



About TIGR²ESS

India's record of progress in agriculture over the past four decades has been laudable, owing to the major life-saving technological advancement of the 20th century, 'The First Green Revolution' enhanced crop productivity for a few key staple crops such as wheat, rice, or maize by using a combination of crop breeding for preferred traits (straw shortening, harvest index) and increased inputs (irrigation, fertilizers, pesticides, pathogen control).

However, the first decade of the 21st century has seen the yield of most of the staple crops reach a plateau. Indian agriculture is plagued with problems such as stagnating growth in productivity, rising input costs, falling profits and price volatility, which together with the emergence of climatic uncertainties, growing regional disparities, and unfavourable trading conditions have made farming un-profitable. Surveys conducted on the small and marginal scale holdings (i.e. holdings of less than 1 hectare

of land), constituting 85% of the total land holdings in India, show that the net monthly income (farm and non- farm) was negative and the net investment in productive assets was limited, indicating that small-scale farming is inefficient in India¹.

Though Indian research contributes substantially to improvements in crop resilience and productivity, yet for a largely agrarian economy like India, the country still struggles with issues such as uneven trade regimes, inequalities in education provision, competition for potable water and urbanisation. To help address some of these issues, the "Transforming India's Green Revolution by Research and Empowerment for Sustainable food Supplies (TIGR²ESS)" programme, a collaboration between the UK and India, has been developed to define the requirements for second, more sustainable Green Revolution in India.

TIGR²ESS: A UK-India Collaborative Programme

The TIGR²ESS consortium represents a £7.8M programme, funded by the UK Global Challenges Research Fund (GCRF), to develop innovative approaches and tackle key research issues and their translation to bring resilience, equal opportunities and diversity to the food system in India (Fig. 1).

This programme intends to achieve the following key outcomes:

Enhance India's capacity to:

- Address sustainable agriculture challenges
- Engage and empower rural communities
- Put project results into practice
- Enhance gender equality for farmers
- Understand food & nutrition across communities

Enhance UK's:

- Research capacity
- Understanding of societal & scientific challenges for sustainable agriculture in India

TIGR²ESS will investigate key Food Security issues, providing fundamental research into crop science and sustainable resource use, as well as translation for the well-being and equality of rural farming communities and development of enterprise opportunities.

This programme will consolidate existing partnerships and build research capacity for sustainable agricultural production, address well-being and nutrition for rural communities, whilst maintaining resilient supply chains for urban populations.

Primarily, the programme will be delivered as fundamental research by supporting at least 14 Postdoctoral Researchers employed at partner Research Institutions and Universities across India, as well as 8 PDRA across collaborating institutions in the UK, integrating delivery and impact via a translational programme of outreach, education and entrepreneurial stimuli. Secondly, a series of capacity building academic exchanges will support leading researchers from India and UK to strengthen capacity in key areas of the food system, and enhance ongoing Government initiatives in India advancing the use of technology for smart agriculture across regional rural communities.



Fig. 1: TIGR²ESS objectives

The research approaches include a programme of primary 'Flagship Research Projects'. Outputs from the TIGR²ESS programme will be disseminated by a programme of academic exchanges, training workshops and educational outreach activities, with regional rural surveys, gender empowering actions, extension workshops, and demonstration farms. Fundamental research will address local and regional socio-economic issues, and translational outputs will enhance well-being and nutrition for small-holder and large-scale farming communities, and the sustainable use of water and resilience in supply chains for food producers and consumer. The objectives and outcomes were jointly framed by the consortium partners as 'Four Key Research Questions' (Fig. 2).



Fig. 2: TIGR²ESS Key Research Questions

At the heart of the TIGR²ESS programme are a series of six Flagship Projects tackling fundamental research questions.

<p>Flagship Project 1</p> <p>to consult, analyse and define the requirements for a 'second' Green Revolution ("Evergreen") in India, leading to policy outputs and regional recommendations.</p>	<p>Flagship Project 2 + 3</p> <p>to use fundamental scientific approaches and address key issues in Crop Sciences. The overall aim is to broaden the production potential of dietary staples and providing lessons for orphan crops.</p>	<p>Flagship Project 4 + 5</p> <p>to enhance water use to develop sustainable cropping systems and model supply chain operational efficiency for the rural to urban food system.</p>	<p>Flagship Project 6</p> <p>will both integrate the outputs of Goal I-V, and undertake research to promote equal opportunities, stimulate entrepreneurship and develop educational programs for stakeholders across rural communities.</p>
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¹Dev, S.Mahendra, 2012. *Small Farmers in India: Challenges and Opportunities*. Indira Gandhi Institute of Development Research, Mumbai

