



Research Report on UK-China Cooperation in Agricultural Research and Innovation

中英农业科研创新合作研究报告

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Executive Summary

Both the UK and China play an important role in global agricultural research and innovation to drive the green transformation and sustainable development of agriculture. Facing severe challenges in climate change, biodiversity loss, land resources degradation, overexploitation of water resources, energy crisis, increased plant and animal disease and air pollution, it is impossible for one country or single discipline to propose effective solutions to cope with these challenges. Given the leading role the UK and China play in these areas, it is necessary to strengthen and deepen exchanges and cooperation in various fields of agricultural research and innovation to provide new ideas and solutions to cope with these challenges.

In this context, the British Embassy Beijing and the Department of International Cooperation of Chinese Academy of Agricultural Sciences (CAAS) jointly planned a research on the UK-China cooperation in agricultural research and innovation. The British Embassy Beijing funded and commissioned two research teams from the CAAS and the University of Nottingham (UoN) to conduct this research. By incorporating the perspectives from two research teams, mixed methods (interviews, questionnaires, workshop and case studies) were taken to achieve these aims.

Firstly, the achievements, experience and practices, challenges and areas of improvement, and respective advantages of UK-China cooperation in agricultural research over the past 10 years (including projects under the UK-China Agritech Flagship Challenge Programme) are systematically summarized. Secondly, priority research areas and mechanisms for future cooperation are identified. Thirdly, new ideas to deepen UK-China cooperation in agricultural research and innovation are presented for reference to research funders and policy makers, including collaborative funding mode, multiple stakeholder participation, project evaluation, and joint PhD training programmes.

The main achievements in the UK-China cooperation in agricultural research over the past 10 years are **as follows**:

- 1) Key actors engaged in bilateral cooperation have been extending from research institutions to include industrial enterprises, farmers' organisations, international organisations and third-party countries.
- 2) Diversified cooperation models have been developed, including: signed agreements and memorandum of understanding between government agencies, joint research projects between universities or research institutes; joint research centres (or laboratories), personnel exchanges, joint training of doctoral students, joint publication, etc. For example, the CAS-JIC Centre of Excellence for Plant and Microbial Science (CEPAMS), which has provided a platform for knowledge exchange and close research cooperation between British and Chinese scientists.
- 3) The UK-China Joint Research and Innovation Partnership Fund focuses on basic research and encourages innovation, achieving remarkable results. The bilateral cooperation has

resulted in more than 1,000 projects completed, established mutual trust and cooperation partnerships extending to other disciplines, countries or regions beyond the scope of original funding schemes.

Based upon data collection and analysis of both interviews and questionnaire survey among senior managers and experienced researchers from the two countries, **the research findings** can be highlighted as follows:

- 1) The bilateral projects in the past were mainly funded from governmental sources, among which the joint projects funded by the UK National Research and Innovation Agency (UKRI) with the Ministry of Science and Technology of China (MOST) and the National Natural Science Foundation of China (NSFC) have been playing a key role in developing and deepening bilateral research cooperation. To strengthen existing partnerships and research links, respondents from both sides jointly called for the government agencies, research funders and other relevant sectors from the two countries working together to further develop, broaden and improve bilateral funding mechanisms to support joint research and talent training in global sustainable agriculture development.
- 2) Addressing the real needs of agricultural technology development has always been taken into consideration by the governments of both UK and China respectively when adjusting the priority areas for collaboration. Respondents from both sides believe that there are a wide range of areas for future bilateral collaboration, with smart agriculture, agroecology and environmental protection, carbon neutrality, climate change, and food health, nutrition and quality and safety standards identified as common interests and priorities.
- 3) The importance and positive influence of multilateral cooperation is emerging, which was particularly emphasized by the British respondents.
- 4) Respondents from both sides agree that global and local challenges as well as cutting-edge research should be considered as the most important factors in future bilateral cooperation.
- 5) The project identified some differences in the academic backgrounds and research interests between respondents from both sides. Nevertheless, respondents attached special importance to collaborative research related to agro-ecosystems, and showed strong interests in developing and strengthening interdisciplinary and cross-field collaboration in the future.
- 6) The participation of companies in the UK-China Agriculture Flagship Challenge Programme demonstrates the value and potential of industrial engagement contributing to bilateral research cooperation.
- 7) Joint PhD training and other longer-term exchange programmes have strengthened mutual understanding, laying a solid foundation for closer research cooperation between the UK and China. Respondents from both sides also expressed strong willingness to strengthen the exchange among young researchers.
- 8) Respondents from both sides have a broad consensus and strong willingness to develop and strengthen bilateral cooperation network in many aspects, including: research norms and methods, technical standards, and project management.

This project also identified **some challenges in bilateral cooperation** based on the review of cooperation in the last 10 years and are as follows:

- 1) There are different project management and evaluation systems between the UK and China's institutions, as well as different expectations for outcomes or impacts from bilateral cooperative projects, an important factor influencing project design and implementation, as well as the diffusion of research outcomes.
- 2) There is a lack of an aligned coordination, management and evaluation mechanism for bilateral projects.
- 3) There are uncertainties in the availability of longer term funding for bilateral projects.
- 4) There are challenges in the data sharing and the exchange of germplasm resources. Although relevant agreements have been signed, the implementation of these agreements needs to be improved during project implementation.
- 5) The level of participation of social scientists, entrepreneurs and farmers relatively low for applied research and innovation projects, creating challenges in project evaluation and the commercialisation of research outcome.
- 6) Long-term exchange programmes mainly happened in the UK with support from the Chinese side. However, the demand from British scholars to study and work in China is not strong.

Looking ahead, the UK and China derive their own advantages and disadvantages which are complementary to each other in many aspects, including: agricultural science and technology resources, financial support, total number of R&D personnel, application and commercialisation of agricultural science and technology achievements, and international R&D networks. It is clear that there is great potential and wide remit for future cooperation in agricultural science and technology innovation. Based upon both research findings and the assembly of suggestions from respondents from both countries, this report proposes following recommendations and policy suggestions for the consideration of relevant funding agencies and other interested organisations from both the UK and China.

- 1) The development and improvement of bilateral project management and coordination mechanisms with specific implementation paths and countermeasures to address issues raised by respondents.
- 2) Improving the evaluation mechanisms for bilateral project outcomes, adopting a multi-dimensional approach.
- 3) Focusing on agricultural related global challenges, jointly exploring financing mechanisms for multilateral cooperation.
- 4) Exploring innovative approaches to diversify financing models.
- 5) Strengthening long-term stable funding support for projects in priority fields or for high-quality projects.
- 6) Establishing an integrated cooperation model of “research project + talent training + trial base + matched funding from enterprises”.

- 7) Enhancing the engagement of social scientists, entrepreneurs and relevant stakeholders in bilateral cooperation in applied research, technology innovation and commercialisation.
- 8) Collecting ideas and research proposals through multiple channels in regards to global challenges in agriculture and sustainability and to advise on the planning and design of bilateral cooperation and encourage interdisciplinary cooperation.
- 9) Actively organising high-level academic seminars to review achievements obtained through bilateral cooperation, set the direction and identify priority areas and mechanisms for post-pandemic bilateral cooperation.
- 10) Establishing a UK-China Young Researchers & Innovators Alliance, and promoting and improving the exchange programs for young scholars and the joint training programs for PhD students.

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中英农业科研创新合作研究报告

执行摘要

中英两国在全球农业科技研究、推进绿色转型与可持续发展等方面起着举足轻重的作用。当前，人类面临着气候变化、生物多样性丧失、土地资源退化、水资源过度开发、能源危机、人畜共患病、大气污染等多方面的严峻挑战，单独依靠某一国家、某一学科的研究探索已无法提出有效的解决方案。中英作为两个大国，共同利益日益增多，合作必要性进一步增强，更需要加强和深化双方在农业科技研究和创新领域的交流合作，为破解上述挑战问题提供新的思路和解决方案。

在此背景下，中国农业科学院国际合作局与英国驻华大使馆共同策划了中英农业科技创新合作研究项目，并共同支持和委托中国农业科学院与英国诺丁汉大学研究团队展开深入研究。本项目基于对中英两国 50 余家农业科研机构的调研，从中方和英文两个视角较为系统

地总结了近 10 年来中英双方在农业科技领域合作（包括中英农业旗舰挑战计划下的合作项目）所取得的成就、值得借鉴的经验做法及面临的困难和挑战；基于各自的资源优势，探讨了未来双方合作的潜在优先领域及合作机制，并从资助模式、利益相关者参与、项目立项评估、博士生联合培养等具体方面，提出进一步深化中英两国农业科技创新合作的新思路，为双方相关部门制定、出台相关政策，资助科研项目提供建议和参考。

本报告将近 10 年来中英两国在农业科技领域合作所取得的成就概括为以下几个方面：1) 合作主体不断拓展，从最初的两国科研机构之间的合作，逐步向企业、农民组织、国际机构及第三方国家等主体拓展。2) 合作形式多样化，包括：政府层面签署了多项协议和备忘录；高校院所层面的合作主要通过项目联合研究、联合共建研究中心（或实验室）、人员交流互访、博士生联合培养及联合出版等形式开展，其中，中国科学院-英国约翰·英纳斯中心植物和微生物科学联合研究中心（简称 CAS-JIC 联合研究中心）和中英环境科学研究中心是中英共建联合实验室的成功典范，为中英双方科学家搭建了科技交流与合作平台。3) 中英联合科学创新基金聚焦基础科研并鼓励创新，成效显著。两国科研人员共同完成了超过 1000 个项目，同时建立了许多互信关系，并将合作领域和合作伙伴延伸到了项目资助之外的其他领域、国家或地区。

总结中英双边合作的成功经验、资源优势及优先领域，本项目有如下研究发现：

1) 双方合作项目经费主要来自政府渠道，其中英国国家科研与创新署（以下皆简称 UKRI）和中国科技部（MOST）以及国家自然科学基金委员会 (NSFC) 的双边项目对于推动双边科技合作的发展和深入至关重要。双方受访者共同呼吁双方政府、科研资助机构及相关部门能从两国和全球农业可持续发展、农业科研创新人才培养的高度，进一步发展、拓宽、深化双边科研融资机制，以巩固和发展业已形成的合作伙伴关系；2) 双方政府都会根据本国农业科技发展的实际需求对优先合作领域做出相应调整，双方受访者认为未来可选择的合作领域覆盖面要更宽，优先领域包括智慧农业、农业生态与环境保护、碳中和、气候变化、食品健康、营养与质量安全标准等；3) 多边合作成果已充分展示了其重要性，这种合作意愿双方受访者都表现比较强烈；4) 双方受访者都同意把参与应对全球和地方性挑战和前沿研究作为未来双边合作优先考虑的因素；5) 双方受访者各自感兴趣的领域既有相同性，又有不同性，但双方都特别重视农业生态系统方面的合作研究，并认为发展和强化跨学科、跨领域的研究合作将是未来双边合作的一种发展趋势；6) 以中英农业旗舰挑战项目为代表的一些合作项目，将企业纳入其中，展现了企业参与科研项目的优势；7) 博士生联合培养和长期交流项目加深了彼此了解，为发展更紧密的中英农业科研合作关系打下了坚实基础；双方受访者对进一步促进青年学者交流和博士生联合培养都表达了强烈的合作意愿；8) 双方受访者对进一步发展和强化双边合作网络，相互学习、借鉴和分享好的科研规范、研究方法、技术标准和项目管理实践等，存在着广泛的共识

和强烈的意愿。

回顾过去 10 年来中英农业科技合作历程，双方受访者认为下列不足之处需要克服和改进：1) 双方农业科研管理与评价体系不同，对合作项目所能达到的预期成果的评价也不尽相同，在一定程度上影响了合作项目的设计、执行和成果的扩散；2) 双边合作项目缺乏统一的协调管理机制和评价机制；3) 双边合作项目的长期资金资助存在一定的不确定性；4) 在数据共享和种质资源交换方面面临挑战，表现在尽管双方签署了相关协议，但在项目执行过程中，仍需要加强落实力度；5) 在应用研究和创新项目合作中，社会科学研究者、企业家与农民参与度低，影响合作成果落地和合作成效评估；6) 长期交流项目主要发生在英国，中方对此也十分支持，但英方青年学者来中国学习工作的意愿不强。

展望未来，中英双方在农业科技资源、经费支持和研发人员总量、农业科技成果应用与转化以及国际研发网络建设等方面，都呈现出各自的比较优势和较强的互补性。因此，在未来农业科技创新领域，双方有着较大的合作潜力，合作前景广阔。为更好地促进两国在农业科技创新领域开展更大范围、更深层次的交流合作，实现优势互补，合作共赢，基于对过去 10 年中英合作成就、经验与挑战的归纳概括和对双方受访者观点、看法及建议的总结分析，特提出以下对策建议供双方科技合作决策者、科研资助机构等相关部门参考：1) 发展完善双边合作的协调管理机制，探讨具体的实施路径和对策；2) 发展完善项目成果分类评价机制，从多个维度评估双边合作成果；3) 着眼全

球农业挑战性问题，共同探索多边合作融资机制；4) 创新多元化的合作资金筹资模式；5) 加强关键领域或优质项目的长期稳定支持；6) 构建“科研项目+人才培养+试验基地+企业配套资金”的一体化合作模式；7) 在应用研究、技术开发和产业化等双边合作项目中，提高社会科学家、企业和利益相关者的参与度；8) 从全球农业发展面临挑战及可持续发展角度，多种渠道征集双边合作需求，谋划、设计未来优先合作领域，促进多学科专家开展跨学科、跨领域的协同创新；9) 组织高层次学术研讨会，总结双边合作成果，探讨后疫情时期双边合作重点方向，重点领域及合作机制；10) 组建“中英青年研究创新者联盟”，积极推动和完善青年学者交流和博士联合培养计划等。

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