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'*Mera Gaon, Mera Gaurav*' policy: A source of hypothesis for the co-production of adaptive agricultural knowledge

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ABSTRACT

Over the past few decades, Indian agriculture is increasingly confronting a range of social, economic and ecological challenges putting the livelihood security of millions of resource poor farmers at risk. The ills plaguing the farm sector have received critical policy attention leading to the launch of several farmer-centric policies and programs aimed at infusing resilience into the ailing croplands, making agriculture a remunerative activity and for driving the rural poor out of poverty. One such initiative called '*Mera Gaon, Mera Gaurav*' (My Village, My Pride) was launched in 2015 with the goal of revolutionizing the pace of technology transfer to the farmers' doorsteps in a time bound manner. In this article, we propose a new model consisting of five propositions for improving the *modus operandi* of '*Mera Gaon, Mera Gaurav*' program such that it does not merely remain a tool of technology dissemination but instead serves as a viable platform for the co-production of agricultural knowledge which is more sustainable, inclusive and compatible to resolving the current and emerging agricultural issues.

Key words: Knowledge co-production, Mera Gaon Mera Gaurav, Sustainable agriculture

Knowledge co-produced by blending the compatible insights from formal and informal domains (Riedlinger and Berkes 2001) could be of immense practical use for sustainable agro-ecosystem management. In a broad sense, knowledge co-production centres heavily on complementary relations among science, technology and society and its evolution is often in tune with the changing social necessities (Jasanoff 2004). This belief is based on the assumption that knowledge is not merely a product of social work but in fact is an inseparable component of the social life (Pahl-Wostl *et al.* 2013). Notwithstanding the fact that 'Green Revolution'(GR) technologies contributed considerably to the food security of India, a 'top-to-bottom'approach adopted during the GR period for knowledge transfer was essentially science-centric, leaving the farmers' as the mere end-users of institutional knowledge. Despite enhancing the food availability by leaps and bounds, some unintended side-effects of GR are known to have undermined the agricultural sustainability with crop intensification inflicting severe damages to ecological balance (GRAIN 1997, Sharma and Singh 2015) indigenous biodiversity, local adaptive practices and the community-based institutions (Singh *et al.* 2015). Advent of GR and the subsequent gradual transition from subsistence farming to the water and agro-chemical intensive commercial agriculture characterized by intensive and pervasive land use dealt a serious blow to the age-old practice of '*Aadhi Kheti, Aadhi Baari*': a traditional ecological knowledge (TEK) based system of farming system management rooted in the belief that tree plantings and local resources and knowledge were the keys to sustaining the local food systems (Chambers 1994, Singh *et al.* 2015). With the emergence of a 'participatory approach' during 1980s, farmers having rich experiences in TEK-based agro-ecosystem management received recognition as the 'resource persons' while scientists were expected to act as facilitators in knowledge generation and diffusion. In India, this concept gained currency with the start of projects like 'Institutional Village Linkage Programme' (ICAR-IARI 2015). The knowledge thus produced was handed over to the extension scientists for bridging the gap between research institutions and development departments; and subsequently to the extension workers for technology transfer in liaison with government agencies. However, such models were still biased towards biological and natural sciences creating an apparent disconnect between the bio-natural and social spheres, hampering the technology diffusion. In fact, knowledge production continued to be a laboratory affair devoid of farmers' concerns which could

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otherwise have constituted an effective source of research hypotheses (Riedlinger and Berkes 2001). This gap between knowledge producers and ultimate stakeholders gradually widened over time (Fig. 1).

New policy initiative of the Government of India, i.e. '*Mera Gaon Mera Gaurav*' (MGMG) started in May 2015 with about 20000 scientists of National Agricultural Research and Education Systems (NARES) (ICAR-IARI 2015) and being spearheaded by the Indian Council of Agricultural Research (ICAR) is far more inclusive and broad-based than previous schemes. By harnessing the synergistic working among a transdisciplinary team of scientists, farmers, extension workers and developmental agencies, MGMG aims to expedite technology transfer from 'Lab-to-Land'for strengthening the socio-ecological resilience while simultaneously changing the extension personnel-centric nature of agricultural technology transfer in India. It is a timely response to address the multiple challenges affecting Indian agriculture through plural knowledge generated by enhanced interface among diverse stakeholders (Verburg *et al.* 2013, Van der Hel 2016)· MGMG could even transgress the 'Lab-to-Land' approach for knowledge generation and dissemination to enhance the farm sustainability (Fig. 1).

Moving beyond technology transfer (*e.g.* varietal interventions) and farmers' awareness for pressing issues such as climate change (ICAR-IARI 2015), MGMG may also provide an opportunity to identify relevant research hypotheses from the farmers' field to truly make agricultural research a co-production venture. Similar to other ICAR institutions, 16 teams of 64 scientists from different agricultural disciplines of ICAR-Central Soil Salinity Research Institute, Karnal are working under MGMG with more than 500 farmers belonging to 77 villages of India, representing Haryana, Punjab, Uttar Pradesh, West Bengal and Gujarat states. Demonstrations on various agricultural salinity management technologies *inter alia* salt tolerant varieties, use of soil ameliorants, drainage and land shaping interventions, crop diversification through low water requiring and high value horticultural crops coupled with regular scientist-farmer interface meetings and the establishment of knowledge networks among different stakeholders including the farmers are the major activities being taken up under this program. However, in the past three and half years, the experiences gained while working with the farmers and other stakeholders have led to realization that certain refinements could make the existing MGMG framework more responsive to the present and emerging needs of the farming communities. Based on empirical observations, we propose five propositions to improve the *modus operandi* of MGMG policy so that it could be transformed from a mere tool of technology dissemination to a means of sustainable co-production of agricultural knowledge.

As as ource of research hypotheses: Integrating societal perspectives into knowledge generation process could enhance the sustainability of research outcomes. Under the MGMG policy, researchers are expected to employ the logics of 'scientific accountability towards society', 'meaningful impacts of research' and 'humility' to mainstream the societal opinion with agricultural research (Borquez *et al.* 2010). Scientists having diverse academic

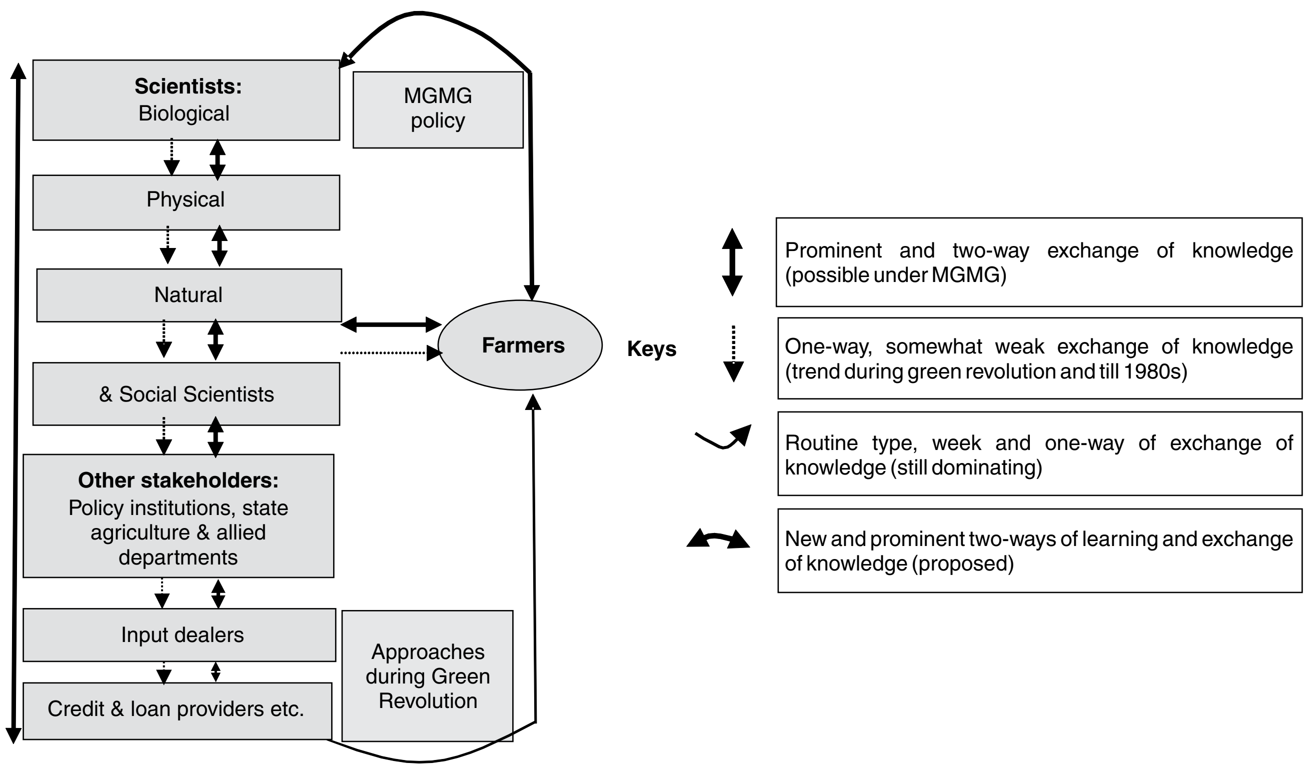

Fig 1 Model proposed for knowledge co-production in tune with the 'Mera Gaon Mera Gaurav' policy

backgrounds could exchange ideas among themselves and obtain farmers' feedback to generate adequate and legitimate knowledge (Borquez *et al.* 2010, Pohl *et al.* 2010). There are characteristic examples (Table 1) where farmers' knowledge can be used as a valid hypothesis for strengthening future R&D programmes for salt-affected soils, for instance. Knowledge co-produced should be in open access to further increase the value of outcome through expanded vertical and horizontal learning.

Rationalizing time, cost and energy: As rapid knowledge diffusion would be critical to the future agricultural growth in India, launch of MGMG program should be seen as a timely response to overcome the shortages of trained human resources stalling the knowledge transfer from laboratories such that even farmer friendly technologies remain incubating for years. In addition to the existing mechanisms for this purpose such as front line demonstrations, MGMG has come out with an innovative idea where a multi-disciplinary group of scientists are adopting a cluster of villages (3-5) to suggest the appropriate remedial measures to the farmers for enhancing the farm profits. It is obvious that a significant chunk of the available resources (e.g. time and money) need to be allocated to accomplish this goal without affecting the process of knowledge generation itself. To avoid the likely trade-off between the science and social obligations, it is desirable to rationalize the time, energy and resources to be spent on these activities. This seems to be achievable following a two-fold strategy. First, there is a need to utilize the services of state line departments/central development agencies, viz. State Department of Agriculture, National Bank for Agriculture and Rural Development (NABARD), Mission for Integrated Development of Horticulture (MIDH), etc. by inviting and integrating them in the ongoing MGMG activities. Second, agri-graduates engaged in agri-business may also be motivated to forge a 'farmer-scientist-industry' interface so that farmers could resolve their assorted problems in one go. While scientists will suggest the sustainable solutions, development officials will ensure that there are no hurdles in technology adoption and those from industry will convince the farmers about potential monetary benefits accruing from the adoption of a particular technology.

Enhancing knowledge networking among stakeholders: MGMG is a broad-based and inclusive approach opening new avenues of collaborative learning for sustainable agricultural development in the country (Fig. 1). Fast-tracking of multi-stakeholder dialogue under one platform will increase the probability of understanding diverse perspectives for use as research hypothesis. It is reasonable to assume that even if the present framework is restructured in future, bonds created during initial years will sustain the processes of knowledge co-production and dissemination. With the start of MGMG program, it is now possible to collaborate and discuss the approaches with other stakeholders to enhancing the social-ecological resilience and farmers' income while sustaining the natural resources and lessening the impacts of multiple stressors. Poor coordination and conflicts of interests among different stakeholders may impede knowledge co-production process. For example, efforts to rehabilitate the waterlogged saline soils through sub-surface drainage technology suffer from the problems of poor community participation and weak policy support in Haryana (Kates *et al.* 2001). Under such conditions, it is desirable to accommodate the competing interests of multi-stakeholders since the initial stages of technology development.

Table 1 Examples of farmers' knowledge explored under MGMG for the potential use as research hypothesis

Farmers' knowledge	Stressor/opportunity	Available formal knowledge(technology)	Applicability	Scope of knowledge co-production
Relay cropping of wheat in Basmati rice	Low-lying sodic lands (pH2~9.0); high residual sodium carbonate (RSC= 4-6meq/l) irrigation water	Use of gypsum and salt tolerant cultivars (threshold sodicity tolerance up to pH2 ~9.3)	Heavy textured soils suffering from sodicity hazard	Refinement(s) in sowing practices; participatory varietal selection and low-cost alternative amendments
Micro-drains to enhance wheat yields	As above	As above	As above	Lay-out and design of micro-drains, use of suitable machines andleaching requirement
Delayed (first) irrigation in wheat	Sodic soils (pH2 8.4-9.35) irrigated with high RSC water (4.0-7.5meq/l)	Conjunctive use of sodic and canal water; gypsum neutralization of water	Sodic soils underlain with high RSC water in Indo-Gangetic plains	Irrigation scheduling; efficacy of locally produced ameliorants (e.g., FYM) for soil reclamation
One seed nursery method for rice for 0.4 ha land area	Extended dry spells; moderate sodicity, limited seed availability	Improved seeds	Locations having similar constraints in rice-wheat system (RWCS)	Farmer participatory seed production, optimizing sowing time and plant density
Reduced till wheat cultivation with rice residues	Saline soils (ECe2.5-7 dS/m) having shallow watertable (~2 feet depth)	Sub-surface drainage, salt tolerant cultivars	Waterlogged saline and sodic soils of RWCS	Seed rate and sowing time, low cost seed drill machine

It is possible that a multi-stakeholder platform could prove catalytic for a transition from the management of farms to agri-entrepreneurship in lucrative fields such as participatory seed production, horticulture and dairying. Such recurrent interactions assume significance as they could eventually transform the farmer from a client to the knowledge ambassador making him/her the master trainer for the fellow farmers who can then form their own knowledge networks either horizontally (small-to-small; and large-to-large farmers) or vertically (small-to-large farmers) for sustainable gains. This networking, by fast-tracking people-to-people exchange of the knowledge, could use in an 'open-access' learning environment ensuring the uninterrupted flow of knowledge in the system and aiding novel dimensions to the agricultural knowledge co-production process (Pohl *et al.* 2010) in India.

Decentralized input management chain: Indian farmers, particularly those in agriculturally advanced states Haryana and Punjab, are increasingly becoming dependent on external sources for key inputs such as improved seeds due to disappearance of informal seed systems. A similar situation prevails with regard to the use of organic resources for sustaining the soil fertility and crop health as chemical fertilizers and pesticides have virtually replaced the traditionally used organic inputs. It is likely that other states may experience similar challenges in the coming years. Besides these, new challenges including climate change impacts, distorted market structure and weak input delivery systems also impose threats to agricultural sustainability. These externalities necessitate localized input chain management by the farmers' to enhance their adaptive capacity. Under MGMG program, a suite of technologies including improved cultivars and location specific agronomic practices are being demonstrated at thousands of farmers' fields in various parts of the country which could indeed set in motion the development of decentralized farm input chains.

Balancing the knowledge power equilibrium: Given the huge differences in nature and extent of the farm problems in different agro-ecological zones of India, various patterns of resource availability and use, and the differences in social-ecological milieus, differences in the methods of knowledge transfer under MGMG program are inevitable. Because multidisciplinary teams comprising of researchers differing in academic background and age, for example, are being deployed for resolving the agrarian problems; different perspectives are likely to emerge for managing a well identified problem. Different methodologies are likely to lead to differential feedbacks even under similar conditions enabling a better understanding of the multifaceted nature of a particular problem. This will provide a heterogeneous substrate to the researchers for further refining the research hypothesis. It may also be helpful in devising and implementing the most appropriate solution across different social settings by harnessing a multi-stakeholders' approach (Fig. 1). It seems that during this process a particular stakeholder may gain at the expense of others resulting in a distorted distribution of knowledge power adversely impacting sustainable knowledge generation and dissemination. Such distortions may be prevented by ensuring the symmetry of horizontal and vertical interactions among and between the stakeholders involved. In countries like India, where knowledge co-production in agriculture is in infant stage, emphasis on ethical ways of power distribution is necessary. The types of stakeholders (Fig 1) proposed to participate in co-producing the knowledge, and their diverse interests need to be treated with caution while formulating the action plan (Verburg *et al.* 2013). For example, while conducting varietal trials at farmers' field, the researchers need to ensure that farmers also get non-tangible incentives for their efforts, for example by citing their specific contributions during public events and in research publications. Any failure in this respect could amount to the wastage of whole exercise turning of this process of knowledge interfacing into 'intellectual robbery' (i.e. use of local knowledge without any reciprocal benefits) (Riedlinger and Berkes 2001).

Conclusions

With the start of MGMG policy, co-production of agricultural knowledge has come to the forefront in India. Many global mega-policies on sustainable agriculture and biodiversity conservation have already incorporated this concept in their work plans. For example, knowledge co-production for enhancing the global sustainability is a major thrust area under Future Earth mega programmes under the components IGBP (International Geosphere Biosphere Programme), IHDP (International Human Dimension Programme) and REDD$^+$ (Reduction of Emissions from Deforestation and Forest Degradation) (Reid *et al.* 2009). MGMG policy, which by default provides an opportunity to all the agricultural scientists, irrespective of their academic background, to work in tandem for technology transfer, could be adopted as a broader platform for location specific knowledge co-production in a multi-stakeholder approach (Verburg *et al.* 2013). Yet, a lot needs to be done to develop a work culture which supports this idea. The six propositions presented here can be used as strong postulates to mobilize stakeholders under MGMG to consolidate the processes of knowledge co-production and diffusion by mainstreaming the societal needs with institutional perspectives. Experiments have shown that integration of social needs with the knowledge generation process enhances the sustainability of the outcome (Hackmann and Clair 2012). Therefore, MGMG policy should be seen as an opportunity by the scientists, extension personnel, development workers and industry representatives for understanding the location specific problems and addressing them by converging the formal and informal knowledge domains to develop sustainable solutions, and related informed policy (Verburg *et al.* 2013, Clark *et al.* 2016).

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