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Editorial Office
Faculty of Agriculture, Goce Delcev University, Stip,
Krste Misirkov Str., No.10-A P.O. Box 201, 2000 Stip, Republic of North Macedonia
japs@ugd.edu.mk
http://js.ugd.edu.mk/index.php/YFA

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INTRODUCTION

Climate change and environmental protection are two critical challenges of the 21st century. Data from measurements of climate parameters show that the climate has been changing since the earliest records, even before the Industrial Revolution, due to natural processes. Today, when we talk about climate change, we refer to the changes that have been occurring since the beginning of the 20th century and they are the result of human activities.

Climate change is already having a visible effect, and numerous scientific papers and analyses predict and warn that it will occur even more intensively in the future. Climate change consequences are obvious, especially when it comes to its influence on the environment, biodiversity, plant and animal species, and finally human societies. Human life and societal well-being depend on natural resources, such as water, soil, flora and fauna. Although these resources are renewable, their unsustainable consumption and excessive contamination disrupt ecological balance, posing significant challenges to both nature and humanity.

Agricultural production is particularly vulnerable to climate change, because it operates as an "open-air factory". On the other hand, agriculture itself has a significant impact on climate change. Despite the technological progress in agriculture, utilization of improved crop varieties, application of biotechnology and enhanced irrigation management, climate and soil remain key to agricultural productivity. There is strong evidence for increasing uncertainty and variability of yields in agricultural production due to rising temperature fluctuations and the prevalence of various diseases and pests.

A growing number of studies suggest that agricultural land has the potential to mitigate the rise in atmospheric gases with the greenhouse effect. To address this, various global initiatives have been undertaken, with one promising solution being carbon sequestration in agricultural soils. The dynamics of carbon in the atmosphere and soil are complex and the amount of carbon that can be captured and stored in the soil depends on soil and crop type, implemented production practices, crop rotation, topography, and local climate. During photosynthesis, plants absorb carbon dioxide from the atmosphere and store it as carbon in their above- and below-ground biomass. At the end of their lifecycle, some of that carbon is released back into the atmosphere, while a portion remains stored in the soil for extended periods.

Many conventional agricultural practices result in higher carbon emission, whereas "carbon agriculture" practices aim to do the opposite. Carbon agriculture involves monitoring of carbon levels stored in the soil as result of production practices. These practices enhance carbon sequestration and reduce greenhouse gas emissions, leading to increased storage or sequestration of atmospheric carbon in living biomass, dead organic matter, and soil. Examples of these agricultural practices include soil conservation or minimal soil tillage, crop rotations involving a wider range of plant species, cover crops and proper management of post-harvest residues.

In this context, the Faculty of Agriculture, Goce Delcev University in Stip is participating in the project CARBONICA / Carbon Initiative for Climate Resilient Agriculture, funded by the European Union, together with three other partner institutions from the Republic of North Macedonia, six from Greece and four from Cyprus.

The main objective of the project is to strengthen the regional capacity for innovation through a multilateral approach and establish a long-term joint strategy for research and development in the field of agriculture with reduced greenhouse gas emissions, with a focus on initiating solutions to the challenge of transition to agriculture with reduced greenhouse gas emissions, through the incorporation of available knowledge, modern technologies and innovative policies. The project team is committed to achieving all project outcomes and jointly to contribute to building a sustainable future with carbon farming innovation.

December 2024

On behalf of JAPS Editorial Board,
Prof. Verica Ilieva, PhD
CARBONICA Project Manager for the Faculty of Agriculture,
Goce Delcev University, Stip