Inovatyvi metodika, leidžianti įvertinti ūkio veiklą ir parinkti efektyvų tvaraus ūkininkavimo modelį

1. Keywords: Operational efficiency, Environmental impact, Sustainable farming, Efficiency assessment, Farm management

2. Area: Agricultural Economics, Business

3. Subarea: Business management, distance soil and plant research

4. Theme: An innovative methodology for evaluating farm activity and choosing an effective sustainable farming model

5. Year: -

6. Summary: The project developed a sustainable farming methodology, which includes studies of soil cover properties and plant physiological parameters and moisture based on aerodistance spectrometric methods, as well as a complex economic assessment of farm resources. Applied research was performed to determine the parameters of accuracy and applicability of the developed methodology. Methods for calculating various spectral parameters in crops were used to assess the overall physiological characteristics and stress of plants. The methodology describes the process of calculating and compiling them. The economic activity of the surveyed farms was assessed and according to the obtained indicators, the methodology of sustainable farming was developed and verified. It consists of an overview of economic, environmental and managerial indicators that assess the ability of farms to farm sustainably and allow for better management decisions. A guide to using a sustainable farming model is also provided.

7. More detailed version of the summary: The project developed a methodology for sustainable farming, which consists of an overview of economic, environmental and managerial indicators that assess the ability of farms to farm sustainably and allow for better management decisions. Applied research was performed to determine the parameters of accuracy and applicability of the developed methodology. The methodology includes studies of soil cover properties and plant physiological parameters based on aerodistance spectrometric methods, as well as complex economic assessment of farm resources. Using hyperspectral photography and laboratory studies, the upper soil humus horizon of farm fields was investigated, electrical conductivity of soil cover was scanned, the amount of organic matter in it was determined and homogeneous boundaries of soil and soil cover areas were distinguished. From the obtained and processed spectral images and laboratory and electrical conductivity scanning data, using mathematical-statistical methods analytical algorithms have been developed. Remote sensing methods were also used to determine the spatial relief of farm fields. Methods for calculating various spectral parameters in crops were used to assess the overall physiological properties and stress of plants. The methodology describes the process of calculating and compiling them. Spectral images were used to calculate the Green Normalized Difference Vegetation Index(GNDVI), Modified Chlorophyll Absorption Continuum Index (MCACI), Ratio Vegetation Index (RVI), Leaf Area Index (LAI), moisture stress (deficiency) index MSI), a spectral indicator of the normalized difference between water content and deficit in plants and soil (the indicator is successfully applied to the analysis of both vegetation and soil cover) (Normalized Difference Vegetation Index – NDWI) and the redshift angle carbon index are mathematically related to the soil organic carbon content – humus, yield index (RE-CI), GIS layers and maps of these indicators in the studied fields have been created. Algorithms have been developed to implement the mentioned spectral indices/indicators, which automatically generate digital GIS spectral indicator layers, and display the obtained maps on the developed platform. The values of the obtained indicators affect the crop yield, on which the income of farms depends. Therefore, the economic activity of the surveyed farms was assessed: farm size, crop structure, yield, used machinery and management, farm material resources and technical base, as well as cost structure. The attachment “Methodology of Sustainable Farming” starting from page 90 provides a guide to the use of a sustainable farming model-spreadsheet.

8. Technology readiness level: 4. Technology validated in lab

9. Effect: Sustainable Farming, Economical, Agro-environmental protection

10. Argumentation: The developed methodology of sustainable farming helps to assess farms from the aspect of sustainability. The values of the indicators show in which area – economic, social and/or technological – farms should make more radical decisions in order to achieve better results. The use of the methodology improves farm management, increases efficiency and reduces the negative impact of farming on the environment.

11. **Project description:** -

12. **Project:** Effective farm management

13. **Education institution :** -

14. **Contacts:** Artūras Lakis +37052617111 arturas.lakis@laei.lt

15. **URL:** -

16. **Images:**
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17. **YouTube:** -

18. **Documents:** The content of the document.pdf