

EVOLUTION OF SOIL CHEMICAL CHARACTERISTICS UNDER THE IMPACT OF VARIOUS AGRICULTURAL TECHNOLOGIES AND ECONOMIC SCENARIOS IN SOUTHERN ROMANIA

Burtan Lavinia¹, Dumitraşcu Monica^{1*}, Anghel Amelia Victoria¹, Petre Marius Bogdan⁴, Petcu Victor^{2,3}, Ciornei Laurenţiu³

¹ National Research and Development Institute for Soil Science, Agrochemistry and Environment - ICPA Bucharest, Mărăşti Blvd, no. 61, District 1, Bucharest, Romania

^{2,3} Centre of Study and Research for Agroforestry Biodiversity “Acad. David Davidescu”, Calea 13 Septembrie, no. 13, District 5, Bucharest, Romania

³ National Agricultural Research and Development Institute Fundulea, Nicolae Titulescu str., no. 1, Fundulea, Călăraşi County, Romania

⁴ University of Economic Studies, Romană Square, Bucharest 010374, Romania

Corresponding authors. E-mail: monica.dumitrascu@icpa.ro

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INTRODUCTION

Agricultural intensification has become a necessary evil, as it is crucial worldwide to feed a growing population and support urbanisation and economic growth. There is no magical solution to increase food production without environmental side effects (Lee et al., 2023; Poudel et al., 2024). For instance, in the past, climate change has led to significant yield drops in intensively managed croplands. Globally, under the most severe climate change scenarios, cereal crops (millet, sorghum, rice, wheat and maise) are expected to lose between 7% and 23% of their yield. Maise and rice appear to be among the most affected (Pereira et al., 2025).

MATERIALS AND METHODS

Two soil tillage systems were tested, the conventional system (classical) and the conservative system (minimal tillage), in the following locations: Mavrodin, Teleorman county; Sohatu, Calarasi County and Afumati, Dolj County. The soil classes identified in the studied areas are Cernisoles, with the types cambic Chernozem and typical Faeoziom and Luvisoles with the type reddish Preluvosol (WRB-SR 2014). Soil samples were collected by 5-10; 25-30 and 45-50 cm depths and their and chemical properties were determined in the laboratory according to standardized methodology.

RESULTS AND DISCUSSIONS

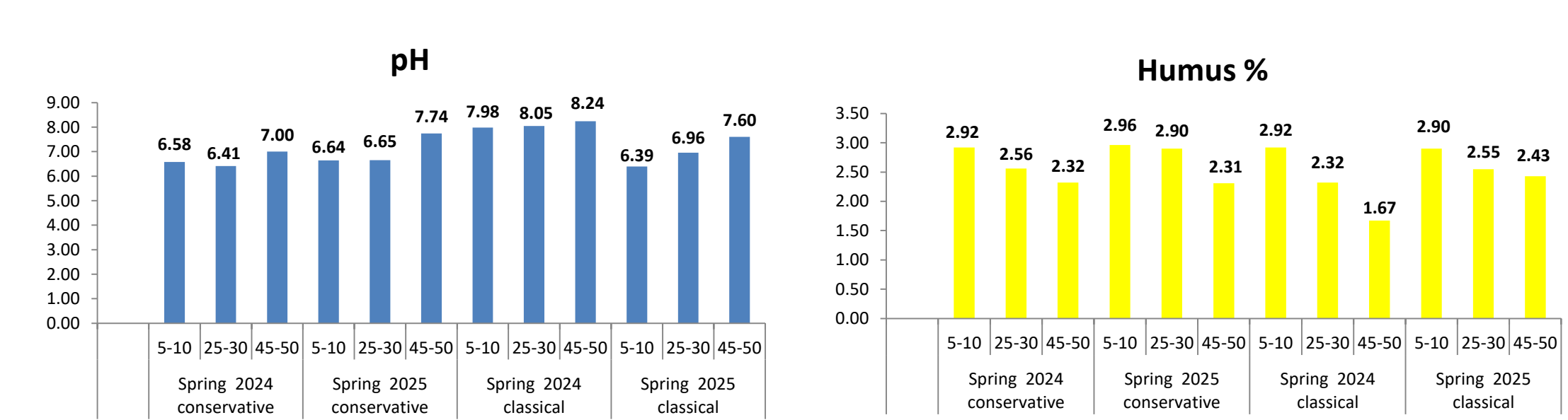


Figure 1. Influence of soil tillage on soil reaction the Afumati unit Dolj County

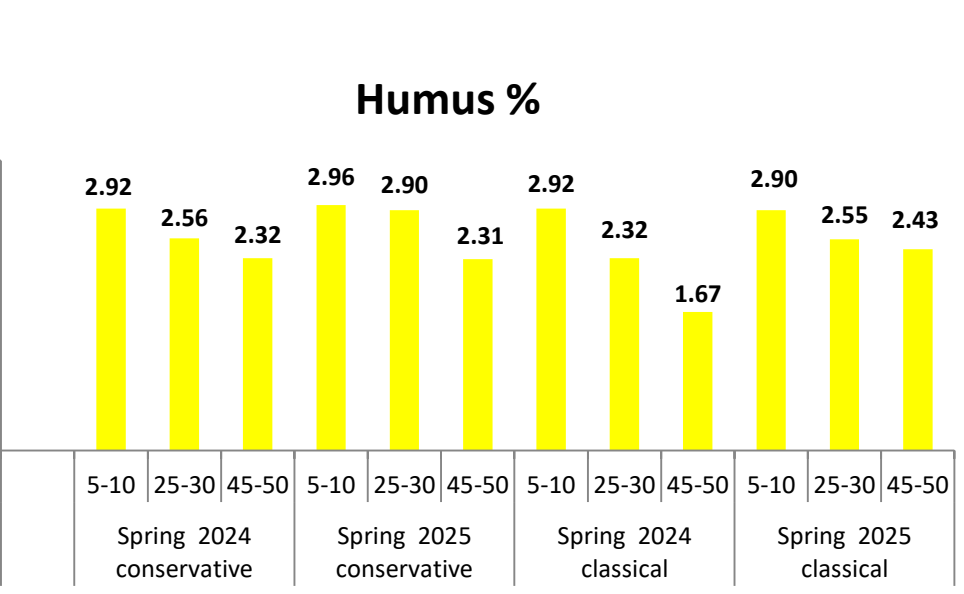


Figure 2. Influence of soil tillage on humus content the Afumati unit Dolj County

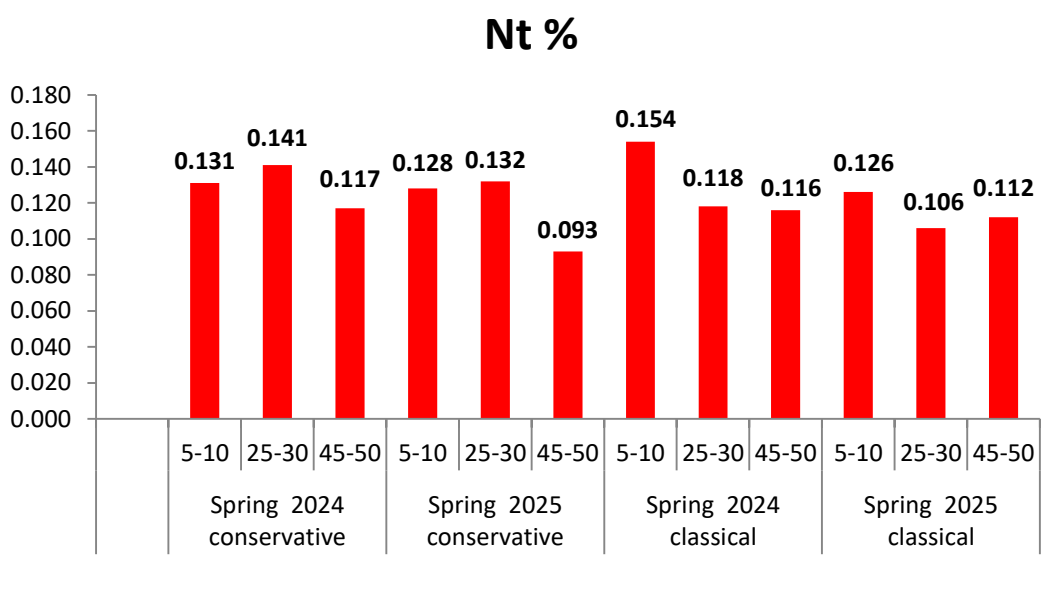


Figure 3. Influence of soil tillage on total nitrogen the Afumati unit Dolj County

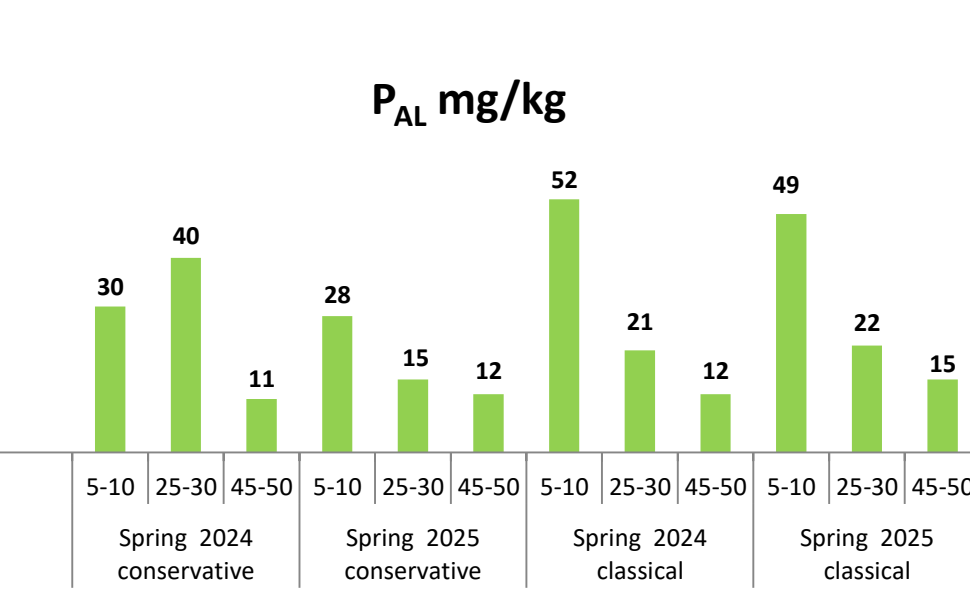


Figure 4. Influence of soil tillage on mobile phosphorus the Afumati unit Dolj County

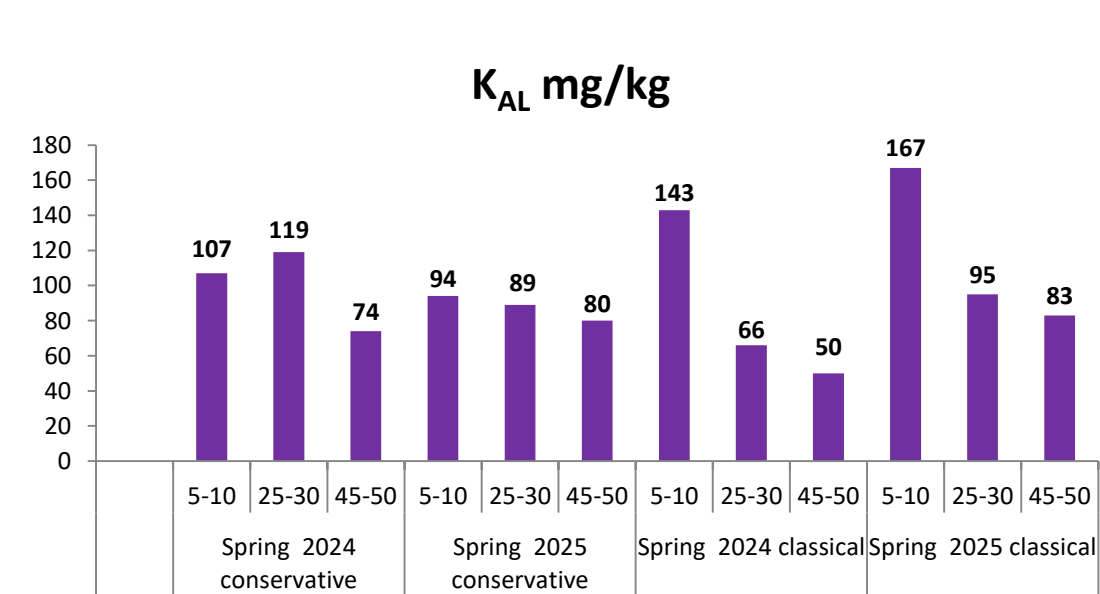


Figure 5. Influence of soil tillage on mobile potassium the Afumati unit Dolj County

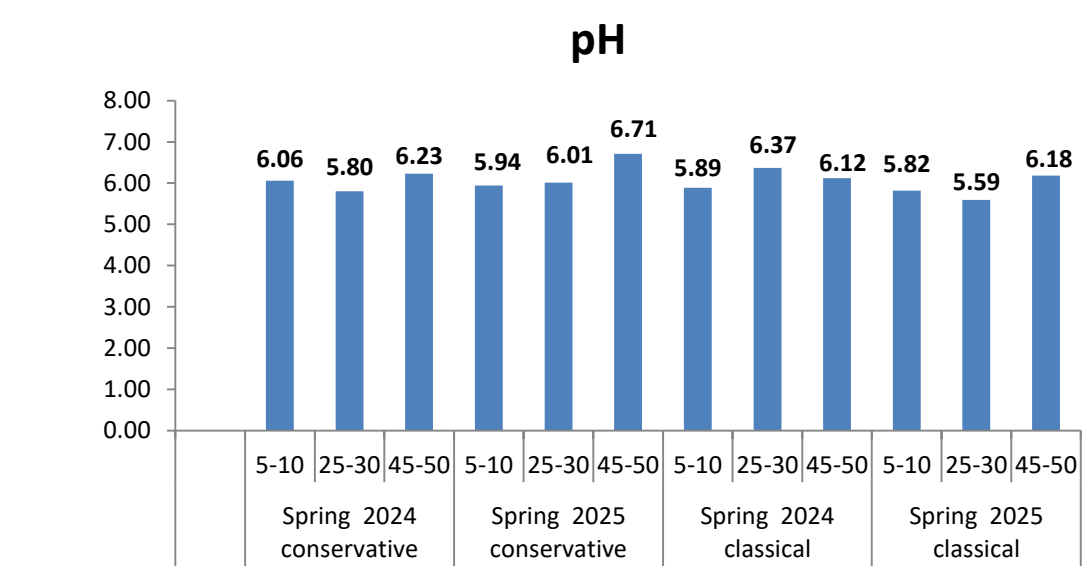


Figure 6. Influence of soil tillage on soil reaction the Mavrodin unit Teleorman County

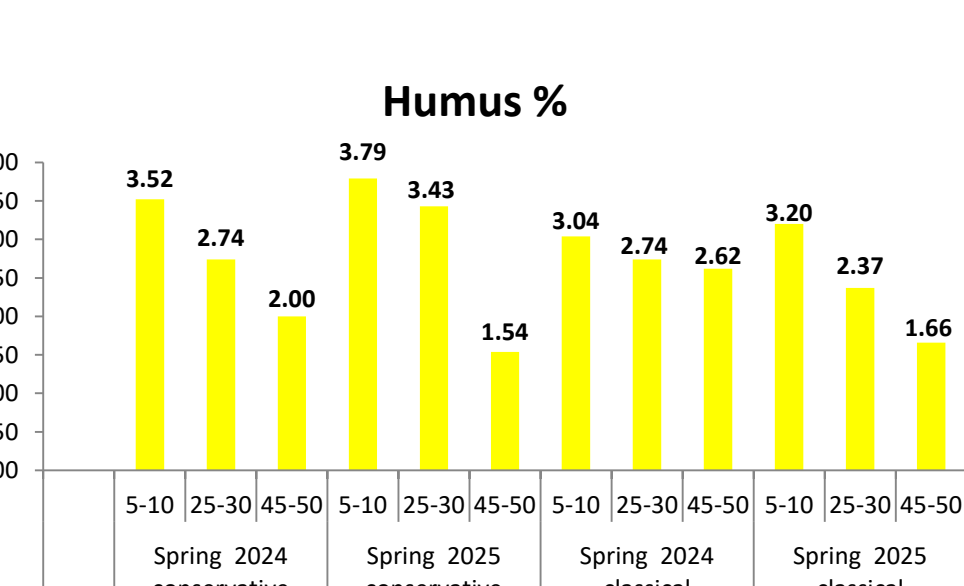


Figure 7. Influence of soil tillage on humus content the Mavrodin unit Teleorman County

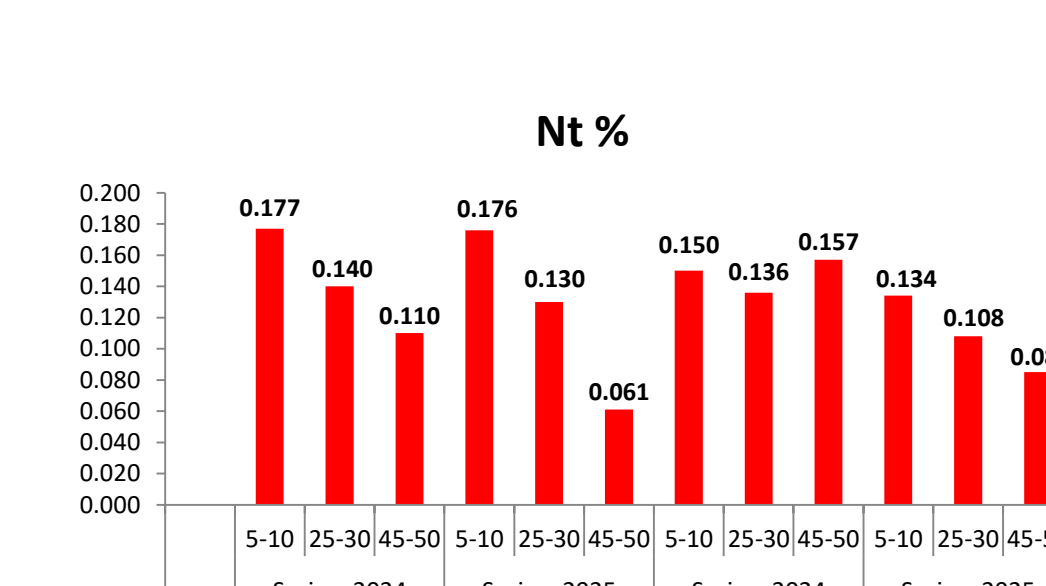


Figure 8. Influence of soil tillage on total nitrogen the Mavrodin unit Teleorman County

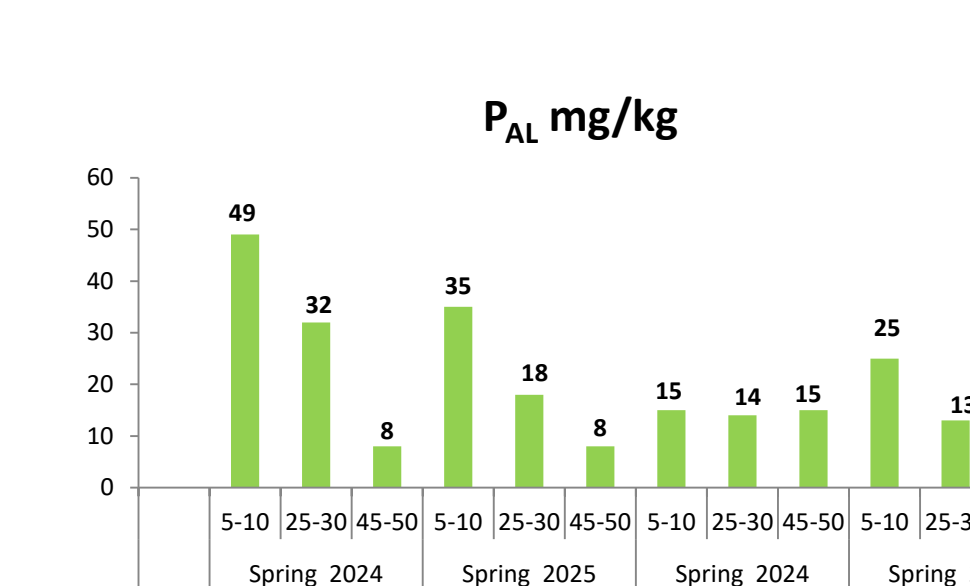


Figure 9. Influence of soil tillage on mobile phosphorus the Mavrodin unit Teleorman County

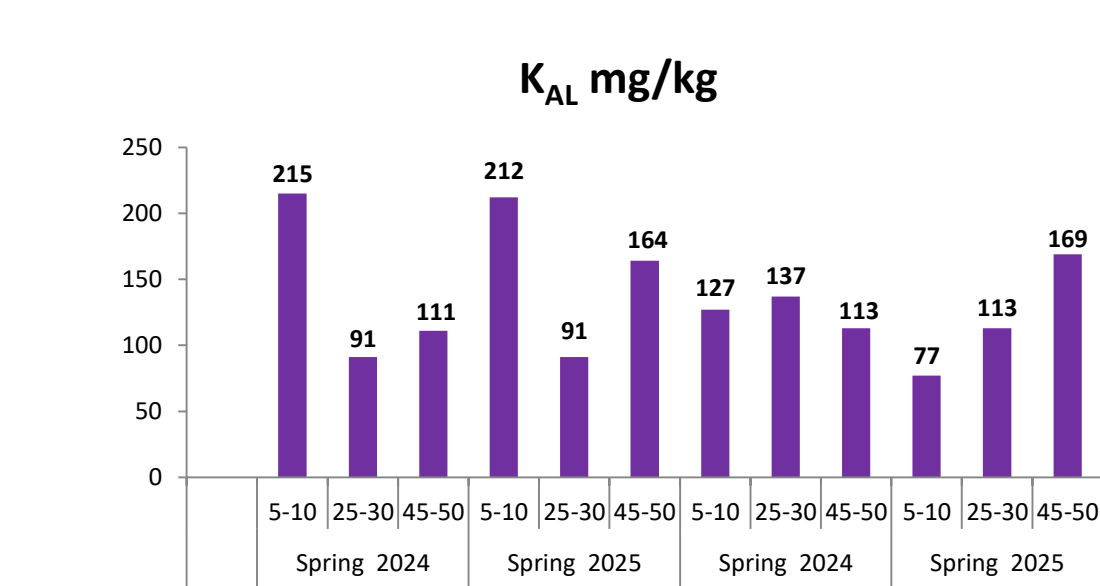


Figure 10. Influence of soil tillage on mobile potassium the Mavrodin unit Teleorman County

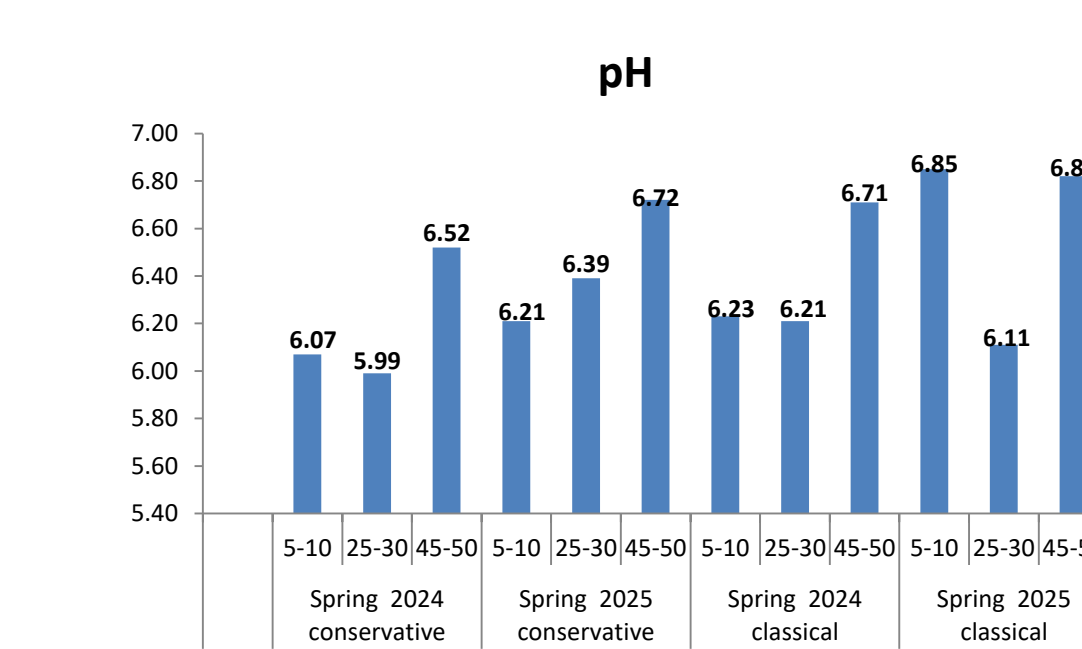


Figure 11. Influence of soil tillage on soil reaction the Sohatu unit Calarasi County

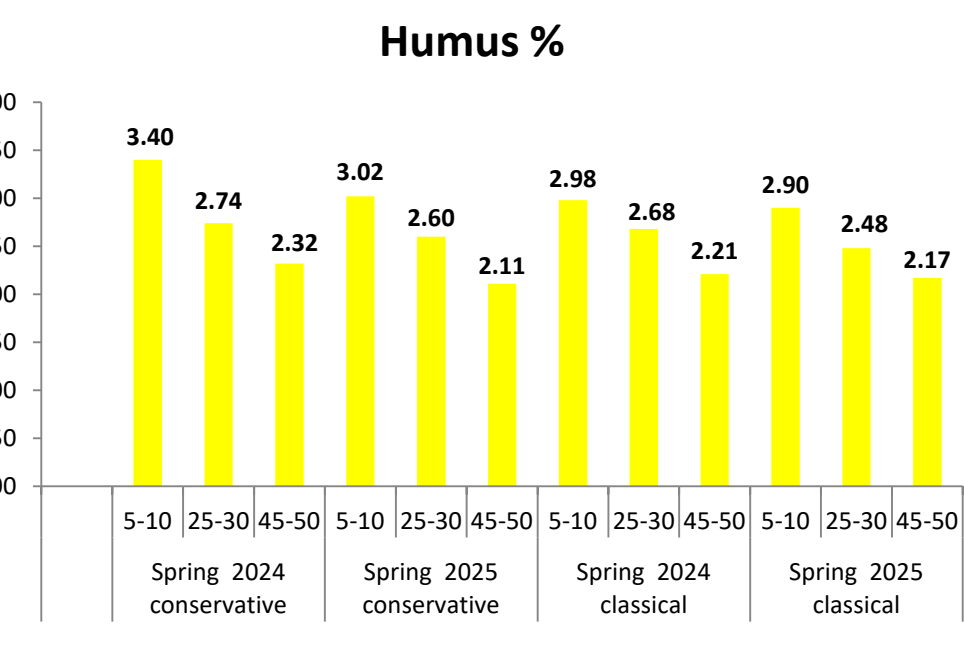


Figure 12. Influence of soil tillage on humus content the Sohatu unit Calarasi County

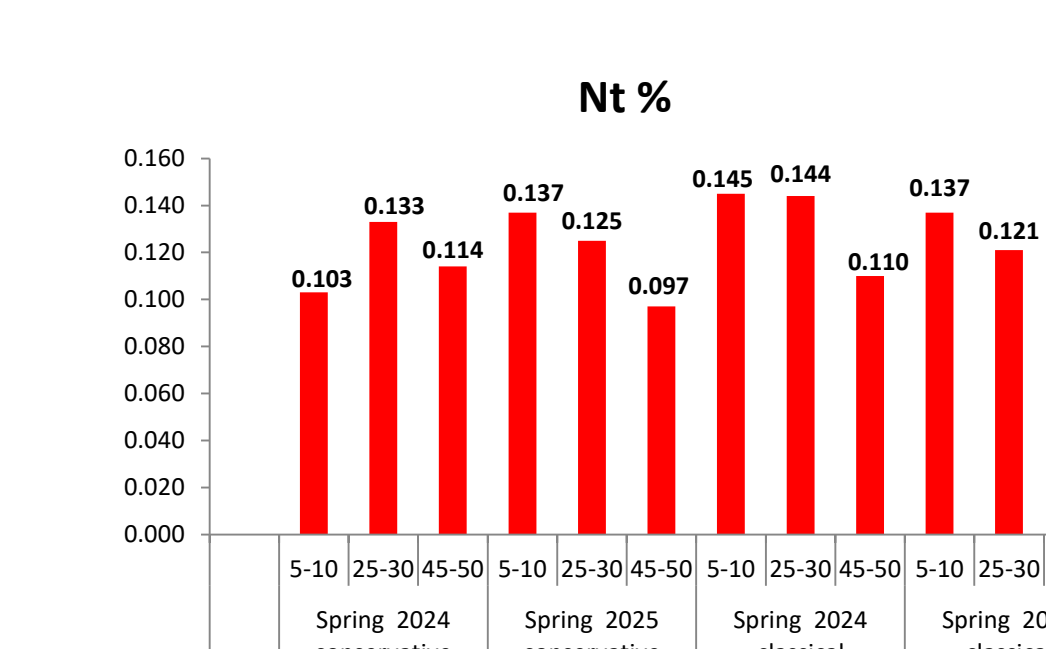


Figure 13. Influence of soil tillage on total nitrogen the Sohatu unit Calarasi County

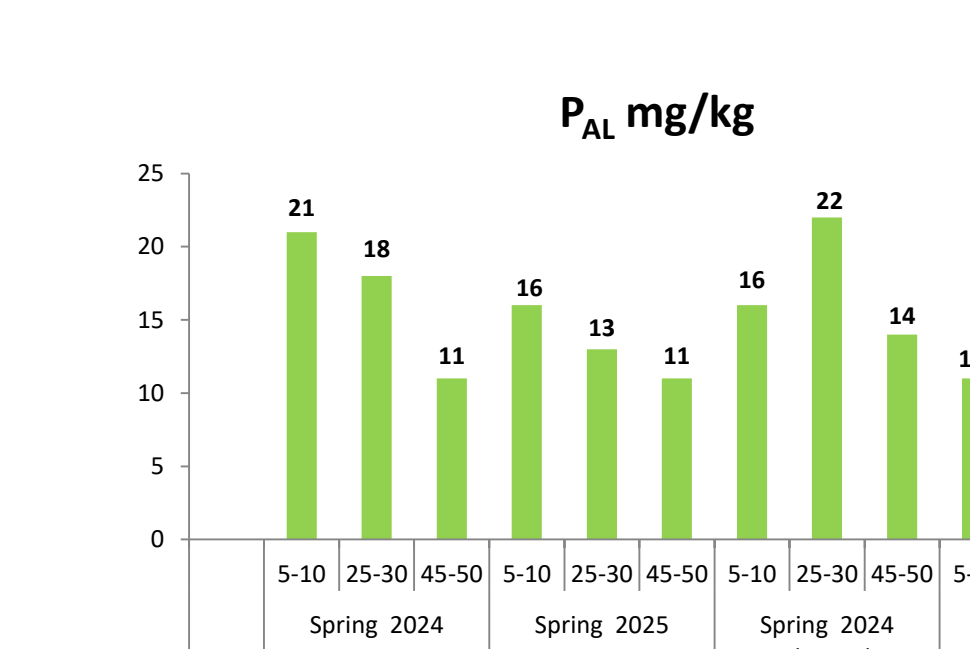


Figure 14. Influence of soil tillage on mobile phosphorus the Sohatu unit Calarasi County

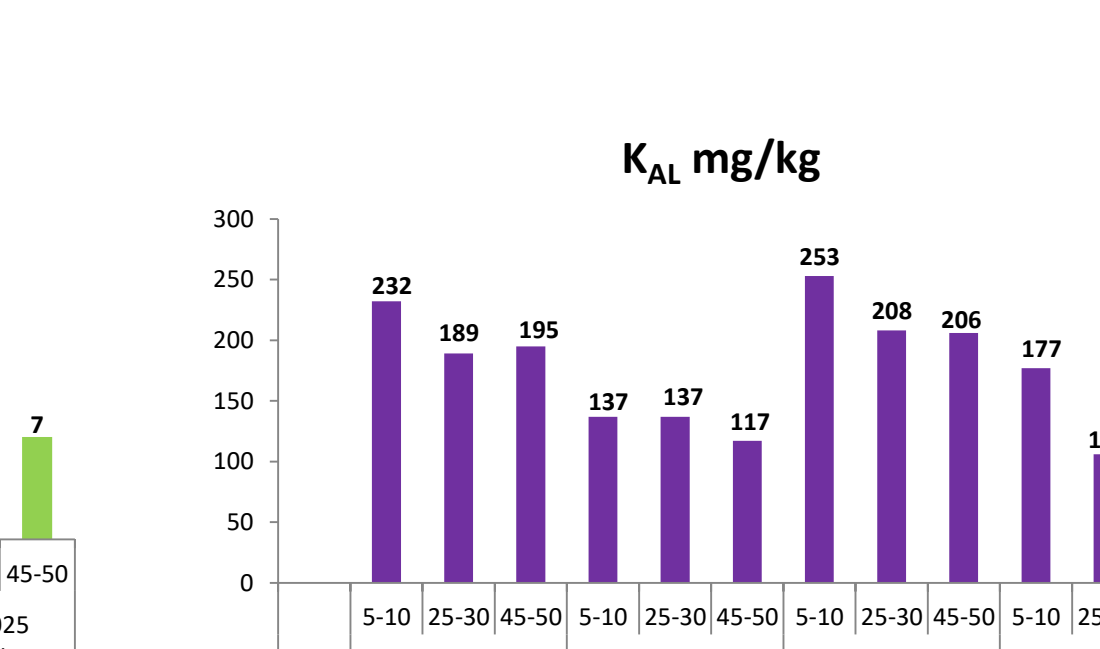


Figure 15. Influence of soil tillage on mobile potassium the Sohatu unit Calarasi County

CONCLUSIONS

At U. A. T. Afumati, the minimum tillage system offers clear advantages over the classical one, by maintaining an optimal pH (weakly acid-neutral), a more stable humus content and a more balanced distribution of nutrients (nitrogen, phosphorus and potassium). Comparing the two systems of soil tillage in the Mavrodin area, the minimum tillage technology is distinguished by a more stable pH, a better accumulation of organic matter on the surface, as well as an increased concentration of nitrogen and potassium in the upper layers, favorable aspects for soil fertility. Overall, the conservative system better supports long-term soil health and balance. The no-till (conservative) technology applied at Sohatu, favors a gradual improvement of the soil reaction (pH), especially in the deep layers, as well as a better accumulation of organic matter at the surface. Although the total nitrogen content is lower than the classical system, its distribution is more stable over depths. Mobile phosphorus is more concentrated in the superficial layer, and mobile potassium shows high values in 2024, with a slight decrease in 2025. The classical system maintains higher values of nitrogen and phosphorus in 2024, but this decrease significantly in 2025, indicating a potential long-term in of balance. Overall, the conservative system provides a better balance and increased soil sustainability.

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