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for managing natural resources and a better life for all”

Response of dryland crops to climate change: Understanding the nexus between water and nutrient use efficiency, nutritional security, and food safety

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Abstract

One of the most significant global challenges is the alleviation of hunger and food insecurity. This challenge is further compounded by the anticipated impact of climate change on agricultural yields in various world regions, particularly in dryland regions where water scarcity and temperature extremes affect crop production, which may have implications for food availability and quality. These alterations subsequently affect water and nutrient use efficiency. Moreover, studies have demonstrated that shifting climate conditions create environments conducive to mycotoxin-producing fungi and increased uptake of heavy metals.

The multifaceted challenges posed by climate change to agricultural systems create a nexus between water and nutrient use efficiency, nutritional security, and food safety. However, the scarcity of integrated studies evaluating all these dimensions underscores the need for comprehensive research endeavours. Consequently, to enhance understanding of dryland crop responses to a shifting climate, it is imperative to implement integrated strategies that promote climate-resilient agricultural practices. This integrated and multidisciplinary approach can be achieved by utilising the capabilities of three laboratories of the Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture: Food Safety and Control Laboratory (FSCL), Plant Breeding and Genetics Laboratory (PBGL), and Soil and Water Management and Crop Nutrition Laboratory (SWMCNL).

This FAO/IAEA project, entitled “Ensuring food security and safety by future-proofing dryland crops under climate change”, funded by the UK government, aims to reinforce existing methodologies and identify novel applications on the use of nuclear and related techniques to enhance genetics, optimise resource utilisation, improve nutrition, and ensure the safety of food and feed under elevated CO₂ levels, high temperatures, and drought conditions. Furthermore, the initiative aspires to develop a global network for investigating the impact of climate change on the food and nutritional security of dryland crops, while developing mitigation strategies and future readiness under challenging climate conditions. Through this interdisciplinary project, FAO/IAEA will further support Least Developed Countries to mitigate the effects of climate change on global nutrition.

Keywords: Climate change, dryland crops, food safety, nutritional security, resource use efficiency