



## India's Green Revolution: Towards a New Historical Perspective

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### **Introduction**

Much has been written about the history of the Green Revolution in India, i.e., the effort to intensify agriculture with the help of mechanisation and new kinds of agro-technologies begun in the mid-1960s and realised in the late 1960s and early 1970s. In public memory, two opposing positions compete with each other: The perception that the Green Revolution effectively and efficiently solved India's food problem, and the criticism of the unintended consequences of the Green Revolution, especially the ecological effects of the use of pesticides and chemical fertiliser and the social conflicts resulting from the growing socioeconomic divide it affected.

Already before the Green Revolution was implemented critics argued that the intensification strategy, by focusing on large farms and wealthy farmers, would widen the gap between rich and poor, which could strengthen separatist movements and potentially lead to violence (Cullather 2010: 201). Also, environmentalists were aware of the risks technologies like pesticides and chemical fertiliser could carry. For example, American ecologist Paul Ehrlich warned of the ecological consequences intensive agricultural practices might have (Robertson 2012: 142-3). The violence that broke out in the Punjab in the early 1980s was interpreted the most dramatic sign of the drastic effects the technological intervention could have on the socio-economic situation of the rural populations involved (for a discussion see Corsi 2006).

Yet despite the dire social and ecological consequences attributed to the intensification approach, the concept as such has not been questioned in the development community, and calls for a Green Revolution for Africa or a 'second' Green Revolution can be heard regularly (cf.



Bationo 2011; Bettòlo 1987). Few observers challenge the need for a change in agricultural practices to provide more and cheaper food for a growing world population. While some continue to warn of the ecological and social consequences such a transformation can have, the interest in the lessons the Green Revolution in India and other Asian countries might provide for agricultural and overall economic development is generally low (exceptions are Djurfeldt 2005; Matson 2012). As Jonathan Harwood notes, the Green Revolution has “failed as a cumulative learning process” (Harwood 2013: 401).

The selective memory surrounding the Green Revolution seems to be tied in part to its portrayal as a scientific phenomenon. This narrow view is reproduced by interpretations that subsume the Green Revolution under ‘agricultural history’. Yet agriculture cannot be separated from its broader environment. “Agrarian environments [...] have to be comprehended as being part of a biophysical and social environment that always includes the urban and the nonurban, the arable and the non-arable, and other areas that are integrally linked to the world of agriculture and environment and their allied social-economic relations” (Agrawal & Sivaramakrishnan 2000: 6). Hence, it is necessary to conceptualise the phenomenon more broadly and to understand the Green Revolution less as an isolated agricultural event and more as a result of a multilayered political, economic, technological, and social phenomenon made possible by a variety of actors and interests. Such an analysis needs to take into account Indian and non-Indian actors and national as well as international and transnational organisations and structures. We also need to look beyond agriculture and include discussions about development, population growth, and international politics.

### **Existing Research on the Green Revolution in India**

The literature on the Green Revolution is so vast that it is impossible to summarise it. However, a few very general observations can be made. The earliest accounts of the Green Revolution were published right at the time when the new agricultural practices were being introduced in India in the late 1960s. While some observers hailed the enormous achievements and highlighted the promises of the Green Revolution lying ahead, others attacked the new approach to farming and predicted negative side effects (cf. Brown 1970; Frankel 1971; Rockefeller Foundation 1969). Since then, discussions of the Green Revolution have taken place in a highly politicised setting. Over the course of the



1970s, Indian scholars studied the sociological and economic effects of the changes in agricultural in different regions of the country. While the economic gains and the increase in yields seemed impressive, many authors highlighted the growing socio-economic inequalities, the social and cultural tensions and the violence associated with the introduction of new agro-technologies (cf. Chakravarti 1973; Dasgupta 1977; Nair 1979).

This ambivalent, sometimes quite polarised interpretation still exists today. While some scholars consider the intensification of agriculture a unique achievement and a rare instance of 'success' in the history of rural development (cf. Evenson & Gollin 2003; Zeigler & Mohanty 2010: 566-8), others have criticised the Green Revolution for being a technocratic approach to providing food security without solving the underlying problems of poverty and inequality (cf. Glaser 1987; Shiva 1991; Datta 2006). While both interpretations contain some elements of truth, each seems too narrow in itself to do justice to the complexity of the Green Revolution.

Generally, while most people would agree that the Green Revolution in India (and elsewhere) was of enormous economic, political, social, and environmental importance, relatively little attention has been paid to its history. The majority of the existing accounts of the Green Revolution are sociological or agricultural in nature; only few studies offer a historical interpretation of the process. Thus, it is not surprising that there is no established periodisation of the Green Revolution. In contrast to other kinds of revolutions, the timing of this one's beginning and ending appear vague. Similarly, the question of whether the Green Revolution can or should be classified as a revolution in the strict sense of the term, or rather as an evolutionary process, remains to be answered (Ladejinsky 1973: A142; Palmer 1972). Doing so would require a better understanding of the ideas and activities of the individuals and groups involved in preparing and promoting of what is known as the Green Revolution, yet the existing literature does not offer much precise information in this regard.

Most publications stress the role of Western, specifically American, technology and, thus, at least implicitly, of American organisations (governmental and non-governmental alike) in making possible or pushing for what became the Green Revolution (cf. Perkins 1997; Ahlberg 2007; Unger 2011a). More generally, the Green Revolution appears as a political strategy driven by a few influential politicians and scientists, most importantly US President Lyndon B. Johnson,



Indian Prime Minister Indira Gandhi, Chidambaram Subramaniam, the Indian Minister of Agriculture in the mid-1960s, and Nobel laureate and plant scientist Norman Borlaug (Cullather 2014; Ahlberg 2007; Brass 1994: 303-20).

Notably, the role of Indian administrators, scientists, administrators, farmers and peasants in the process is largely neglected. Together, the selective perception of actors and the neglect of the Indian role in the process mirror a one-sided, top-down perspective and suggest that the Green Revolution, once initiated by a few individuals, lived a life of its own. This perception seems to be based, at least implicitly, on the assumption that technology moves freely and unaffectedly by the existing social conditions and structures – a perspective that came under fire already in the late 1960s and during the 1970s, when the problems accompanying the Green Revolution came into focus.

With the shortcomings of our historical understanding of India's Green Revolution in mind, it seems important to contribute to a better understanding of its history and its relevance with regard to Indian and international history. In the following, I will first give a short overview of the Green Revolution in India and the different perspectives and expectations involved. I will then turn to the actors and organisations involved in preparing and implementing the Green Revolution, and I will discuss the role knowledge (or 'know-how') played in the process. In the conclusion I will briefly outline opportunities and challenges for a new historical perspective on the Green Revolution in India.

### **India's Green Revolution in Historical Context**

The Green Revolution's underlying concept in India and elsewhere was straight forward: Yields were to be increased by using chemical fertiliser, pesticides, insecticides, and herbicides, installing electrically powered irrigation systems and planting newly-bred, more resistant, high-yielding varieties of rice, maize, wheat, and sorghum. To allow peasants to participate in these costly efforts, credits were to be made available more easily, and extension officers were to spread knowledge and train peasants in mastering the new technologies. The underlying belief was that peasants, if offered the required input and the necessary incentives, could make farming more efficient and thereby contribute to solving the food problem many of the so-called developing countries were facing. In this regard, the Green Revolution of the 1960s and 1970s was not at all different from efforts at earlier times to increase agricultural output and to use new technologies and infor-



mation to do so. The mechanisation and intensification of agriculture had been promoted in many European countries since the late nineteenth and early twentieth century and in Latin America since the 1940s (cf. Perkins 1997; Harwood 2012; Dix & Langthaler 2006).

In the decades after World War II, the provision of sufficient food supplies gained a new meaning, both with regard to the experiences of the war and in the context of decolonisation and the Cold War. Making food available and preventing hunger was considered essential for the new nations' governments to gain and secure political legitimacy both domestically and internationally. A country like India, with a historical legacy of famines and food shortages, was particularly aware of the importance of food stability and, thus, the need to increase agricultural yields. Hence, food security became a central item on independent India's development agenda (Sherman 2013; Amrith 2008; Saha 2013b: 201-3). Whereas, broadly speaking, in the 1950s the Indian government focused on community development measures to increase agricultural production the 1960s witnessed a shift towards a technology-driven approach to making agriculture more efficient.

This shift, which was mirrored in the changing priorities of the First and the Second Five-Year Plans, was closely tied to India's goal of rapid industrialisation, which required large amounts of cheap food, and to the growing criticism of the slow pace of change the community development approach was achieving. Both domestically and internationally, critics argued that India needed to pay more attention to the modernisation of agriculture, and that technological solutions should be given priority over 'low-modern' (Gilbert 2003) village development approaches (cf. Frankel 1978; Lanier 1991; Merrill 1990; Unger 2011a).

Meanwhile, the United States and their allies considered the issue of how to avoid food shortages in India strategically relevant. In their eyes, India's food situation could either stabilise or challenge Asia's position in the Cold War. If there was too little food to go around, and therefore little or no economic progress, the likelihood that Moscow's efforts to spread socialist ideas succeeded would increase dramatically, political strategists believed. Consequently, making sufficient amounts of food available was considered essential in preventing communism from taking root in Asia (Cullather 2010; Perkins 1997; Ahlberg 2007). The influence of Cold War thinking on agricultural intensification efforts becomes apparent in the terminology.



The term 'Green Revolution' is said to have been coined by William S. Gaud, director of the US Agency for International Development (USAID) in March 1968. Western political commentators took the term up and used it to contrast political positions in the conflict between West and East: The 'green' revolution stood for the use of agrotechnology as an instrument to promote economic growth and socio-political modernisation, while the 'red' revolution suggested the victory of socialism (Cullather 2010: 233). Whereas the Soviet Union was accused of relying on ideology to promote communism, the Western world was proud of using science, which was supposedly free of ideological baggage and therefore superior to promote democracy (Pletsch 1981).

As J. R. McNeill points out, elites in Asia and other 'developing countries' shared the Western interest in the vision offered by the Green Revolution: "It promised to augment the incomes of landed elites and, where this was an issue, make land reform less urgent. To state bureaucracies it seemed to show a way to urban industrial society, and hence to wealth and power, without the risks of alternative paths" (McNeill 2000: 222). In that sense, increasing agricultural production was about much more than about preventing malnutrition and starvation and promoting development. It was also about securing existing privileges and promoting business interests while avoiding political radicalism.

Closely tied to this perspective was the neo-Malthusian perception that the accelerating population growth diagnosed in many Asian and African countries was presenting a challenge to regional and global stability because of increasing pressure on resources. If socioeconomic conditions deteriorated, the likelihood of socialist ideas taking root in those countries would grow, Cold War observers warned, and emphasized the need to take measures to prevent this from happening. Hence, in the 1960s and 1970s national and international organisations funded family planning programs with enormous amounts of money (cf. Robertson 2012; Demeny & McNicoll 2006; Connelly 2008; Frey 2011). India, as the most populous democracy, received particular attention in this context.

From the Indian perspective the negative consequences of population growth on economic development seemed much more relevant than strategic concerns. Building on older debates and structures (Nair 2011), and sharing many of the concerns of the Western political elites, the Indian government conducted population control to prevent



population growth from endangering economic stability and growth (Rao 2004; Connelly 2008). Yet reducing population growth by voluntary means was not an easy task. Family planning programs were based on the belief that individuals acted rationally, i.e., that they understood the economic advantage of having a smaller rather than a larger number of children and acted accordingly. However, in practice individuals tended to behave differently than social scientists predicted (Unger 2014a). Hence, focusing on efforts aimed at reducing population growth did not seem sufficient. If a global crisis of Malthusian dimensions was to be avoided, the other variable in the equation – food – had to be considered, too (for the historical background of these debates, see Bashford 2014). It was with this ‘ecological’ understanding in mind that agricultural intensification strategies gained broad political backing.

### **Knowledge, Actors, Institutions**

When, in the mid-1960s, the Indian government decided to opt for agricultural intensification, a large number of non-Indian experts of different backgrounds became active in the field. International scientists and expert advisors are generally considered the drivers of the process leading to the Green Revolution. Yet the fact that a large part of the personnel involved in the Green Revolution shared a high degree of professionalisation and was very international in composition should not lead us to assume that agricultural improvement was something new in India in the 1960s. Indian farmers and peasants had been experimenting with ways of increasing yields and quality for centuries. In the early decades of the twentieth century the British established a variety of institutions to promote agricultural research, and independent India’s government invested large amounts of money into expanding research institutions and promoting scientific approaches to promoting India’s development (Ludden 1999: 12, 38-9; Arnold 2005; Raina 1999: 72-3; Saha 2013b).

For a long time historians discussed whether the scientific knowledge produced, imported, and used was ‘Indian’ or ‘Western’ in nature (Raj 2007: Ch. 1). In the end, the distinction between ‘Indian’ and ‘non-Indian’, ‘indigenous’ and ‘foreign’ knowledge is difficult – and not necessarily useful – to uphold due to the long history of knowledge exchange and circulation (Agrawal 1995). For example, we know of colonial administrators who were acutely aware of the potential of humoral knowledge and actively tried to combine different kinds of





knowledge, if with limited success (cf. Maat 2011; Moon 2007; van Beusekom 2002). Similarly, at least some of the actors involved in shaping development projects in the postcolonial period were quite aware of the existence and value of 'local' knowledge (cf. Sackley 2012).

Generally, with regard to the Green Revolution it seems much more fruitful to study the circulation, transformation, and application of knowledge rather than its alleged origins. How and under which circumstances were the concepts and methods developed on which the Green Revolution was based? Which beliefs and assumptions informed the activities of the scientists and experts involved? These questions draw on the assumption that scientific research and knowledge production do not take place in a vacuum but are part of the social world and thus subject to a variety of 'non-scientific' influences (cf. Latour & Woolgar 1979; Jasanoff 2004). Specifically, the scientists involved in the research leading to the technology driving the Green Revolution had their own, culturally and biographically specific assumptions about the right kind of agriculture and rural relations. Their findings and recommendations rested not on 'pure' science but on a combination of personal and professional beliefs, scholarly traditions, and social expectations. Similarly, the Green Revolution was not a 'neutral' approach to scientifically solve India's food problems but a historically contingent answer to a situation shaped by perceptions of crisis and conflict, be it with regard to India's domestic stability, the Cold War, or global demographic developments.

This brings us to the question of who the actors and organisations were that prepared, implemented, and administered the knowledge that made the Green Revolution possible. There is broad agreement that the Rockefeller Foundation was instrumental in the process, and that its experience with agricultural modernisation in Latin America in the 1940s served as the basis for its work in India (Cueto 1994; Cullather 2010: Ch. 2). Another influential organisation was the International Rice Research Institute (IRRI) in Los Baños, Philippines, which was founded by the Rockefeller Foundation, the Ford Foundation, and the University of the Philippines (Anderson, Levy & Morrison 1991; Van der Burg & Maat 2014; Cullather 2010: Ch. 6). The institute's task was to develop rice varieties suitable for Asian soil and climate conditions, particularly ones that were more resistant and promised higher yields than traditional varieties, and to train scientists from Asian countries.





Seeing that 'know-how' appeared as a highly flexible cargo, it did not seem to require a prominent role of the state. On the contrary, private and non-governmental agencies seemed much better suited to promote the production and transfer of knowledge than a large bureaucratic apparatus. Consequently, the IRRI and the foundations involved cooperated with organisations like the Indian Agricultural Research Institute (IARI) in Delhi, which the British had established in 1905 (Raina 1999). The Rockefeller Foundation started supporting the IARI in 1956, the year it initiated its Indian Agriculture Program, and began to remodel the institute along the lines of an American land-grant university that combined research and training (cf. Unger 2014b).

It is important to note that the research needed for the Green Revolution was not entirely conducted elsewhere and then transported to India. Apparently there was an awareness that each country had its own institutional setting as well as regional and local particularities that needed to be accounted for. At the same time, the Americans involved felt that India's existing research structures did not allow for the kinds of agricultural research needed to 'modernise' Indian agriculture, and that it would be easier to realise the change they were envisioning if they could use structures similar to those present in the United States or other Western countries. Hence, the transfer of knowledge that characterised the Green Revolution was not limited to agricultural and biological knowledge but also involved knowledge and assumptions about institution-building, higher education, and research structures (cf. Arnove 1980; Unger 2011b).

Another important, yet notably neglected group of actors and transmitters of knowledge are the private companies who produced and sold the technologies on which the Green Revolution was based. Entrepreneurial interest in the markets of the so-called developing countries was immense, and economic lobby groups and companies tried to influence the development strategies of national governments to further their particular interests. The governments of the industrialised countries actively supported 'their' companies in trying to win tenders and secure offers, sometimes tying the granting of development aid to the preferential treatment of companies in bidding contests (cf. Acker 2014; Unger 2012).

The Green Revolution in particular suggested itself to a number of industries producing different technological goods, ranging from biotechnology to chemical fertiliser to water pumps. India, in the 1960s,



had to import most of these products and therefore depended on the cooperation with companies from industrialised countries. To reduce its dependence on imports, the Indian government pushed the establishment of the respective factories in India, but this, too, required foreign investments. For example, in trying to expand Indian fertiliser production needed for the intensification program, India cooperated with the Bechtel Corporation and with other American companies (Posgate 1974: 738-41; Saha 2013a).

The Food and Agriculture Organisation (FAO), under the leadership of director-general Binay Ranjan Sen, supported the procurement of chemical fertiliser and other agricultural inputs to allow the so-called developing countries to increase their yields. To do so, and as part of the "Freedom from Hunger Campaign", Sen established the Industry Cooperative Program (1966) and encouraged private companies to cooperate with FAO. Development and entrepreneurial interests were supposed to complement each other. Many companies recognised the chance to secure new business opportunities and joined the program. Sen was aware of the fact that the program gave companies privileged access to new markets and that the interests of the rural populations might not be served best by this set-up. However, he justified his initiative by arguing that the specialised 'know-how' needed could not be supplied solely by governments and international organisations, and that public-private partnerships were in the interest of development (Jachertz 2014: 87-8).

The role of private companies and international organisations in shaping the conditions under which a process like the Green Revolution took place has yet to be studied systematically. This is true both with regard to the economic interests involved and the kinds of knowledge produced, sold, and distributed by non-governmental actors. Such an analysis would also have to pay attention to advertising and information campaigns conducted by companies, extension workers, and representatives of international organisations. The Green Revolution, although it was a project shepherded and administered by the Indian government, cannot be adequately understood in a national framework. We rather need to place it in its international and transnational context and acknowledge the variety of actors, structures, and knowledge involved.

Finally, we need to consider much more systematically those actors who stood at the centre of the Green Revolution but have received the least attention in historical accounts so far: The farmers, peasants, and



agricultural labourers who were expected to take up and implement the new agro-technologies – to buy and plant high-yield varieties, to apply fertilisers, to install new irrigation systems, etc. Since the beginnings of the Green Revolution, sociologists and anthropologists have investigated their behaviour and experiences in various regions of India and interpreted them from different political points of view (cf. Frankel 1972; Leaf 1984; Sharma & Dak 1989; Gill 2003). Also, some scholars have studied the ways in which existing agricultural practices were merged with the new approaches, and how cultivators transformed and adapted the different kinds of knowledge (cf. Gupta 1999; Kurin 1983; Freed & Freed 2002). Historians have yet to find ways of writing their histories, just as the environmental effects of the Green Revolution need to be taken into historical consideration more fully. What seems particularly relevant is to understand the impact of the Green Revolution on property relations and social structures, including gender, caste, and intergenerational relations.

### **Conclusion**

In order to understand the place of the Green Revolution in twentieth century Indian and international history, we need to take into account the different factors that together produced a situation in which the Green Revolution could take place: India's independence and the country's development goals and strategies; the political and ideological interests shaped by and reflecting the Cold War; the revival of Malthusian ideas about the nexus between food and population; the scientific advances and the scientific optimism characterising the post-war period; and the growing presence and political influence of non-governmental actors as producers and transmitters of ideas and knowledge. Scientists and experts were essential in identifying agricultural problems and suggesting solutions. In an effort to solve problems which politics alone could not solve, and with their own institutional interests in mind, non-governmental organisations used their transnational connections to spread 'know-how' across political and cultural borders. This implied the transfer of assumptions about the nature of 'modern' agriculture and the role of agriculture in society.

Yet knowledge and technology alone were not sufficient to affect lasting change in Indian agriculture. Established patterns of behaviour and social relations had to change in the context of a more output-oriented agricultural system. Both the 'empirical' changes in rural life as well as the underlying assumptions about social organisation, the



importance and meaning of customs and traditions, and the apparent need for change deserve historical analysis. Taken together, the different perspectives – agricultural, sociological, economic, political, scientific – should help us to better understand why the concept of the Green Revolution received such immense support in India in the 1960s and 1970s and so much criticism at the same time, and why it remains such a polarised topic. A systematic historical account of the Green Revolution should also allow us to gain better insight into the changing roles of and relations between governmental and non-governmental actors in the last third of the twentieth century. Finally, we should be able to appreciate more adequately the position of agriculture, the environment, and rural life in the process of development and globalisation.

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