APN
ASIA-PACIFIC NETWORK FOR
GLOBAL CHANGE RESEARCH

FINAL REPORT

Exploring technologies innovation for smallholder farmers in the context of Climate Smart Agriculture (**CSA**)

CBA2023-02MY-Ju

2025

VIỆN THỔ NHƯỠNG NÔNG HÓA
Soils and Fertilizers Research Institute

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1. Summary

Chinese agriculture is dominated by smallholder farmers and decentralised small-scale field operations, which are highly vulnerable to climate change and extreme events. To maintain their basic livelihoods, smallholder farmers often adopt accessible technologies to enhance crop production and cope with weather disasters and climate extremes. This project aims to build adaptive capacity among multi-stakeholders, including smallholder farmers, researchers, and local leaders in climate-vulnerable arid regions, through exploring innovative technologies in the context of Climate-Smart Agriculture (CSA). The primary achievements are to mitigate agricultural climate risks and promote innovative technologies to strengthen the resilience of smallholder farmers against climate change.

The project adopted multiple methodological approaches and pathways—including climate risk assessments, village and household surveys, international Climate-Smart Agriculture (CSA) workshops, and technical training—to evaluate climate change risks and explore innovative adaptive technologies. Through climate risk assessments, it was found that climate change poses severe threats to crop production and smallholder livelihoods. Over recent decades, climate variability has intensified and become more frequent. Drought remains the most severe and prevalent climate risk both historically and in the future, followed by emerging hazards such as heavy rainfall, late-spring frosts, and early-autumn cold waves in recent years. Additionally, water use efficiency (WUE) in the eastern Yellow River Basin (YRB) is primarily driven by yield factors, while in the western region, it is dominated by evapotranspiration (ET). These findings suggest that differentiated water management and optimized agricultural technical pathways should be implemented across different regions of the YRB to address future climate-driven drought risks. Village surveys and farmer interviews further identified critical adaptive technology needs of smallholder farmers, including water resource management, pest and disease control, and early warning systems. Based on these findings and farmers' expectations, the project organized an "International CSA Workshop" and related training activities, inviting domestic and international experts. Over 50 participants attended, including representatives from the FAO China Office, the former Director of the International Food Policy Research Institute (IFPRI), and experts from the USA, Thailand, Vietnam, and Pakistan. These events facilitated the sharing of CSA knowledge and provided hands-on training on innovative technologies. Local village leaders and large-scale farmers actively participated in these programs to raise CSA awareness and encourage technology adoption through the influence of pioneering participants. Several promising technologies were identified and promoted, such as integrated water and fertilizer irrigation, IoT-based monitoring and early warning systems, and drought-resistant field mulching. These technologies not only enhance smallholder farmers' resilience to climate risks but also offer practical references for future scientific assessments.

Overall, the project deepened smallholder farmer's understanding of climate risks, spurred innovation in CSA adaptive technologies, and enriched adaptation options for local and international stakeholders. The international CSA workshops addressed Asia-Pacific agricultural climate risks, enhanced practical CSA actions, and facilitated knowledge exchange across

countries and regions. It further delivered robust scientific evidence and practical recommendations to inform national agricultural adaptation policies and offered replicable experiences for similar agricultural systems in the Asia-Pacific region.

2. Objectives

The project aims to improve adaptation capacity for multi-stakeholders, especially for smallholder farmers through climate risks assessment and scientific knowledge exchanges, while exploring adaptation innovative technologies within the framework of Climate-Smart Agriculture (CSA). The specific objectives of the project are to:

- **Strengthening CSA knowledge and building the capacity on adaptive technologies for addressing climate risks among smallholder farmers and researchers.**

  The CSA focused training programme and workshop of this project can consolidate key CSA research knowledge and identify accessible technologies for smallholder farmers, thereby increasing multi-stakeholder capacity to mitigate climate risks. This is highly aligned with the APN Strategic Plan.

- **Fostering joint research and knowledge exchange among researchers from APN and other research networks.**

  The "International Climate Smart Agriculture Workshop" in this project brings together experts from Asia-Pacific region, the USA or Europe to share and exchange views, share knowledge and innovative technologies from diverse perspectives. These activities enrich and promote innovative technologies, assess the potential replication, scale-up and implementation of relevant solutions.

- **Developing the leadership capabilities and networks on CSA perspective at the regional, national and local levels.**

  Through a structured programme of knowledge exchange and technologies training,the project deepen and strengthen networks within the existing consortium of APN partners. It will also enhance the capacity of researchers and smallholder farmers to drive agricultural technological innovation in the context of CSA.

3. Outputs, Outcomes and Impacts

Outputs	Outcomes	Impacts
Completed assessment on the impacts of historical and future climate change on crop systems under CMIP6 scenarios	Recognized climate risks, identified key drivers of the Water Use Efficiency (WUE) threshold for crops, and developed adaptive pathways for smallholder farmers	Enhanced knowledge of global change among researchers and farmer communities, and improved understanding of climate change impacts on agricultural production systems
Organized the "International Climate-Smart Agriculture (CSA) Workshop," with over 50 participants from 6 countries and 17 organizations in attendance	Built resilience to climate risks for smallholder farmers and promoted CSA knowledge among researchers and multi-stakeholders	Established a joint research framework and knowledge exchange network among researchers from the APN and other countries
Implemented on-field technology training activities in Inner Mongolia, Shaanxi, and Shandong, focusing on technology investigation and training	Increased local farmers' acceptance of CSA technologies; identified several promising innovative technologies within the CSA framework for future promotion, such as "integrated water and fertilizer irrigation" and "IoT-based monitoring"	Strengthened the scientific knowledge foundation of CSA and built adaptive capacity among multi-stakeholders; accelerated technological innovation and dissemination in the global CSA sector
Disseminated the project's scientific papers and related international conference poster to reach a broad audience and publicize results; released bilingual (English/Chinese) newsletter	Enhanced the effectiveness of national agricultural adaptation policies and reduced the impacts of climate change on agriculture	Strengthened the sustainable development capabilities of similar agricultural systems in the Asia-Pacific region; developed leadership capabilities and networks related to CSA at the regional, national, and local levels

4. Key facts/figures

1) 52 participants from 6 countries and 17 organizations attended “International Climate Smart Agriculture Workshop”held in Beijing on July 25-26, 2024 [***App.1& App.2***];

2) 139 effective questionnaires and 16 field interviews were conducted through village survey on climate change perception and adaption technologies needed by smallholder farmers, findings on farmers' adaptation technology needs in Northwest China revealing key adaptation constraints and urgent technology needs of local farmers) [***App. 3***];

3) 2 scientific assessment papers accomplished compiling on climate risk impacts on crop systems in the Yellow River Basin evaluating effects of climate change and drought on water use efficiency, yield, and quality of maize. [***App. 4-1 & 4-2***];

4) 5 local survey activities were conducted in Yangling & Yulin of Shaanxi, Bayannur of Inner Mongolia and Kashi, hetian of South Xinjiang to explore CSA innovation technologies, mainly focusing on water-saving technologies and high-value greenhouse cultivation considering accessibility and feasible implementation [***App. 5***]

5) Multiple disseminated and presentations at high-profile domestic and international event derived results from APN CBA2023-02MY-Ju including [***App.6***]

- 1 session themed "Technological Innovation for Climate Change Adaptation in Key Areas" chaired by Dr. Ju Hui by Dr. Ju Hui at the 2nd China Climate Change Conference in Shanghai and presented the project relevant results ;
- 1 Presentation and 1 poster disseminated some results of APN project at the 3rd International AgroBiodiversity Conference
- 3 people invited to attend the Symposium on Climate Change and Conserving the Himalayas for Envoys of Himalayan Countries
- Results posted in China Pavilion of 2024 COP29 in Baku, Azerbaijan [***App.6***];

5. Publications

◆ Chen W., Ju Hui*., Zhang D., & Batchelor W. D. (2024). Identification of thresholds and key drivers on water use efficiency in different maize ecoregions in Yellow River Basin of China. *Journal of Cleaner Production*, 482, 144209. https://doi.org/10.1016/j.jclepro.2024.144209 [***App.4-1***]

◆ Zhang, D., Wu, D., Xue, M., Liu, J., Batchelor, W. D., Li, D., Zhang, W., Wang, Y*., & Ju, H*.(2025) . Optimizing the water-energy-food nexus in dryland winter wheat systems on the Loess Plateau. *Agriculture Water Management,* 321, 109930 https://doi.org/10.1016/j.agwat.2025.109930 [***App.4-2***]

6. Media reports, videos and other digital content

中国农业科学院农业环境与可持续发展研究所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

陈蔚，居辉 地学科研动态 2024年11月18日 16:24 湖北

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Identification of thresholds and key drivers on water use efficiency in different maize ecoregions in Yellow River Basin of China

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文章信息

文章题目：Identification of thresholds and key drivers on Water Use Efficiency in

中国农业科学院农业环境与可持续发展研究所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

陈蔚等 农业遥感与作物模型 2024年11月19日 09:01 德国

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西北院刘伟琦 干旱区气象生态 2024年11月18日 12:44 北京

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通讯作者：居 辉 研究员

第一作者：陈 蔚（2023级博士研究生）

第一单位：中国农业科学院农业环境与可持续发展研究所

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第一作者： 陈蔚（2023级博士研究生）

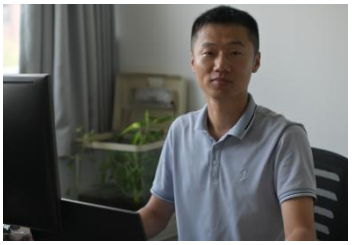
第一单位： 中国农业科学院农业环境与可持续发展研究所

7. Pull quotes

Quote from the Project Leader (Dr. Ju Hui) "*The completion of the Yellow River Basin agricultural climate risk assessment not only clarified the key drivers affecting maize water use efficiency but also provided a scientific basis for local farmers to cope with drought. What makes me more encouraged is that the International CSA Workshop has built a cooperation platform for cross-country technology exchange—this will help our water-saving and disaster-resilient technologies benefit more smallholders in the Asia-Pacific region.*"

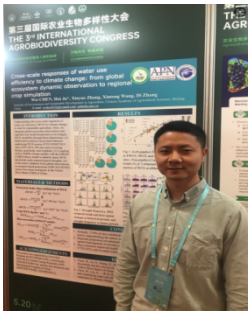
Quote from a Trainee (Local Technology trainer Zhang Di, Yangling Shaanxi)

"Before participating in the CSA technical training, I always worried about the low yield of the crops on our maize field due to insufficient irrigation water. Now, I've learned how to use the water-fertilizer integrated irrigation technology. Last season, the maize yield increased by nearly 12%, this technology really solves our urgent problem!"



Quote from a Research Team Member (Dr. Wei CHEN, Co-author of the Publication)

"Our two peer-reviewed papers on maize water use efficiency and the water-energy-food nexus have been accepted by the international academic journal. More importantly, these research findings can be directly shared with local administrators and be applied to dryland agricultural production, that connected academic achievements with smallholder farmers' actual needs is the greatest value of this project."



8. Acknowledgments

We extend our sincere gratitude to the FAO China Office, the Rural Energy and Environment Agency of Ministry of Agriculture and Rural Affairs, China Agricultural University, Shaanxi Vocational and Technical University of Agriculture and Forestry, and the Inner Mongolia Bayannur Agricultural Research Institute for their invaluable assistance and collaboration. We are also deeply grateful to our international partners for their vital contributions to global collaboration and joint research initiatives during the conference organization and related activities. Finally, we express our heartfelt appreciation to the APN China Office for its guidance and support.

9. Appendices

Appendix 1 Announcement of the APN CSA Workshop and List of International Experts

Appendix 2 Summary Report of the APN International CSA Workshop

Appendix 3 Key findings of the Village Surveys and Photos

Appendix 4 Publications Co-funded by the APN Project

Appendix 5 Technologies Training Activities

Appendix 6 Outreach Materials for Project Achievements (including COP29 Poster, Presentation and Poster on 3rd International Agro-biodiversity Congress etc.)

Agenda 会议日程

International Workshop on Climate-Smart Agriculture

July 25 - 26, 2024，Hubei Hotel-Beijing, China

July 24, 2024 8:30-17:00 Registering in the lobby, Hubei Hotel-Beijing

July 25, 2024 8:30-17:30 Longzhong Hall, Hubei Hotel-Beijing

08:30-09:00	*Registration*
Part I: Opening Speeches Chairman：Weiping Hao	
09:00-9:30	***Welcome speech*：** **Weiping Hao**, Deputy Director, Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences (IEDA CAAS) ***Guest speeches*：** **Shenggen Fan**, Former Director/Chair Professor, International Food Policy Research Institute (IFPRI) / China Agriculture University **Chunsheng Yao**, Project Officer of Global Environment Facility (GEF), FAO Representative Office in China **Lin Zhai**, Deputy Director, Department of International Cooperation of Chinese Academy of Agricultural Sciences (CAAS)
09:30-09:40	*Group photo*
Part II: Climate change risks and impacts on agriculture Chairman：Weiping Hao **20 minutes for presentation, 5 minutes for Q&A**	
09:40-10:05	**Climate Change Risk Assessment of Cropping Systems Based on the DSSAT Model** *Prof. William D. Batchelor*, Auburn University, USA
10:05-10:30	**Reflections on the Ecological Low-Carbon Transformation of Agri-Food Systems in China** *Prof. Quanhui Wang* Chief Expert of the Rural Energy and Environment Agency, Ministry of Agriculture and Rural Affairs
10:30-10:45	*Tea break*
10:45-11:10	**Climate Smart Agricultural Practices for Mitigating Climate Change** *Prof. Scott Xiaochuan Chang*, University of Alberta, Canada
11:10-11:35	**Scenarios of CSA Innovations in 'Small' Settings: A Combined Foresight and DSSAT Approach** *Professor Emeritus Attachai Jintrawet*, Chiang Mai University, Thailand

11:35-12:00	**Climate Change Risks in Agriculture and Pathways to Climate Resilient Development** *Prof. Hui JU* Institute of Environment and Sustainable Development in Agricultural, Chinese Academy of Agricultural Sciences
Lunch	
Part III: Climate change adaptation and mitigation Chairman：Hui JU **20 minutes for presentation, 5 minutes for Q&A**	
14:00- 14:25	**Low-Carbon Pathways of Agrifood System in China** *Prof. Yumei Zhang* Academy of Global Food Economics and Policy，CAU
14:25- 14:50	**Straw Clean Conversion and High Value Utilisation Technology** *Dr. Jing Feng* Institute of Environment and Sustainable Development in Agricultural, Chinese Academy of Agricultural Sciences
14:50- 15:15	**Implementing Climate-Smart Practices in Agriculture:Insights and Innovations from Pakistan** *Dr. Ishfaq Ahmad* Climate Change Specialist, Asian Development Bank (ADB) in Pakistan
15:15- 15:30	*Tea break*
15:30- 15:55	**Constructions of Climate-Smart Cropping Systems in the North China Plain** *Prof. Xiaogang Yin* China Agriculture University
15:55- 16:20	**Promoting Climate-Smart Agroforestry System Development in Northwest Vietnam** *Mr. Tri Dan Nguyen* Soils and Fertilizers Research Institute, Vietnam
16:20- 16:45	**Spatial and Temporal Pattern of Water Surplus and Deficiton the Loess Plateau** *Prof. Fengxue Gu* Institute of Environment and Sustainable Development in Agricultural, Chinese Academy of Agricultural Sciences
16:45- 17:00	*Wrap Up*
17:00-18:00	**Visit to Chinese Academy of Agricultural Sciences**
18:30	*Dinner*

July 26, 2024 (8:30--)

Internal round table meeting ---- Directions and funding channels for future collaboration

Field excursions ---- Visit to Beijing Shunyi Agricultural Comprehensive Experimental Station

CBA2023-02MY-Ju

Summary Report

International Workshop on Climate Smart Agriculture

I. Meeting Brief

The APN "International Workshop on Climate Smart Agriculture" hosted by the Institute of Agricultural Environment and Sustainability Development of the Chinese Academy of Agricultural Sciences (IEDA CAAS), co-organized by the Global Food Economy and Policy Research Institute, the International Forum on Low-Carbon Transition of Agricultural and Food Systems, and the international journal "Climate Smart Agriculture"(CSA) was successfully held on July 25-26, 2024 in Beijing China.

The workshop aimed to gather domestic and international experts to explore the climate change risks, adaptation and mitigation strategies, and pathways for the low-carbon transition of agro-ecosystems. More than 50 participants from the United States, Thailand, Pakistan, Vietnam, Germany, and China internal organizations attended, covering a wide range of stakeholders including renowned scholars, officers, farmers and industry experts in the fields of climate change and agriculture.

The workshop was chaired and presided over by Deputy Director Hao Weiping of IEDA, firstly delivered a welcome speech emphasizing the importance of sustainable agricultural development in the context of climate change. Dr. Linda Stevenson, Acting Director of the APN, also sent a welcome letter to express heartfelt congratulations on the convening of the workshop, hoping that the Asia-Pacific region can form a close research cooperation alliance in the field of climate-smart agriculture, enhancing the resilience of agriculture to climate change. Mr. Fan Shenggen, former Director of the International Food Policy Research Institute (IFPRI) and Professor at China Agricultural University, Mr. Yao Chunsheng, Global Environment Facility Project Officer at the FAO Representative Office in China, and Deputy Director Zhai Lin of the International Cooperation Bureau of the Chinese Academy of Agricultural Sciences, each delivered speeches, forming a consensus on the relationship between climate change and agriculture, the importance of international cooperation, and highlighting supports of China's contributions to international collaboration on CSA.

The workshop focused on climate change adaptation and mitigation strategies, with lively exchanges and discussions on effective strategies and technologies for agricultural adaptation and mitigation of climate change, such as CSA measures, low-carbon agricultural practices, and the resource utilization of agricultural waste, to enhance the resilience and sustainability of agricultural systems. Participants engaged in academic exchanges and discussions on climate change risks and their impact on agricultural production. By sharing the latest scientific research findings, they assessed the potential risks that climate change may pose to global and regional agricultural systems, including fluctuations in crop yields, water resource shortages, and increased pest and disease pressures. Based on crop model-based climate risk assessment on agriculture, many experts discussed the climate risks and solutions faced by the ecological low-carbon transition of the agricultural and food system, and provided a detailed exposition on the future contributions of CSA, offering new ideas for sustainable agricultural development. Chinese and foreign experts also conducted in-depth exchanges on the construction of CSA planting systems, the development of agroforestry systems.

On July 26, the attendees had an internal roundtable discussion, focusing on future research directions and funding channels for future cooperation both in the Asia-Pacific region and worldwide, building a platform to promote regional cooperation and exchange. Subsequently, participants visited the Beijing Shunyi Agricultural Comprehensive Experimental Base for the field trial, experiencing firsthand the research and technological potential of modern agricultural technology in addressing climate change, providing scientific evidence and references for government policymakers and research institutions to better cope with the impact of climate change on agriculture.

II. Main Outcomes

The workshop brought together experts, scholars, government officials, and industry experts from different countries and regions to discuss and address the impact, challenges, and opportunities of climate change on agriculture, and to promote the transformation of agriculture towards a more sustainable, low-carbon, and resilient direction, achieving the expected outcomes, mainly including:

(1) Deepened scientific understanding of the impact of climate change risks on agriculture

Through the presentations and discussions, the workshop deepened participants' understanding of the impact of climate change on agricultural systems, including risks in crop growth, water resource management, and pest and disease control. Participants conducted in-depth discussions on how to adapt to and mitigate the impact of climate change on agriculture, proposing various strategies, including improving crop varieties, optimizing agricultural management measures, promoting water-saving irrigation technologies, and strengthening the resource utilization of agricultural waste.

(2) Shared cutting-edge achievements and technologies on CSA

The workshop showcased cutting-edge research results and technologies such as crop model-based climate change risk assessment, ecological low-carbon transition of agricultural systems, and clean transformation and high-value utilization of straw technology. The workshop raised public awareness and attention through publicity and reporting, encouraging all sectors of society to participate and contribute to achieving harmonious coexistence between agriculture and the environment.

(3) Promoted international cooperation and exchange

The workshop provided a platform for experts and scholars from different countries and internal regions to exchange and promote international cooperation and exchange in CSA, helping to jointly activities to address climate change challenges. The workshop also expected to provide insights for policymakers and researchers on technology innovations and CSA solutions, promoting the formulation of relevant policies and scientific innovation to better cope with the climate change on agriculture. In the internal roundtable discussion, participants discussed future research directions and funding channels for climate change, such as bilateral or multilateral international cooperation projects by the Ministry of Science and Technology each year, and APN programme on agriculture, clarifying the direction of future research and the focus of cooperation, providing guidance for future scientific research work.

The workshop achieved significant results in deepening understanding, sharing results, discussing strategies, promoting cooperation, driving innovation, and raising awareness, making a positive contribution to addressing the challenges of climate change to agriculture and promoting technology innovations for agriculture sustainable development.

III. Next Steps

During the workshop, participants reached a broad consensus on issues such as climate change risk, low-carbon transition of agriculture, adaptation and mitigation strategies, contributing wisdom and strength to CSA perspective. The following work plans will be considered in future works:

(1) Strengthen the transformation and application of scientific research results

Select suitable technologies for China's specific agricultural production circumstance from the cutting-edge technologies and research results displayed at the workshop for trial application. Help farmers master new technologies and improve agricultural production efficiency and quality through technical training and demonstration projects. Establish CSA technology demonstration sites in different ecological regions to showcase the practical application effects of CSA technologies, and drive the CSA development in surrounding areas and even larger regions through the successful experiences and models of demonstration sites.

(2) Deepen the cross-integration of CSA across multiple departments and fields

Actively promote cooperation between different departments and expand into multiple crop fields to promote in-depth integration and development of CSA. Establish long-term cooperative relationships with international organizations, research institutions, and universities to jointly carry out research projects on climate change and agricultural development. Promote the process of sustainable agricultural development through cross-integration of different fields, sharing resources, technologies, and experiences. Organize technical training and exhibitions, invite domestic and foreign experts, scholars, and industry representatives to participate, and carry out face-to-face exchanges and interactions to enhance mutual understanding and trust, promoting comprehensive discipline construction and deepening.

(3) Seek bilateral or multilateral project cooperation opportunities

Thai experts and ADB experts from Pakistan have expressed a positive intention for project cooperation, including jointly exploring the establishment of a comprehensive agricultural climate change monitoring system, assessing climate change conditions in agricultural production processes, and providing data support for formulating scientific response measures. Participating experts have indicated a need for broader cooperation channels to assess and feedback on the effectiveness of sustainable agriculture actions in the Asia-Pacific region, adjust action plans and

agriculture policies timely according to risk assessments, and ensure the realization and continuous effect of CSA goals in the Asia-Pacific region.

This workshop not only provided a platform for domestic and international experts to deeply exchange and share scientific results in CSA, and also promoted the application of new measures in the crop field. Looking forward to continuing to strengthen international cooperation in the Asia-Pacific region and globally in the future, to jointly address climate change challenges and strive for harmonious coexistence between agriculture and the environment.

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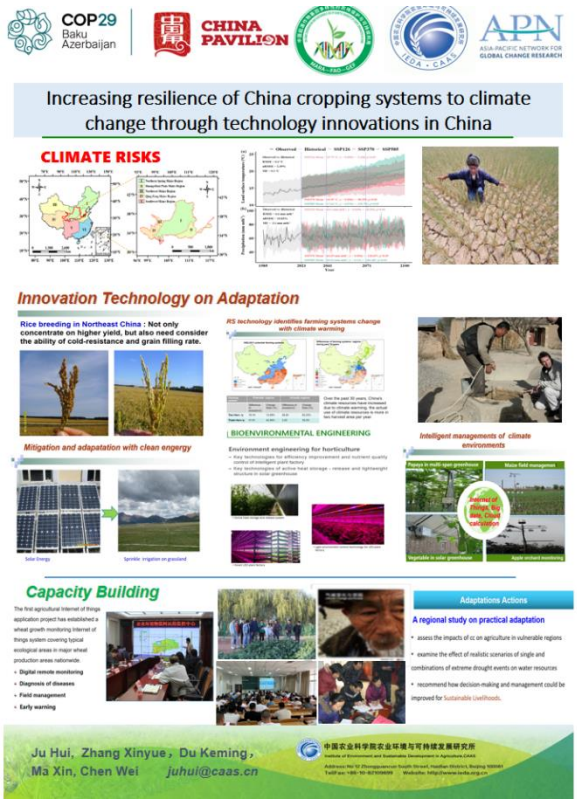
Appendix 5

Technical Training Activities

Within two days in May 2025, the technological training was organized in two eco-farms that employs sustainable farming practices. These include planting green manure and using protective farming technologies to enhance soil structure, growing local crop varieties that are more adaptive to climate changes, installing sprinkler systems, and building minor water reservoirs to conserve rainfall and combat drought. Moreover， by processing wheat into flour and biscuits to add value, the farm adopts a diversified model to increase the chain value. Additionally, the farm promotes straw mulching and conservation tillage techniques. These practices conserve energy and labor while reducing greenhouse gas emissions, achieving ecological and economic benefits simultaneously.

Appendix 6 Project achievement outreach

- **COP 29 China Pavilion POSTER** (Baku, Azerbaijan, Nov. 2024)



➢ Climate risks assessment and technology innovation

Link：*IEDA | Green and low-carbon agriculture*

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Enhancing Maize Water Use Efficiency by Adapting to Local Conditions Based on Differences in Yield and Water Consumption

Time: 2024-11-22

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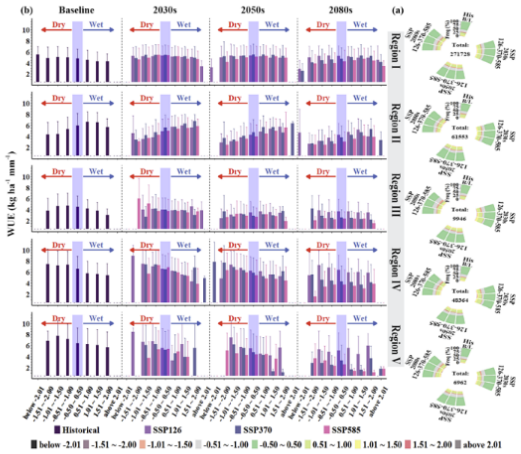
Recently, the "Smart Meteorology and Utilization of Agro-climate Resources" Innovation Team at the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences (IEDA, CAAS), revealed the technical paths for improving water use efficiency (WUE) of maize in different ecoregions of the Yellow River Basin (YRB) by employing a nested simulation method combining the climate model from the Coupled Model Inter-comparison Project Phase 6 (CMIP6) with the CERES-Maize crop model. The related research findings have been published in the *Journal of Cleaner Production*.



The research optimized the crop model using a grid-based bias correction method, revealing the WUE thresholds under different hierarchical dry-wet gradients and their key driving factors. The corrected CERES-Maize crop model can effectively simulate crop yield and evapotranspiration (ET), with normalized root-mean-square errors (nRMSEs) reduced by 4.00% and 9.73%, respectively. In the future climate change scenarios, WUE thresholds exist in all maize ecoregions of the YRB, primarily under mild to moderate dry/wet conditions. In the eastern region of the basin, WUE is primarily driven by yield factors, while that in the western region is mainly driven by ET. The study findings provide scientific support for implementing differentiated water management and optimizing agricultural technical paths in different regions of the YRB under future climate change scenarios.

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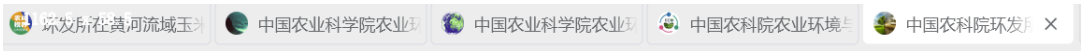
➢ Publication dissemination on various official account of Wechat



中国农业科学院农业环境与可持续发展研究所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

小张听！ 生态学议 2024年11月18日 18:00 甘肃

公众号 · 生态学议

文章信息

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陈蔚，居辉* 生态学家 2024年11月18日 15:02 北京

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Identification of thresholds and key drivers on water use efficiency in different maize ecoregions in Yellow River Basin of China

Wei Chen [a], Hui Ju [a b] ✉, Di Zhang [a c], William D. Batchelor [d]

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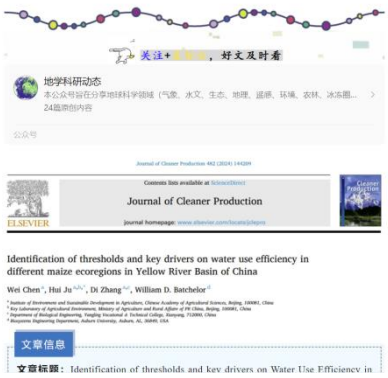
亮点

- 未来黄河流域的干旱风险持续存在，区域间存在差异，且西部呈现明显的干湿转变。
- 改进的DSSAT模型偏差修正方法使产量的nRMSE降低了4.00%，蒸散量的nRMSE降低了9.73%。
- 黄河流域各玉米生态区存在特定的阈值，主要出现在轻度至中度SPEI条件下。
- 与基准期相比，SSP585情景下显现的WUE阈值均有所降低。
- Yield[2]和ET对东、西部玉米生态区WUE的驱动性不同。

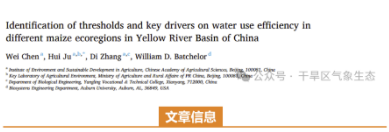
中国农业科学院农业环境与可持续发展研究所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

陈蔚，居辉 地学科研动态 2024年11月18日 16:24 湖北



中国农科院环发所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

西北院刘伟玲 干旱区气象生态 2024年11月18日 12:44 北京



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陈蔚等 农业遥感与作物模型 2024年11月19日 09:01 德国

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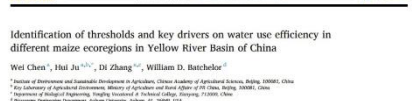
环发所在黄河流域玉米水分利用效率阈值及关键驱动因子研究中取得新进展

农环视界 2024年11月19日 20:00 辽宁



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Climate Change Adaptation Strategies for Agriculture Systems in China

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Understanding the impacts of climate change on agricultural productivity is crucial for ensuring global food security. This study examines how climate change impacts agricultural cropping systems in China and explores the role of agroforestry and biodiversity in enhancing climate resilience and ecosystem services.

The project investigates the impacts of climate change on agricultural cropping systems and explores regional adaptation options in China. Using the Regional Crop Model to predict the effects of climate change on major crops, including wheat, maize, and rice. Results indicate that while wheat yields may increase under certain scenarios, maize yields are likely to decline significantly, particularly under higher emission scenarios. Overall crop productivity could decrease by 5-10% by mid-century, with potential yield reductions reaching up to 40% by the end of this century if no adaptions are taken. To address the challenges, it proposed region-specific adaptation strategies, including technological improvements, water conservation, land use management, and capacity-building initiatives. It also emphasized the importance of integrating agr-biodiversity to improve resilience and reduce vulnerability to climate change. Through a multi-criteria analysis, the study evaluated the feasibility and effectiveness of various adaptation options, emphasizing the importance of coordinated efforts among stakeholders.

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（Both Speaker and Poster of APN Project)