

Creating space for smallholder farmer innovation: Reflections from Australian researchers

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Abstract

An agricultural research for development project on the East India Plateau provides the context for reflecting on the conduct of research, the creation of learning opportunities, scaling out of research results, and monitoring research impact. What appears at one level as research into rice agronomy actually has profound implications for climate resilient agriculture, nutrition security and the empowerment of women. It is clear the most important outcome of our research is the development of human beings rather than the development of agricultural technology or agricultural systems. Despite often extreme disadvantage, our women research farmers have frequently demonstrated individually and collectively that they have the capacity to transform their lives. The process of engaging them in research appears to hold the key to unlocking their latent capacity for independent innovation. Our research practice continues to evolve in light of this new understanding.

Keywords: direct seeded rice, nutrition sensitive agriculture, climate resilient agriculture, adult learning

Introduction

Poverty, malnutrition and gender inequality are endemic on the East Indian Plateau. By most international measures, (for example, Multidimensional Poverty Index, Global Hunger Index, Women's Empowerment in Agriculture Index), the east Indian states of Jharkhand, Bihar and West Bengal stand out for all the wrong reasons. Against this background the Australian Centre for International Agricultural Research (ACIAR) has funded an agricultural research for development project in some of the most disadvantaged communities in Jharkhand and West Bengal. This research is conducted in partnership with tribal communities where the non-government organisation (NGO) Professional Assistance for Development Action (PRADAN) has a history of engagement to improve livelihoods and develop a sense of agency. The development activity includes a focus on empowering women and supporting their access to entitlements and rights.

This paper presents observations from Australian agricultural scientists who have been involved in this agricultural research for development project. By positioning our agricultural research activity within the broader context of PRADAN's development activity we are witnessing impressive research impacts. These impacts include examples from the bio-physical domains such as increased agricultural productivity, greater use of water resources, more diverse and intensive cropping systems; the socio-economic domains such as increased household income, reduction in labour drudgery performed by women, improved food security, and perhaps most interestingly examples

from the psycho-social domain including self-perception, transformational learning and human capacity for independent innovation.

What are we doing?

The process of engaging women farmers in on-farm, farmer-managed research is described elsewhere in these proceedings (Kumar *et al.*, 2015). In short, women participate in the research through existing Self Help Groups (SHGs). Through the social institution of the SHGs women contribute to formulating locally relevant research questions, impose experimental treatments in their fields, participate in data collection, communicate research results to fellow farmers, and create ownership of the innovation process (Figure 1). A more detailed analysis of the learning and human development aspects of this process of engagement is described by Ramsay *et al.* (2015) in these proceedings.

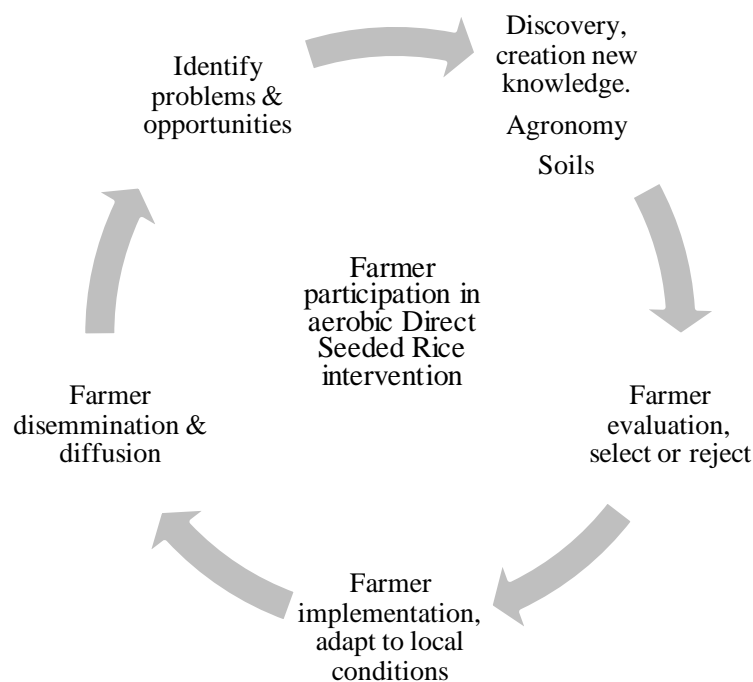


Figure 1. Smallholder farmers play critical roles in the innovation of new production systems.

Our current research focus is on diversifying and intensifying local cropping systems that are dominated by transplanted rice. The rice dominated farming system is implicated in widespread malnutrition where rice can account for up to 80 % of household calorie consumption (Ahmed, 2013). Traditional transplanting of rice also contributes to the disempowerment of women where the menial tasks of transplanting and hand weeding are traditionally reserved for women. However, our initial research focus was on the high risk of transplanted rice failing in this environment. Cornish *et al.* (2015) describe why transplanted rice is such a high risk, mainly due to the unreliable nature of ponding that is necessary for transplanting, and the feasibility of directly seeding rice as an alternative cropping practice. Aerobic Direct Seeded Rice (DSR) is a useful case study illustrating how a relatively straight forward intervention, such as a rice establishment system, can have profound implications for livelihoods and agency (Table 1).

Table 1. Impacts of Aerobic Direct Seeded Rice on a range of development criteria.

Criteria	Prior to aerobic DSR	After aerobic DSR
Household income	Minimal cash income from on-farm activity. Rice is grown mainly for home consumption. Labour inputs very high.	Average annual household income increased by ₹10,400 over four years (2008-2011). Some households have earned more than ₹50,000 in one season from vegetables.
Food security	80 % of households with only six months food security.	Nearly all households have 12 months food security. FS enhanced both from consumption of own production, and through food purchases using higher income.
Nutrition security	Malnutrition severe and widespread, particularly women and children.	Nutrition intensive interventions include; pulses (Chickpea, Pigeon Pea, Black Gram, Mung Bean), oilseeds (Mustard), vegetables (Cow Pea, French Bean, Tomatoes, Cucumber, Gourds), forages for small ruminants (goats).
Distressed migration	Young adults, particularly males, forced to leave home seeking low-paid employment in towns and cities.	Distressed migration almost absent due to attractive on-farm enterprises.
Participation in local markets	Almost no participation in local markets to sell farm produce.	Regular participation in local markets. Some local youths employed as 'consolidators', collecting produce (mainly vegetables) from individual farms to sell in markets.
Climate resilience	Traditional rice culture relies on transplanting. Climate variability results in late transplanting and failed crops.	Aerobic DSR established by manual direct seeding into non-flooded, non-puddled conditions. Using this method, rice crops can be sown on time with reliable crop yield even in dry years when transplanted rice fails.
Empowering women	Tribal women see themselves as labourers, with low self-esteem, and little capacity for improving their lives.	Tribal women begin to see themselves first as farmers, then as researchers and trainers. Indicators of women's empowerment enhanced. 'Sense of agency' facilitated and women acting as entrepreneurs.

Surprises along the way

There are advantages and disadvantages to conducting agricultural research in partnership with smallholder farmers. Obvious advantages include improved relevance of research to farmer's needs and consequently more rapid and widespread adoption of research results. A less obvious advantage is the opportunity for incorporating transformational learning into the research activity, thereby developing human capacity for solving local problems and realising opportunities. Obvious disadvantages include less control over sources of variability (birds, rats, elephants, unplanned

change in farmer management) in the experimental design and greater cost and difficulty in collecting comprehensive data sets for analysis and communication. These advantages and disadvantages come down to a trade-off between relevance and rigour in scientific method (Carberry, 2001). On balance, the advantages outweigh the disadvantages, but the approach requires time and resources, it is not a quick fix. Rapid and widespread adoption of research, significant research impact, and ongoing capacity for independent innovation justify the additional cost and time invested.

Research interventions that have been rapidly adopted, adapted and disseminated by farmers include commercial vegetable production, aerobic DSR, appropriate mechanisation of agriculture, and year-round crop planning. These interventions are attractive for a range of reasons including high income generation potential (vegetables), more climate-resilient and less labour required (aerobic DSR), less labour and gender sensitive (mechanisation), and empowering women by attaining a higher level of cognitive development (crop planning). In the Purulia district the year-round crop planning tool has been scaled out to more than 2000 families over the past three seasons. In the Chaibasa district, aerobic DSR has been scaled out to several hundred farmers and demand for manual cultivation equipment is outstripping supply. In both cases farmers play an active and effective role in adapting and disseminating the new technology, and in both cases there has been little or no government role in developing or extending the technology.

Farmers participating in our research continue to impress on many fronts. First, research farmers take on the risk associated with testing a new technology or production system, the project does not pay farmers or provide compensation. Second, research farmers are excellent observers of change in their production system. For example, farmers report improved soil physical conditions just one or two years after converting from transplanted to aerobic DSR cultivation. Third, research farmers are excellent communicators of research results to fellow farmers. A new practice communicated by a local farmer with personal experience of the practice has much more credibility and influence than the same message delivered by an external 'expert'. By engaging farmers as research partners we facilitate their emergence as local innovators. It is becoming clear that our process of research is fundamentally developing the capacity of participating farmers rather than merely introducing new agricultural technology or farming systems.

Making sense of our process of research

With the growing evidence of research impact, and growing awareness of the importance of learning in our research activity, it is incumbent on the research team to better understand the key processes operating so we and others can take our lessons and apply them elsewhere. This search for understanding naturally leads to a search for underlying theories and frameworks that might help explain and underpin our evolving research process. The concept of transdisciplinarity appears to provide some useful insights and is explored below. The focus on transdisciplinarity is complementary to other theories based on social and cognitive development (Ramsay *et al.*, 2015), or a rights based approach to empowerment (Kumar, *et al.*, 2015), that are described elsewhere.

The theory and practice of transdisciplinary research appears well suited to the challenge of agricultural research for development projects. Lang *et al.* (2012) provide the following definition:

Transdisciplinarity is a reflexive, integrative, method driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge.

Key elements of transdisciplinarity relevant to the current project include:

- The research is directed by a higher level purpose (e.g. to empower women, alleviate poverty, improve nutrition).
- The research explicitly involves non-scientists in the research process (e.g. development professionals and farmers).
- Data collection utilises protocols that go across traditional discipline boundaries, so-called 'boundary objects' (e.g. the year-round crop planning tool, or the soil water balance model).
- Opportunities for learning are incorporated into the research activity, facilitating change in behaviour and practice of all stakeholders.
- Research results are packaged and communicated to specific audiences to be useful for their purposes (e.g. soil water dynamics for farmers, development professionals or scientists).

Integration is a hallmark of transdisciplinary research. Rather than conceptualise research and extension or scaling out as a linear process, transdisciplinarity seeks to simultaneously combine research activity, learning activity, and real-world impact. Mitchell *et al.* (2015) describe three 'outcome spaces'; *Improving the Situation* (e.g. poverty, empowerment), *Contributing to Knowledge* (e.g. research, discovery or invention), and *Mutual and Transformational Learning* (e.g. farmers and researchers learning). All three outcome spaces need to be considered and planned for during a project's inception.

Opportunities and challenges

This project is a positive example and source of inspiration for those seeking to address the many inequalities and injustices all too evident on the East India Plateau. Project interventions are having a positive impact on lives and some interventions are being rapidly scaled out. However, the challenge is huge, and the resources available to the project are modest. ACIAR are currently negotiating a new project with the research team that will expand the project geographically to include a location in north-west Bangladesh, and also include a new focus on dietary diversity linked to agricultural diversity and empowering women.

There are many opportunities and challenges, just two are mentioned here. First, we need to better understand the process of collective learning that is facilitated by engaging women farmers in research. The word 'transformational' is often loosely used in development and research projects but in this case we believe we are on the cusp of understanding a truly transformational learning process. Second, we need to better understand our research theory and practice so that all project participants have a clear and shared understanding of how our research is linked to our higher purpose, and how this determines research practice. This understanding is necessary to enable other teams to build on our approach. To this end the proposed *Virtual Centre for Rural Development* will be of great utility for communicating and developing this shared understanding.

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