

PAFiC: Precision Agriculture for Family-farms in China

Brief Profile

Rapid advances in fertiliser use and other inputs to crops have dramatically improved Chinese crop production over recent decades, but this has not been done in a sustainable manner and it is estimated that >10M t of synthetic nitrogen fertiliser is wasted annually in China. The number of small to medium-sized commercial family farms is increasing from a merging of smaller, non-commercial family plots. It is desirable to support these farms to maintain rural populations and economies. These family-farmers also need technological assistance to manage larger areas that they have no historical connection to. Precision agriculture, allowing for fine-scale within-field management of crops based on detailed spatial data collection, has an essential role to play in increasing fertiliser and resource use efficiency on farms. This will increase production efficiency (profitability) as well as reduce the environmental footprint of agricultural practices linked to fertilizer use. However, in China there are fundamental barriers to uptake of precision agriculture methods and technology, including high costs relative to income and unquantified financial benefits, a lack of data and services and a lack of awareness and acceptance by growers, communities and administrative agencies.



This joint UK-China collaboration aims to improve the use efficiency of nutrients and agri-chemicals in crop production in China, by addressing key technological, agricultural and social or economic barriers to the use of precision agriculture methods in commercial family farms. The project will develop new technology and data sources for agricultural decision making, including the application of advanced hyperspectral cameras, able to measure many wavelengths of light and provide detailed information on crop health, and improved technology for precise spatial positioning within fields. Improved methods to utilise satellite imagery, especially from radar sensors systems, to provide accessible data on crop nutrient levels and growth will also be developed and the advantages of combining data from multiple sources (satellites, airborne sensors and ground monitoring) will be assessed. These improved data layers, providing frequent and detailed spatial information on crop growth, crop health and soils, will then be combined with models of crop growth to provide a system for agricultural decision making that is applicable to family farms in China. This will promote the optimal use of agricultural resources, such as fertiliser. Developed methods will be tested on exemplar farms in China, covering a range of geographic regions and crop systems that have been established in previous research projects. To facilitate both the maximum engagement from a diversity of community and industry members, and the maximum usage of the agri-technologies and precision agriculture methods by farmers, it is critical to incorporate both scientific and local (community and practitioner) expertise into the project. This is critical to understanding and addressing issues specific to these farming system. An

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integral aspect of the project is to therefore undertake focussed research on the societal and economic barriers to uptake and to use of these technologies. This research will identify and address these barriers via the mode of development and the delivery of the project outputs onto family-farms. This work will also form the basis for wide-reaching and effective public engagement, knowledge exchange and policy translation to ensure the latest methods are adopted in China. Activities will include the development of a data information portal for crop management, stakeholder workshops and technical training for local growers and agricultural specialists.

Partners

UK: Newcastle University (UK Lead Organisation), FERA Science Limited, RAL Space

China: National Engineering Research Center for Information Technology in Agriculture (NERCITA, China Lead Organisation), Beihang University

Project web-link:

<http://gtr.rcuk.ac.uk/projects?ref=ST%2FN006801%2F1>

Project status:

On-going (2016-2019)

Expected Outputs

- Advances in agri-technologies and agri-methodologies
- Improved resource-use efficiency on-farm.
- Increasing adoption rates of precision agriculture (PA)
- Enhance collaboration between academia and industry/local governments
- Increased awareness and capacity for PA among all stakeholders, the public, and younger generations
- Influence on policy makers

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