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# Participatory research approaches rapidly improve household food security in Nepal and identify policy changes required for institutionalisation

K.D. Joshi[a], K.P. Devkota[b], D. Harris[c,1], N.P. Khanal[d], B. Paudyal[b], A. Sapkota[d], J.R. Witcombe[c,*]

[a] Centre for Advanced Research in International Agricultural Development (CARIAD), c/o CIMMYT South Asia Regional Office, P.O. Box 5186, Kathmandu, Nepal
[b] Local Initiatives for Biodiversity, Research and Development (LI-BIRD), P.O. Box 324, Pokhara, Nepal
[c] CARIAD, Bangor University, Gwynedd LL57 2UW, UK
[d] Forum for Rural Welfare and Agriculture Reform for Development, P.O. Box 11, Bharatpur, Nepal

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ABSTRACT

The introduction, testing, promotion and release of a rice variety, BG 1442, in Nepal were examined in relation to existing policies governing these procedures and to how more participatory approaches could benefit food security. From 1998 to 2006, participatory varietal selection (PVS) was used to test BG 1442 and other candidate rice varieties in the spring (*Chaite*) rice-growing season (February to June) and in the main season (June to November). The testing of BG 1442 commenced 11 years after it was first introduced into Nepal in 1987 by the national rice research programme (NRRP). Following its initial acceptance by farmers, it was widely disseminated from 1998 by non-governmental organisations (NGOs) in the low altitude region of Nepal called the *terai* in projects funded by the Department for International Development (DFID), UK. This dissemination was done using a method termed informal research and development (IRD) where many small packets of seed were distributed without fertiliser or pesticides, the only additional input being a description of varietal characteristics on an enclosed leaflet. From 2001 to 2008, various assessments were made of its extent of adoption and its impact on livelihoods. In a randomised survey of households in 10 districts, BG 1442 increased from not being used at all in 1997 to being grown by about 20% of the surveyed rice farmers by 2008. It was grown both in the *Chaite* and the main season and was well adapted to the rainfed-upland and medium-land rice ecosystems. The variety was grown from the far west to the far east of low-altitude Nepal by resource-poor farmers. IRD was important in accelerating adoption and improving food security as it was by far the most important external source of seed for farmers. Prior to the adoption of BG 1442, farmers who did not harvest sufficient rice to last their households for 12 months increased rice self sufficiency by over 2 months (25% more). Those households that sold surplus grain and who grew BG 1442 increased grain sales by 600 kg (25% more) in the *Chaite* season and by 370 kg (24% more) from main season cultivation.

Compared with the conventional on-station variety testing and release, PVS can significantly reduce the time needed for testing and increase the benefits from plant breeding. However, the greatest impact of using more client-oriented approaches was not from PVS but from the subsequent IRD given that it was the major source of seed resulting in its wide use by 2008. This popularity certainly influenced the decision by the national programme to eventually release the variety. This demonstrated how the extent of adoption could be a useful criterion for release, particularly when experimental data has previously failed to establish the superiority of a variety. The benefits from using PVS and, particularly, IRD were very large as they reduced the time needed for variety testing and popularization and hence reduced the time needed to improve food security. However, NGOs cannot sustainably finance the use of IRD and if it is to become a routine part of the national research and extension system then government needs to change policies to routinely use PVS and IRD. The regulatory framework needs to pay more attention to farmers' preferences and make the process of official release or registration simpler and faster. The diversion to NGOs of some of the resources currently allocated solely to governmental organisations would allow NGOs to participate sustainably in varietal testing and dissemination.



* Corresponding author.
*E-mail address:* j.r.witcombe@bangor.ac.uk (J.R. Witcombe).
[1] Present address: International Crops Research Institute for the Semi-Arid Tropics, P.O. Box 39063, Nairobi, Kenya.

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## 1. Introduction

Participatory varietal selection (PVS) allows farmers and other stakeholders, such as seed producers and traders, researchers and extension workers, to evaluate the suitability of a wide range of new varieties, both released and unreleased, in trials conducted by farmers' in their own fields using their own management (Joshi and Witcombe, 1996; Witcombe et al., 1996). This research approach for identifying superior varieties is relevant for remote and marginal areas as well as for high potential production systems (Joshi and Witcombe, 2002). PVS has been used in many crops and countries, and more recent examples include Witcombe et al. (2003) in maize, Ferrara et al. (2007) in wheat, and Tiwari et al. (2009) in maize. There are many examples of PVS on rice (*Oryza sativa* L.) including: Joshi and Witcombe (1996), Joshi et al. (1997), Witcombe et al. (2001), Gridley et al. (2002), Joshi and Witcombe (2002), and Joshi et al. (2007).

PVS, apart from identifying varieties that farmers prefer to grow, accelerates varietal adoption and spread and enhances food security through the improved yield and stress tolerance of the new varieties (Joshi and Witcombe, 1996; Joshi et al., 1997, 2005; Witcombe et al., 1999). Informal research and development (IRD), is a much-simplified and less intensive approach. It was initiated at the Lumle Agricultural Research Centre, Nepal in 1990 (Joshi and Sthapit, 1990) at a time when conventional breeding followed by extension had not benefited smallholders in remote, marginal and difficult areas. This approach emphasised increased varietal adoption rather than data collection for research and was particularly suitable for increasing the flow of new genetic materials to areas lacking an effective formal seed supply system (Joshi and Sthapit, 1990; Joshi et al., 1997).

Although there are many papers on PVS most concentrate on the PVS process itself. Very few of such papers have examined the socioeconomic or institutional impacts of participatory research or how it is constrained by the regulatory framework for variety testing and release. Lilja and Erenstein (2002) describe how evidence from these approaches is important for strategic decision makers in overcoming resistance by national systems to adopt participatory research methods. Tiwari et al. (2010) reported that PVS can greatly contribute to improved food security by addressing the issues of social exclusion and discrimination based on gender, ethnicity and caste and that it can have important institutional impacts in making the research and development process more inclusive and demand-driven.

In this paper, we use the rice variety BG 1442 as a case study to examine the social impacts of PVS and IRD, particularly on food security, and present and future institutional impacts on release policy and varietal testing and popularisation. BG 1442 was chosen because it was the most widely adopted rice variety of more than 50 varieties that had been tested by PVS in Nepal, despite it having not been released by the National Rice Research Programme (NRRP) after a decade of evaluation. We examine the social impact of PVS and IRD by assessing the extent to which they have influenced the adoption of BG 1442 and the significance of this adoption on food security and improved livelihoods. For institutional impacts, we review how participatory research has impacted on official policy, including the eventual release of BG 1442, and discuss the further policy changes needed to facilitate the sustainable use of participatory research and extension.

## 2. Materials and methods

### 2.1. Introduction, testing and promotion of BG 1442 in Nepal by the national research system

The testing and promotion of BG 1442 by the national government programme were reviewed from the available literature, particularly from the data included in the release proposal for this variety by NRRP (Anonymous, 2004, obtained from National Seed Board (NSB)). Other sources were two NGOs: the Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and the Forum for Rural Welfare and Agriculture Reform for Development (FORWARD). The variety was also tested by the Lumle Agricultural Research Centre (LARC) at the same time as the earlier years of testing by NRRP (the early nineties). No data were available from LARC following a major reorganisation in 1997 so we relied on the knowledge of scientists who worked in this institution.

### 2.2. Evaluation and promotion of BG 1442 by participatory research projects in Nepal

The Department for International Development (DFID) Plant Sciences Research Programme (PSP) funded projects from 1996 to 2006 in Nepal in two complementary themes; Participatory Crop Improvement (PCI) and the Promotion of Rainfed *Rabi* Cropping (RRC) in rice fallows of India and Nepal. The lead organisations were LI-BIRD for the PCI project and FORWARD for the RRC project. Scientists from the Centre for Advanced Research in International Agricultural Development (CARIAD), Bangor University, UK (at that time called CAZS) supported both projects. They covered districts in the low altitude region called the *terai* (Fig. 1) and in some of these both PVS and subsequent IRD were done ('intensive districts') and in others only IRD was employed ('extensive districts'). Several District Agriculture Development Offices (DADOs) of the Department of Agriculture (DoA) and other NGOs, e.g., the Social Upliftment through Participatory Programmes, Research and Training (SUPPORT) Foundation and the Community Development and Research Centre (CDRC) also collaborated in popularising BG 1442.

The PVS trials (Table 1) included mother trials that consisted of all the new test entries in single replicates of a randomised complete block design using the most widely grown farmers' variety as a control (mostly CH 45 but also Chaite 4 and Bagari). The farmer decided the agronomic management of the trial and the plot size varied with the land available. Researchers collected quantitative data including yield. In each village, a matrix ranking of important varietal traits was done jointly with participating and other interested neighbouring farmers when the crop was near to maturity. Post-harvest interviews with the participating farmers were done to include traits such as milling recovery, cooking and eating qualities, and market price.

### 2.3. Promotion of BG1442 through IRD

In the IRD (Table 1), BG 1442 was promoted along with several other rice varieties also identified by PVS. Farmers received either a 1 kg or 2 kg bag of seed (this varied with the organisation involved and seed availability) that usually contained a leaflet that described the varietal characteristics. Seed was distributed to farmers in villages that were chosen according to priorities established in the projects. In each village, the NGO handed over the seed bags to farmers' groups who distributed them to their members. The DADOs supplied the bags to government agricultural service centres that distributed them to farmers on a first-come, first-served basis. In all cases records were kept of the recipient farmers.

### 2.4. Impact assessment by Monitoring Impact and Learning (MIL) of the DFID Research into Use Programme (RiUP), 2008

Two studies included an assessment of the adoption and impact of rice variety BG 1442, and were done in 2008, through the MIL component of the RiUP, across 10 districts of the *terai* (Fig. 2). Both the studies were done from July 2008 to January 2009. The design of the survey and quality control of the field surveys by NGOs was