Report on: Discussion of a doctoral thesis on System of Rice Intensification (SRI) at Al-Qadisiyah University in Iraq

On March 2, 2026, PhD student Ahmed Kazem Abdullah discussed at the College of Arts' Department of Geography, Al-Qadisiyah University, his thesis research entitled "Global warming and the orientation towards a System of Rice Intensification (SRI) in the governorates of Najaf and Al-Qadisiyah". The discussion was an in-depth scientific discussion between the researcher and the members of his dissertation committee, where the committee addressed the various scientific and methodological aspects of the thesis research, starting from the analysis of climate indicators, covering the assessment of water and environmental resources, and concluding with an assessment of the efficiency and efficacy of the System of Rice Intensification (SRI) as a modern agricultural methodology for adapting to climate changes.

The panelists focused discussion on the scientific explanations and practical feasibility of the SRI system in Iraq, particularly addressing the challenges such as high temperatures, water scarcity, and increasing pressure for maintaining food security. Committee members indicated that adopting this SRI system could represent a promising direction for developing rice cultivation by reducing water consumption, improving resource efficiency, and potentially increasing crop yields compared to traditional methods.

The discussants also expressed optimism about the possibility of conducting this system in rice-growing areas in Iraq, stressing that the results reported in the thesis indicated that there are substantial opportunities to adopt smart and sustainable farming technologies, including the SRI system, due to the environmental and economic advantages it provides, such as mitigating greenhouse gas emissions, improving soil properties, and increasing water use efficiency.

At the conclusion of the discussion, the members of the discussion committee praised the importance of the topic and its scientific novelty, stressing that the study represents an addition to scientific knowledge that can contribute to supporting better future agricultural policies and encourage the expansion of applied research related to the System of Rice Intensification in Iraq. The discussion reflected a growing optimism about the potential of the SRI system as a practical solution to address the challenges of climate change and promote agricultural sustainability in rice-growing areas.

In order to strengthen the researcher's scientific and applied knowledge, he personally practiced rice cultivation operations using the SRI system principles at the Al-Mishkhab Rice Research Station including field preparation, seedling planting, and intermittent irrigation.



Below is a summary of the thesis in English; the full thesis will be sent later.

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Ministry of Higher Education and Scientific Research
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Global warming and the orientation toward the System of Rice Intensification (SRI) in the governorates of Najaf Al-Ashraf and Al-Qadisiyah.

A Dissertation Submitted by
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to the Council of the College of Arts / University of Al-Qadisiyah
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Supervised by
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Abstract

This dissertation examines long-term climate change trends and evaluates their impacts on the suitability and sustainability of agricultural systems, with particular emphasis on the System of Rice Intensification (SRI) in the Najaf and Al-Qadisiyah governorates, which are part of Iraq's semi-arid region. The study is based on the premise that recent climatic changes no longer represent temporary cyclical fluctuations, but rather constitute structural pressures that necessitate a reorganization of the relationship between climate, water, and space, as well as the adoption of more highly efficient adaptive agricultural systems.

The research encompasses an analysis of extended climatic datasets that cover the period 1980-2023, including maximum and minimum air temperatures, rainfall amounts, and reference evapotranspiration (ETo),

in addition to analyzing the temporal and spatial distribution of these variables across four successive climatic cycles. Quantitative indices were employed to assess the climatic suitability of rice cultivation, most notably the Climate Suitability Index (MSI) and Water Use Efficiency (WUE). Furthermore, the Multi-Criteria Decision Analysis (MCDA) approach was applied to evaluate agricultural adaptation alternatives under future climate scenarios extending to 2050.

The results of the temporal analysis revealed a statistically significant upward trend in both maximum and minimum temperatures, particularly after the year 2000, accompanied by a steady increase in evapotranspiration and a decline in effective rainfall. This led to an expansion of climatic water deficit across the four climatic cycles, reaching its highest levels during the 2011-2023 cycle. This combined climatic shift contributed to a transition from a pattern of periodic climatic variability to a structurally stressful climate regime, directly affecting the suitability and production stability of rice cultivation.

Findings derived from the Climate Suitability Index (MSI) indicated a gradual decline in the proportion of area classified as highly suitable for rice cultivation, with significant portions shifting toward moderate and marginal suitability classes. This change exhibited clear spatial variability between Najaf and Al-Qadisiyah. Najaf Governorate recorded higher levels of climatic stress during the fourth climatic cycle, reflected in a pronounced contraction of highly suitable areas, whereas certain zones in Al-Qadisiyah—particularly its northern parts—demonstrated relatively greater resilience. Statistical analyses further revealed strong and significant negative correlations between SRI suitability and both elevated temperatures and evapotranspiration, while positive correlations were observed with relative humidity. In contrast, the influence of solar radiation remained below the critical threshold compared to other climatic variables.

The applied results demonstrated that the traditional system of continuous flooding irrigation exceeded acceptable water consumption limits, with a marked decline in water use efficiency, rendering it inefficient for use under semi-arid climatic conditions. Conversely, the System of Rice Intensification (SRI) achieved a substantial reduction in water consumption and a notable improvement in water use efficiency, while maintaining relatively stable yields under climatic stress. However, the effectiveness of SRI when applied independently declined in more arid environments, highlighting the necessity of integrating it with Alternate Wetting and Drying (AWD) irrigation management.

Within this context, the results of the Multi-Criteria Decision Analysis (MCDA) confirm the superiority of the combined SRI + AWD alternative across all future climate scenarios up to 2050, achieving the highest composite scores in terms of productivity, water efficiency, and environmental sustainability. Water Use Efficiency (WUE) emerged as the most influential variable in ranking adaptation alternatives, surpassing economic indicators when weighting schemes were altered, thereby reflecting the dominance of water scarcity as a governing factor in future agricultural decision-making. Moreover, climate scenario analysis showed that the intermediate scenario (SSP2–4.5) provides a wider margin for adaptation and lower adaptation costs compared to more rigorous scenarios, which carries significant implications for long-term planning.