

Postprint of Fengqiu Agro-Ecological Experimental Station, Chinese Academy of Sciences

Authors: Institute of Soil Science, Chinese Academy of Sciences

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Abstract

Full Text

Introduction

The Fengqiu Agricultural Ecology Experimental Station (hereinafter referred to as “Fengqiu Station”) was established in 1983 and is located in Pandian Town, Fengqiu County, Henan Province, on the north bank of the Yellow River. Affiliated with the Institute of Soil Science, Chinese Academy of Sciences (CAS), it serves as a field observation and research station of the Chinese Ecosystem Research Network (CERN) and a key field scientific observation and research station of the National Ecosystem Research Network. From 2001 to 2015, the station was rated as an excellent field station of CERN for three consecutive five-year evaluation cycles. It represents the primary field experimental base deployed by CAS in the Huang-Huai-Hai Plain, particularly in areas along the Yellow River and its floodplains, dedicated to research on agriculture, resources, ecology, and environmental science.

Main Research Directions

The station’s research focuses on four principal areas: (1) long-term evolution patterns of resource and ecological environment-related elements—including water, soil, atmosphere, and living organisms—in the Huang-Huai-Hai Plain; (2) critical processes and underlying mechanisms of farmland ecosystems; (3) theories and technologies for enhancing farmland productivity; and (4) development of modern agricultural technology systems and optimized management models.

Research Achievements and Scientific Contributions

Addressing the national strategic positioning of the Huang-Huai-Hai Plain as China’s major grain production region and responding to the regional characteristics of its farmland ecosystems, Fengqiu Station has conducted comprehensive,

long-term theoretical research, technological development, and demonstration work. These efforts have centered on major scientific and technical challenges such as integrated agricultural management, critical ecosystem processes, efficient utilization of water and nutrient resources, soil quality evolution trends, and principles for targeted soil improvement. The station's achievements have provided crucial theoretical and technical support for constructing grain core areas, promoting efficient regional resource utilization, conserving cultivated land quality, and ensuring sustainable agricultural development in the Huang-Huai-Hai Plain.

The station pioneered the “Fengqiu Model” of regional comprehensive agricultural management, creating a salt-alkali control technology centered on well-irrigation and well-drainage for water management. This core technology, integrated with supporting agronomic and ecological measures, provided critical technical support for the comprehensive agricultural management and development of the Huang-Huai-Hai Plain during the 1980s. Additionally, Fengqiu Station was among the first in China to conduct systematic soil quality research, elucidating the evolution patterns of fluvo-aquic soil quality under different agricultural management practices and providing theoretical foundations and methodological guidance for cultivated land quality assessment and targeted productivity improvement.

Furthermore, the station has revealed the water and nutrient cycling processes and their efficient utilization mechanisms in farmland ecosystems of the Huang-Huai-Hai Plain, establishing an important theoretical basis for developing efficient water-fertilizer management strategies. In response to the challenges of high-intensity cropping in the new era, Fengqiu Station has proposed innovative theories for farmland productivity enhancement, developed key technologies for reducing soil constraint factors and improving land productivity, and established a technical system for targeted farmland productivity improvement and large-scale balanced yield increase in the Huang-Huai region. These advances have comprehensively enhanced the grain production potential of the region.

Talent Cultivation and Team Building

Leveraging its role as a field research platform, Fengqiu Station prioritizes talent cultivation and team development. The research team comprises recipients of the National Science Fund for Distinguished Young Scholars, CAS “Hundred Talents Program” members, innovative research fellows, and CAS Youth Innovation Promotion Association members, supported by an experienced technical and management team. This includes two Chief Scientists of the National “973” Program, one Chief Scientist of the National Key Research and Development Program during the 13th Five-Year Plan period, one recipient of the National Science Fund for Distinguished Young Scholars, and two CAS “Hundred Talents Program” members. Over the past decade, the station has trained 45 doctoral and 46 master's students, with one dissertation receiving the CAS Outstanding Doctoral Dissertation Award and over 30 students receiving various honors

including the CAS President's Excellent Award and the CAS Zhu Li Yuehua Outstanding Doctoral Student Award.

Openness and Exchange

Since CAS designated Fengqiu Station as an open research station in 1988, it has consistently adhered to the principles of “mobility, openness, collaboration, and competition,” actively initiating substantive domestic and international cooperation on key scientific questions. The station has become an important field platform and academic exchange base for collaborative research on farmland ecosystems both nationally and internationally. It has established long-term, stable cooperative relationships with numerous renowned universities and research institutions in the United States, Australia, New Zealand, Germany, Canada, and South Korea. Additionally, the station attracts numerous domestic researchers for scientific activities and academic exchanges, serving as a training base for undergraduates and graduate students from multiple domestic universities and for agricultural technical personnel.

Research Capacity and Technical Platform

Fengqiu Station has constructed comprehensive research and living facilities in Pandian Town, Fengqiu County, located in the central Huang-Huai-Hai Plain. The station features over 4,000 square meters of research buildings and guest accommodations, along with 400 square meters of analytical laboratories, sample processing rooms, tissue culture rooms, sterilization rooms, and sample storage facilities. It is equipped with more than 140 sets of instruments and devices. The experimental area spans 130 mu, containing over 40 long-term experimental plots, networked monitoring sites, and large-scale facilities. This infrastructure provides a complete work platform and living conditions for researchers conducting studies at the station.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.