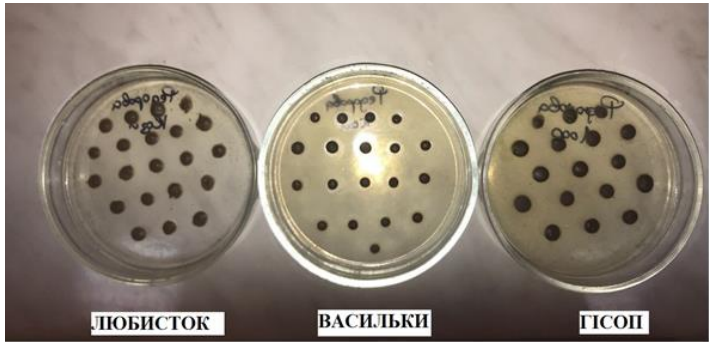
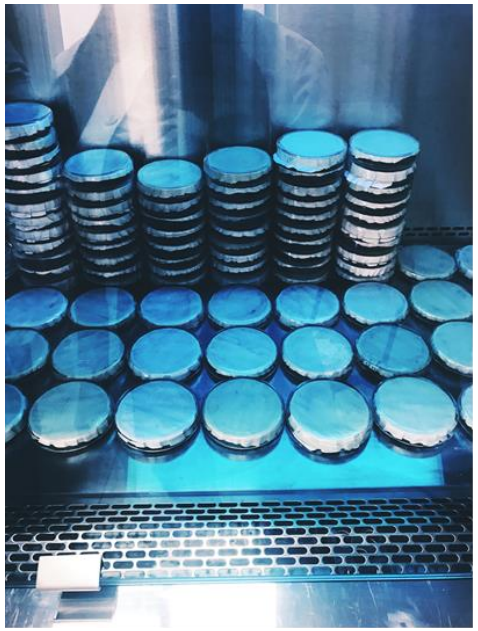
Introduction

Agrophytocenology, the study of the interactions between plants and their environment, has recently been focusing on the introduction of multifunctional crops into agricultural systems. These crops have antimicrobial, antiseptic, and allelopathic agents, which can lead to the formation of a specific soil microbiome in the agroecosystems where they are cultivated. Two such crops are Ocimum basilicum and Levisticum officinale, which are not only valued for their ornamental and medicinal properties but are also important agro-ecological resources. Ocimum basilicum L. merits attention due to a number of bioeconomic properties of value: high taste qualities and phytomass production, rich in biologically active substances.





Materials and Methods

- The soils of the experimental field are soddy-brown loamy podzolizedmedium loamy.
- Agrochemical characteristics of the arable layer: pH (KCL) - 5.0, hydrolytic acidity – 2.6 mg-eq/100 g of soil, humus content (according to Tyurin) – 1.56%, mobile phosphorus (according to Chirikov) – 1.9, exchangeable potassium (according to Maslova) – 14.1mg/100 g of soil.
- The area of plots: sown - 240 m² , accounting - 100 m². Arrangement of variants in the experiment was systematic and sequential.
- For the study of physico-chemical and agrochemical indicators, they are mixed soil samples (6–8 individual samples) were taken in sterile jars using a sterile spatula to take soil samples from a depth of 10-30 cm. In the laboratory, soil samples were tested in triplicate.
- Soil biological studies were conducted during the period of active vegetation plants (May, September).

Materials and Methods

- Physico-geographic characteristics of the research area.
- Berehove district is located in the south-west of Zakarpattia region, has an area of 0.8 thousand km2 and a population of 81.8 thousand people. Berehove district has significant deposits of mineral resources (natural sulfur deposits are of national importance); the district is characterized by a temperate climate favorable for agricultural development.

Results

№		(CFU colony forming units / per 1 gram of absolutely dry soil) *10^6					%
		Micromycetes	**Ammonifiers**	**Oligotrophs**	**Pedotrophs**	**Anaerobes**	**Azoto-bacter**
1	***Ocimum basilicum***	**2,67±0,54**	**3,9±0,82**	**2,12±0,84**	**2,19±0,46**	**2,96±0,11**	**68,3±1,53**
2	***Levisticum officinale***	**1,78±0,90**	**9,7±0,72**	**2,13±0,69**	**1,78±0,09**	**1,74±,0,61**	**59,6±1,29**
3	***Hyssopus officinalis***	**1,15±0,26**	**8,1±0,22**	**1,97±0,28**	**2,56±0,89**	**1,45±0,19**	**61,5±1,67**

Results

- The percentage of nitrogen-fixing microorganisms was 77.67% and 84.38% in the agroecosystems of Ocimum basilicum and Levisticum officinale, respectively.
- Additionally, in the soil of Levisticum officinale was found the highest number of micromycetes (80.44*1000 CFU/g.d.s.) and ammonifiers (9.84*1000000 CFU/g.d.s.), while the soil of Ocimum basilicum had the minimum number of these ecological-trophic groups of microorganisms, with 40.23*1000 CFU/g.d.s. of micromycetes and 1.88*1000000 CFU/g.d.s. of ammonifiers. In 2021, research also found a significant difference in the content of soil anaerobic bacteria between the agroecosystems of Ocimum basilicum (60.45*10000 CFU/g.d.s.) and Levisticum officinale (180.34*10000 CFU/g.d.s.).

Conclusion

- The cultivation of these plants could have implications for soil health and fertility. Incorporating these crops into agricultural systems has the potential to benefit both human health and ecological sustainability.
- The taxonomic and functional succession of microbial populations in the soils of medicinal plant agroecosystems showed the species specificity of the soil microbiome.

THANK YOU FOR YOUR ATTENTION !

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