

## Drought Tolerant Rice Research in India

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### Abstract

The Generation Challenge Programme (GCP) is an international platform for agrarian knowledge production for a complex scientific problem, namely, Drought. The GCP ushered in a new form of knowledge production that reconciles both the upstream laboratorial research and its downstream delivery at the farmer's field. This paper aims at understanding the knowledge production process of the GCP. More precisely, it explores the following three research questions: how three processes such as research partnership, trans-disciplinary and inclusion of end-user in research manifested within the knowledge production process of the GCP drought-tolerant rice research; what type of knowledge production emerged within the GCP drought-tolerant rice research.

**Keywords:** Knowledge production; Hybrid discourse; Generation Challenge Programme; Rice research; Agriculture

### Introduction

The Generation Challenge Programme (GCP) was a global farming information production programme created in 2003 by the CGIAR as a world crop analysis association. Wound down in 2014, as per its 10-year time-framing, the GCP had as its principle objective, the assembly of data referring to drought mistreatment plant genetic diversity through advanced genomic science and comparative biology thus on support the efforts of plant-breeders in developing countries to develop drought-tolerant varieties [1]. Drought is so a serious drawback for international agriculture. Just in case of rice, some eighty million farmers are acting on acting on are drought prone, with drought alone accounting for AN 18-Mt annual reduction in production. In India, drought may be a major concern for the Jap a part of the country, wherever nearly of the rice-growing space is drought prone, cost accounting some 12 months of the common price of total rice production.

GCP may be seen as a composite information production programme within which divergent approaches of data production have emerged. These divergent approaches embody thought information production theories like instrumental and non-instrumental paradigms likewise as various information production paradigms like commons based mostly production systems and Commons based mostly Peer Production (CBPP) mode. During this paper, the aim is to know the information production method of the GCP [2].

For this, we've got relied upon 3 processes (as organising principles of data production) specifically analysis partnership, trans disciplinary and inclusion of end-user in analysis to elaborate however these 3 methods manifested among the information production process of the GCP's drought-tolerant rice analysis comes in an Indian context that enclosed the International Rice analysis Institute (IRRI), at the side of many Indian agricultural establishments The case of drought-tolerant rice analysis within the Indian context was chosen attributable to the subsequent reasons [3]. First, because of the importance of the rice crop for food security in Bharat, and therefore the giant impact that drought has in curtailing rice productivity in Bharat. Second, accessibility of actors and data on GCP rice analysis comes were obtainable. Third, this analysis was planned among the NWO-WOTRO integrated programme between Bharat and Kingdom of The Netherlands.

### Rice

Several theoretical approaches are relevant to an understanding of the method of data production. Basic during this respect is that the

binary between the divided understanding of a state-funded, discipline-based, and academia-governed and valid truth-oriented persuasion of science, on the one hand, and trans disciplinary, network-governed, outwardly valid, problem-solving and impact-driven science, on the opposite. Even among the farming information production discourse, this divided binary has been expressed through 2 main paradigms: the linear paradigm and therefore the systems paradigm [4]. The linear paradigm, typically conjointly referred to as the technology transfer approach, considers a linear relationship between science and society within which standardised technology packages are developed within the analysis institutes that are then transferred through extension agencies to the farmer's field, where, it's expected, it'll bring amendment.

### Commons based mostly Peer Production (CBPP)

The analysis was initiated with an intensive study of GCP's drought-tolerant rice research-project documents, together with analysis papers, annual reports, project briefs and dealing papers. From this, key actors (institutional and individual) were known. Then, a 14-week (April-July 2012) munitions in Bharat and therefore the Philippines was organized by the primary author. Within the Philippines, IRRI was visited alternative [and several other rounds of interviews with the project leader and other scientists conducted. In India, the author visited and stayed in any respect the associated institutes (see below), attending conferences (including with farmers), discussing problems at length with scientists (as well like directors/vice-chancellors), interacting with (masters and doctoral) students, addressing scientists in interactive session and collection an oversized variety of democratic observations. A complete of forty five in-depth interviews with the scientists, administrator was conducted. Even so, once it became apparent simply however integral the farmers were to the present information production method, it had been deemed necessary to have interaction in more munitions aimed toward reprehension them to achieve a lot of

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holistic understanding of the operation of the system. Thus, a second spherical of munitions focusing solely on the farmers was conducted, within the following Gregorian calendar month and Dec (2012) [5].

The activities of the GCP drought-tolerant rice analysis partnership were organized among fourteen completely different establishments, thirteen in Bharat and one within the Philippines. Additionally to IRRI, the opposite establishments comprised ICAR analysis institutes, state agricultural universities, NGOs and transfer-of-technology centres. These were all set in or about to drought-prone areas, and in several agro-ecological zones. The GCP awarded four comes between 2005 made multiple outputs, each within the kind of drought-tolerant varieties – discharged by the Indian government for industrial cultivation and publications CGIAR Generation. This section is split into following 3 parts: the formation and evolution of the partnership; internal organisational dynamics.

### Formation and evolution of the analysis partnership

The GCP drought-tolerant rice analysis partnership is really designed upon 2 distinct networks: the Upland Rice Shuttle Breeding Network (URSBN) and therefore the Drought Breeding Network (DBN), for rain. The initiation of this partnership goes back to the first Nineties, once the altruist Foundation (RF) took the initiative to boost the rice crop with a serious concentrate on drought tolerance. At that point, among the thought of ICAR analysis, neither was the importance of drought appreciated nor did ICAR have the capability to modify it. Per Several scientists among the DBN and URSBN are literally return through the RF initiative. However, the share between IRRI and non-IRRI varieties in People's Republic of Bangladesh tends to be under for the Philippines underneath the geometric rule that offers a chance to continue providing the essential analysis required to come up with new varieties [6]. The GCP drought-tolerant rice analysis partnership is really designed upon 2 distinct networks: the Upland Rice Shuttle Breeding Network (URSBN), that specialize in rain upland, and also the Drought Breeding Network (DBN), for rain lowland The initiation of this partnership goes back to the first Nineteen Nineties, once the philanthropist Foundation (RF) took the initiative to enhance the rice crop with a significant specialize in drought tolerance. At that point, at intervals the thought of ICAR analysis, neither was the importance of drought appreciated nor did ICAR have the capability to modify it. In line with one human, 'Understanding drought analysis was a visionary step for Indian agriculture by the RF and additionally to the Asian Rice Biotechnology Network (ARBN). Several scientists at intervals the DBN and URSBN are literally come back through the RF initiative. During this section, we tend to discuss the higher than findings. This section is split into 3 components. First, we tend to indicate the educational outcomes from the GCP drought-tolerant rice analysis case. Second, we tend to typify the character of the information production discourse rising from the case. Third, we tend to define the implications which will be discerned from the case on analysis organisation [7].

### Learning outcomes from the GCP drought-tolerant rice analysis case

The following learning outcomes in reference to information production discourse are often discerned from the GCP drought-tolerant rice analysis case as detailed within the previous section. First, the essential explanation behind building-up the analysis partnership wasn't to optimise resources or to minimise dealing prices of doing analysis a thought usually introduced in support of Instrumental paradigm and systems paradigm rather, it solely aimed toward confronting the quality of drought drawback through addressing

the difficulty of G\*E interactions (by conducting multiple trials in numerous agro-ecological zones). For the Philippines, we tend to assume a rice offer snap of 04.28 that was the norm supported 3 offers severally. For People's Republic of Bangladesh, we tend to selected a rice offer snap of 7.25 as a result of the literature reports rice offer elasticity's for People's Republic of Bangladesh within the vary of 7.20–0.30. Moreover, for each countries of interest, we tend to don't need the chance of success as a result of we tend to area unit shrewd AN ex post situation. National rice production levels and rice worth knowledge (for that 1990 is that the base) were collected from the planet Rice info for each the Philippines and People's Republic of Bangladesh. The patron price level knowledge wont to deflate/inflate rice producer costs and analysis and extension prices are out there from the WRS info.

### R&D and extension price calculation

After the yearly total surplus changes area unit calculated, the values are often compared to the yearly IRRI and NARES partners' investment prices to calculate a yearly web surplus amendment, and so rates of come (i.e., yearly investment prices area unit ablated from the calculable yearly total amendment in surplus). we tend to use annual analysis and extension price knowledge out there from IRRI's Portfolio Management workplace and Agricultural Science and Technology Indicators (ASTI) of the International Food Policy analysis Institute to calculate the yearly investment prices for the study amount from 1990 to 2018. For IRRI investments, equal grant allocation per country and per annum was assumed in computing IRRI prices (including management cost) allotted to the Philippines and People's Republic of Bangladesh. We tend to guardedly assumed that government R&D investments on rice were half-hour and 2 hundredth of the national agricultural analysis expenditure for the Philippines and People's Republic of Bangladesh, severally, supported the crop of interest given by the regular equivalent allotted to every crop that corresponds thereto share. The complementary extension price was supported the budget of the Philippines Department of Agriculture that estimates that the rice analysis price is roughly constant because the extension price for the Philippines [8]. For People's Republic of Bangladesh, to outline the extension price, we tend to primarily base our estimate on direct interviews with scientists from BRRI and also the DAE on rice R&D in People's Republic of Bangladesh, WHO thought-about that the extension price was additionally calculable as roughly resembling the value of R&D investment. Finally, we tend to embody national agricultural analysis expenditure knowledge from ASTI, even supposing it's restricted to 2002 for the Philippines and 2000–2016 for People's Republic of Bangladesh. we tend to estimate that the NPV of IRRI's contributions to varietal yield changes within the Philippines for the 1990 to 2018 amount is around USD four.24 billion and USD three.61 billion supported the last cross and geometric attribution rule, severally. The corresponding overall BCR is concerning 9:1 and 7:1 for IRRI and its NARES partners' investment in varietal yield improvement within the Philippines. The IRR is fifty four and forty ninth supported the last cross and geometric attribution rule, severally [9]. The MIRR is concerning thirteen supported each attribution rules. Overall, these figures recommend that there are unit still positive web payoffs to IRRI and its NARES partners' analysis investments in breeding new rice varieties within the Philippines for the amount shows the discounted total advantages and prices within the Philippines supported the 2 attribution rules over the amount 1990–2018. It are often noted that the returns to IRRI varietal analysis investments are decreasing by pure gold, on average.

## Conclusion

All varieties in Republic of India used throughout the amount of research were developed by the native partners; thus, solely the geometric attribution rule applies. IRRI contributions to the varieties employed in the country from 1990 to 2018 area unit gift. Note that it's a crucial action for the native partners to become the most supply for the ultimate breeding varieties, whereas IRRI remains because the supply for basic germplasm. Relating to the proportion contributed by analysis, we tend to see that IRRI's contribution is trending upward vis-à-vis the downward trend for the Philippine case. This is often as a result of the native partners believes the first germplasm provided by IRRI or advanced lines provided from IRRI's breeding.

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