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THE IMPACT OF MODERN IRRIGATION SYSTEMS ON CORN CROP, WITHIN A FARM LOCATED IN GIURGIU COUNTY

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Abstract: This study aims to analyze the maize crop in Giurgiu County, focusing on the assessment of climatic conditions and the water requirement for this crop. The study is carried out within the Agro Mares SRL farm, a reference agricultural unit in Giurgiu, which has implemented modern irrigation systems to face climate challenges. The analysis is based on climatic and agronomic data collected during 2021-2023, using calculation methods such as Thornthwaite and Lowry-Johnson to determine evapotranspiration and water consumption. Through this approach, the paper provides a detailed perspective on the impact of climate variability on the corn crop and the efficiency of the irrigation systems implemented. The study emphasizes the importance of continuous monitoring of climatic conditions and efficient management of water resources, highlighting the need to adopt advanced technologies and sustainable agricultural practices.

Introduction

In the Romanian context, maize is one of the main agricultural crops, playing a crucial role in the rural and national economy. Romania is one of the largest producers of corn in the European Union, with Giurgiu County being among the regions with significant production. Maize is valued for its high nutritional value, with a high content of carbohydrates, proteins and other essential substances.

Rising temperatures, rainfall variability and extreme weather events affect agricultural productivity and require effective adaptive strategies.

In this context, the proper management of water resources and the implementation of advanced irrigation technologies become essential for maintaining and increasing Agricultural yields.



GIURGIU COUNTY
(<https://pe-harta.ro/giurgiu/>)

Material and method

In the experimental field, the Agro Mares SRL farm, from Giurgiu county, the determination of water consumption for the corn crop was carried out for the last three years, respectively 2021, 2022 and 2023, and the implementation of pivot type irrigation systems in 2023 on an area of 343 ha.

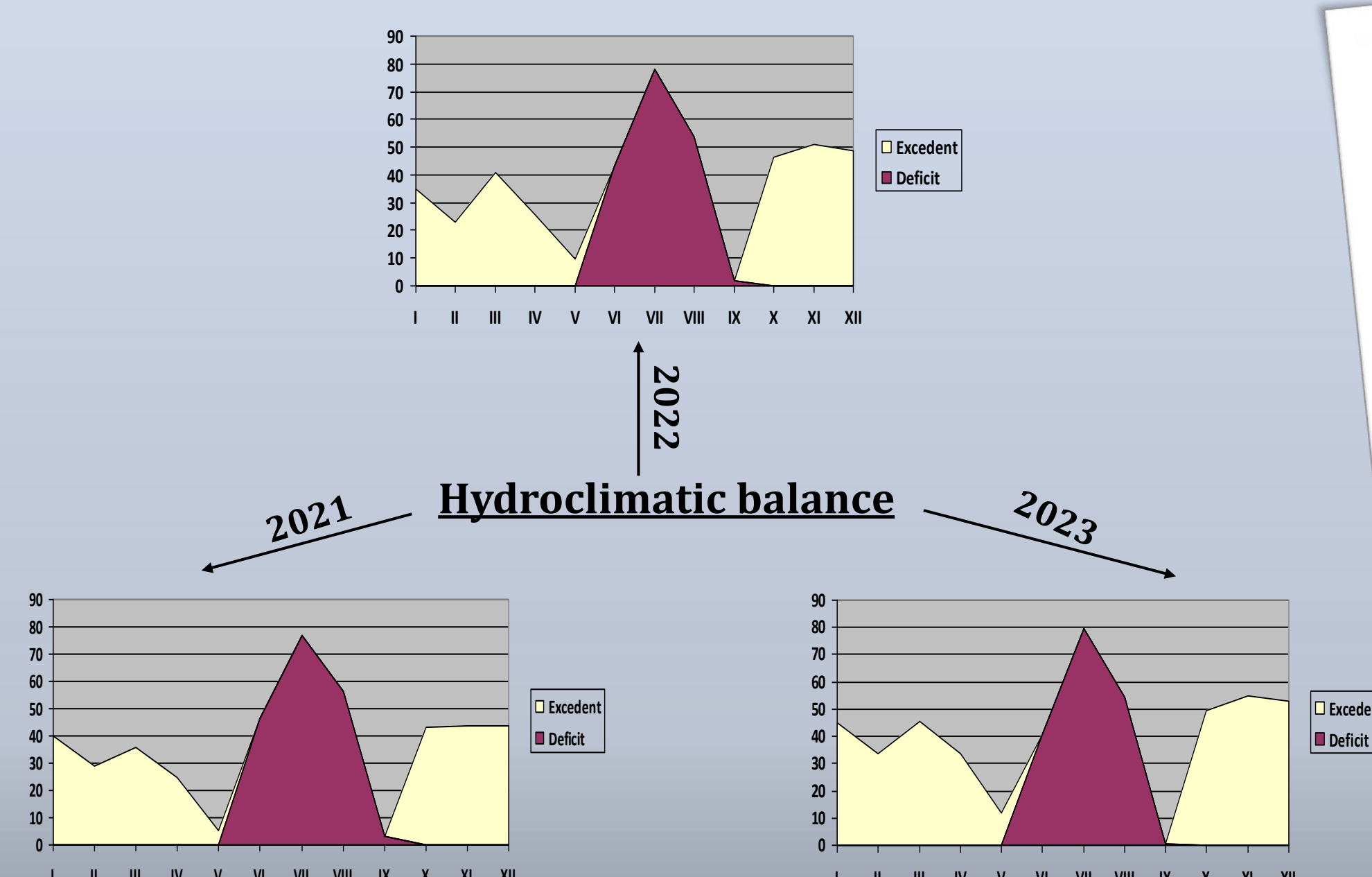
In this study, the climatic elements of the studied years were analyzed, namely:

- The thermal and annual regime, respectively its evolution during the analyzed period, with the differences compared to the multi-annual averages also being calculated;
- The rainfall regime and those during the vegetation period recorded at Giurgiu, respectively the evolution and deviation from the multiannual averages;
- Evapotranspiration (ET), monthly, annual values and during the vegetation period calculated using the Thornthwaite and Lawry-Johnson formulas. The data obtained using these formulas are multiplied by the correction coefficients from the literature for each month for the given conditions;
- Annual hydroclimatic balances and throughout the vegetation period.

Results and discussions

Effective irrigation planning and management becomes essential to compensate for possible water deficits resulting from higher temperatures and variable rainfall. Due to the fact that rainfall was deficient in all 3 years and had a significant impact on maize, it follows that it required additional irrigation, especially during the critical growing period (April-September). Water deficit can negatively affect vegetative development phases, panicle formation and grain filling.

The hydroclimatic balance in Giurgiu county for the years 2021-2023 shows significant variations in precipitation and potential evapotranspiration, with a direct impact on the corn crop. In this case, to ensure optimal maize production, it is crucial to implement efficient irrigation systems to compensate for the water deficit not covered by rainfall.



Pivot irrigation system implemented at the agricultural unit

CONCLUSIONS: The study on irrigation systems and climatic conditions in Giurgiu in the period 2021-2023 reveals significant changes in the thermal and pluviometric regime. The irrigation systems implemented at the Agro Mares SRL ensured an adequate coverage of the water requirement, contributing to the maintenance of optimal yields even in conditions of pluviometric deficit.

Pivot irrigation systems offer many advantages, including reduced soil compaction and water loss, as well as the ability to regulate the speed and intensity of watering. The technical specifications of these systems include optimized water and energy consumption, adequate operating pressures and effective water filtration to prevent clogging and equipment wear.