Rapporteur’s Report on Agricultural Research and Extension in India: Achievements, Failures and Directions for Future

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INTRODUCTION

Agricultural research is key to the technology development and increased productivity. It is however, only one element in a complex process that leads to innovation and the adoption of a new technology, while the other important component is agricultural extension, which contributes significantly by way of the dissemination of agricultural knowledge (FAO, 2006).

In India development of agricultural research and educational institutions owe their existence to the 19th century when Lord Mayo, the then Governor General of India established the Department of Revenue, Agriculture and Commerce in the Imperial and Provincial Governments in 1871. The Department was mandated to look into the agricultural enquiry, and famine relief (Anonymous, 1997). However, major support to agricultural research and education came in the first decade of the 20th century when the then Viceroy of India, Lord Curzon established the Imperial (now Indian Agricultural Research Institute (IARI)) at Pusa Bihar in 1905 with the financial assistance from an American philanthropist, Mr. Henry Phipps (Anonymous, 2013a).

India has one of the largest agricultural research systems in the world with approximately 30,000 scientists and more than 1,00,000 supporting staff actively engaged in research related to agriculture. The agricultural research system of India comprises essentially of two main streams, the ICAR at the national level and the agricultural universities at the State level. Besides, several other agencies such as general universities, scientific organisations, various Ministries/Departments at the centre, and private/voluntary organisations, also participate directly or indirectly in research activities related to agriculture (Chauhan, 2012).

Agricultural research and extension played a major role in bringing about the Green Revolution. In the post-Green Revolution era, however, extension faces important challenges in the areas of relevance, accountability and sustainability. The changing economic scenario in India, demands appropriate agricultural technologies/better agro-management practices to respond to food and nutritional security, poverty

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alleviation strategies, diversifying market demands, addressing export opportunities, and environmental concerns posing new challenges to the technology dissemination systems. It is expected that future agricultural growth would largely accrue from improvements in productivity of diversified farming systems with regional specialisation and sustainable management of natural resources, especially land and water. Effective linkages of production systems with supply chain would play an increasingly important role in the diversification of agriculture. It is becoming increasingly evident that public extension by itself can no longer respond to the multifarious demands of farming systems. There is need for reappraisal of the capacity of agricultural extension to address effectively, contemporary and future needs of the farming community. Public funding for sustaining the vast extension infrastructure is also under considerable strain. Meanwhile, in response to market demand the existing public extension network is inexorably being complemented, supplemented or even being replaced by private extension. The public-private partnership model formulations and their effective execution at different levels would be a better preposition for exploitation of unexploited productive potentials at the farmer’s field. As the nature and scope of agricultural extension undergoes fundamental changes, the outlook is for a whole new policy mix nurturing a plurality of institutions (Anonymous, 2013b).

In this backdrop an attempt was made to understand the achievements, failures and direction for future of agricultural research and extension in India. The main theme has identified the following sub-themes/key issues for formal discussion.

1. Performance assessment of agricultural research and extension systems in India: It will deliberate on the strategies to combat the divergent perspectives of high returns to investment on agricultural research and low agricultural growth rates and challenges in making agricultural growth sustainable in the future?

2. Socio-economic impact of agricultural research and extension in India - successes and failures: The sub-theme will look into the data bases and methodologies of research on returns on investment in research in order to develop a system that could accumulate, analyse and highlight impact data and stories of success and failures to estimate the output from an agricultural system to justify for the economic value of an investment.

3. Changing dynamics of agricultural research and extension: This sub-theme shall focus on the sustainability/profitability of agriculture from farmer’s perspective as well as assess the society’s need for sufficient food and nutrition, which are central issues of food security and agricultural development. Therefore, proper and efficient strategies/policies could be explored to build new agricultural institutional mechanisms. This could bridge the gap between adaptability and requirements of emerging trends, and production/consumption patterns/methods demanded by the new system of globalisation.

4. Public Private Partnership in agricultural research and extension: It will concentrate on greater integration of public–private partnerships in agricultural
system so as to identify the capacities/potential opportunities to develop common interests, and negotiate commitments that would strengthen PPP to confront demand-led agriculture system with global relevance.

5. Future directions in agricultural research and extension: Agricultural research and extension have strong implications on agricultural development by way of providing services to stakeholders that ensures socio-economic growth and sustains future challenges. However, there is need to put the efforts to identify the major barriers and propose policies to achieve the desired levels of development.

The response to the call of themes has partially been satisfactory. In all eleven papers were received for discussion that covered research and extension system in India. However, the coverage of the papers was confined to a few states except for three papers which covered all-India/country level situation. The geographic distribution of the papers is given below:

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<tr>
<th>Sl. No.</th>
<th>Name of the state</th>
<th>No. of paper(s)</th>
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<tr>
<td>1.</td>
<td>West Bengal</td>
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<td>2.</td>
<td>Assam</td>
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<td>3.</td>
<td>Jammu &amp; Kashmir</td>
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<td>4.</td>
<td>Andhra Pradesh</td>
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<td>5.</td>
<td>Kumaon (hills)</td>
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<td>Total</td>
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The papers have touched various issues such as research priorities for sustainable growth, competence and penetration of extension, future of agricultural research, achievements and failures of research and models for enhancing agricultural productivity.

The papers contributed by the authors have, however, been categorised into two groups: (i) Research and Extension System in India and (ii) Production, Productivity and Growth in Agriculture, which are briefly discussed below.

II
RESEARCH AND EXTENSION SYSTEM IN INDIA

Agricultural research and extension system in India aims to disseminate information and educate farmers regarding new techniques and technologies that may help them achieve their potential by increasing the production and productivity. In this context, a macro level study on research priorities for faster, sustainable and inclusive growth in Indian agriculture was submitted.

The paper by Parag Saikia et al., deliberates on the delivery competence and penetration of extension services among fish farmers of Assam. The authors have evaluated the competency of fisheries extension officers and extent of penetration of Department of Fisheries' initiatives in improving the awareness and knowledge of
fish farmers. The officials were having high acquaintance on technical know-how (84 per cent), managerial skills (81 per cent), on training (69 per cent), communication skills (66 per cent), and social mobilisation (69 per cent). It was observed that majority of fish farmers (59.4 per cent) had average knowledge in respect to scientific fish culture. They suggest a monitoring system through continuous visits of extension officials to plug the existing gaps in the information/dissemination process. The study suggests that reorientation of fisheries extension system should be equipped with technical and input support to the farmers for productive gains.

Arimardan Singh et al., provides an excellent background of forage crop production-past, present and future agricultural research and extension in India. The authors explain that very little attention has been focused on research in the past to forage and fodder crops, though, research on forages was initiated on a limited scale in Maharashtra state towards the end of 19th century followed by Madras, Madhya Pradesh, Bengal and Punjab. They further observe that the availability of quality fodder seed is a major bottleneck in fodder production followed by its labour intensive nature. The authors emphasise that the key to successful development of efficient forage production involves two biological systems, viz., soil-plant and plant-animal system in a dynamic manner. Consequently, the essential technological modifications are recommended in perennial forage production system. The study indicates that integrated use of low quantity roughages supplemented with green fodder, processed forage and other wastes along with shrubs and tree leaves can provide balanced ration to animals.

Huma Sehar et al., evaluated the impact of research and extension in total factor productivity (TFP) of rice-wheat system in Jammu and opine that the technologies used at research station were dwindling. This was substantiated with the fact that TFP declined and the technical change was less than one indicating that the firms included in the analysis did not follow the best identified practising firm. The study implied that for augmenting TFP, new and improved technologies should be adopted. Moreover, adoption of high-yielding varieties (HYVs) along with production management recommendation and appropriate extension services could increase productivity of rice-wheat system.

A.K. Sharma and Brahm Prakash in their paper on chickpea research and extension in India showed that the area under chickpea had increased at an annual rate of 4.61 per cent from 2001 due to various field level demonstrations (FLDs). On an average during last five years 1163 FLDs had been conducted annually on 11 different aspects for exploring the production potential of high yielding varieties of chickpea. FLDs on fertiliser management, integrated pest management (IPM), disease management and package technologies was low ranging from 12 to 16 per cent whereas, FLDs on improved varieties owing to their easy implementation are preferred. The authors put the pulse crop as a priority agenda for its production owing to its huge pulse consumption demand in the country. They further observed that despite better support price for cereal crops in India, the farmers are looking for
alternative cropping systems to boost their productivity and economy. They further suggest that proper genotypes are expected to play a pivotal role in pushing further the productivity and sustainability of the system, which therefore, need to be promoted.

P. Kanaka Durga in her paper gives emphasis on agricultural extension - case of agriclinics and agribusiness centres. The author is of the view that the extension services provided by agriclinics have been very useful to big farmers of Andhra Pradesh. The extension services of agripreneurs culminated into better awareness about dairy practices feed/fodder management, better production and price stabilisation. The study focuses mostly on the training given to the agricultural graduates for setting up their independent ventures. The results suggest that there is a pent-up need to involve private extension staff in production, processing, transporting and marketing chain that could help increase productivity per unit of time.

The paper on impact of public sector research and extension on backyard poultry production in Kumaon hills by L.S.Gangwar et al., give an impression that poultry research, education and extension services by public/private funding institution, viz., SAUs/SVUs and NGOs have developed various elite coloured birds, with their housing and disease management techniques designed to suit the backyard poultry. The study concluded that in Kumaon hills, backyard poultry farming is thriving and successfully addressing the gender and equity issues. The authors propose that government should provide economic packages to the agencies involved in the supply of critical inputs and veterinary services for sustainable poultry farming and must perk up research and extension services so that the suppressed input supply and delivery system could be improved.

V.K. Sajesh and A. Suresh have looked at the performance and emerging challenges in agricultural extension system in India. The study revealed that the extension system of India has to confront issues of huge yield gap, proliferation of small holders and natural resource degradation. During 1995-96 to 2004-05, the extension expenditure has suffered a negative growth in case of crops and soil water conservation activities. Considering the prevalence and importance of small holders in Indian agriculture, the authors suggest that there should be an effective and inclusive extension system for boosting overall growth, because such systems authorise an enabling and supportive policy environment in responsiveness to the need of rainfed agriculture, tribal farmers, non-tribal forest produces, inland and marine fisheries etc. Further, they intend that sufficient encouragement for non-public extension needs to be given for it to grow and make its own presence. The study is suggestive of the strengthening of public extension to cater to the scale and diversity of production.

In the paper on engendering agricultural research and extension, G.P. Reddy et al., examine the benefits of public-private partnership (PPP) for promoting research and extension in agricultural sector and revealed that the risky nature of agricultural sector acts as a deterrent for investments by private sector. Therefore, the authors
suggest that PPP is a proper mode to overcome the obstacle like financial viability gap funding by public sector and to increase efficiency in the delivery system of rural community. Moreover, for successful public-private partnership, the existing markets should be converted to PPP markets. There is also need to encourage market set up by private sector and farmers’ co-operatives as it will attract private investment in the creation of much needed marketing infrastructure, creating competition and ensuring better services to the farmers.

R.N. Barman in his paper exploring research and extension needs has observed that the gaps in adoption of new technologies could be minimised by research and extension services. The author has selected sali rice, ahu rice and wheat crops for his study and indicated that various problems like tiller mortality on submergence, drought, moisture stress, nutrient deficiency syndromes declined the yield. The author gives emphasis on research and extension for improving productivity and also suggests diversifying paddy-paddy dominant cropping system to paddy-wheat cropping system.

III

PRODUCTION, PRODUCTIVITY AND GROWTH IN AGRICULTURE

Agricultural policy in India for decades has been focusing on self-sufficiency and self-reliance in foodgrain production. Although all major crops have witnessed a significant growth in production, yet the recent trends in Indian agriculture present a dismal picture. In this background, two research papers were received for understanding the problems in crop sector.

Sant Kumar et al., have assessed the priorities for faster, sustainable and inclusive growth in Indian agriculture and explains why emphasis needs to be given to north-eastern, eastern, western and hill states over existing share while allocating the resources. The study focuses on the developmental goals of growth, equity, sustainability and research capacity, and makes an in depth assessment on the priorities to be given to the areas which have more potential in pushing agricultural growth owing to the unexploited potential of niche areas of development in these regions and demands more resource allocation for such states/regions. States that see drop in their share have relatively better economic conditions than those who gained. They also found that livestock research demands 33.9 per cent of total resources, followed by cereals 24.3 per cent, horticulture 11.7 per cent, oilseeds 6.5 per cent, fisheries 5.2 per cent and pulses 3.1 per cent. It is in this context that ignoring of intensity dimensions may lead to either over or under investment of research resources which in turn may lead to regional and interpersonal disparities. The authors perceive that micro-level priorities could prove more useful in providing convincing evidence for reallocation of additional resources.

Subhasis Mandal et al., have dealt with land shaping model for enhancing agricultural productivity in salt affected coastal areas of West Bengal and assessed
that the management of agricultural land in coastal saline areas is quite challenging as the agriculture is characterised by low yielding kharif rice varieties and it is due to this reason that livelihood of resource poor farmers had become a real challenge both for technology developers and policy makers. Therefore, development of coastal saline area should focus on land shaping techniques particularly farm-pond and paddy-cum-fish models, which are unique for addressing challenges like land degradation, drainage congestion and scarcity of fresh water for irrigation and have, in turn, the potential to increase production, productivity, income and employment. The authors recommended that research level and policy level constraints need to be addressed, also community based rainwater harvesting /common pool/wasteland may be encouraged in this direction for enhancing agricultural productivity.

On the basis of the above observations the following researchable issues emerge for further deliberations and conduct.

Assessment of Research and Extension Deficits in Different Agricultural Enterprises

- There is a growing consensus that in order to create a demand-driven technology system there must be direct involvement of farmers in identifying the problems, establishing priorities, and carrying out on-farm research and extension activities. This will involve specific services like agricultural research and rural extension and its subsequent deliverance to the people who need it.
- Contemporary extension reform strategies demand attention owing to their long-term consequences on economic growth and short-term consequences in improving rural situations and reducing poverty. This will need a new paradigm towards market-driven reforms with an agribusiness orientation that would help efficient delivery of agricultural and rural extension.
- Price forecasting is an important area in providing information services to the farmers by comparing economic data across the regions through a systematic approach and disseminating it to the farmers for increasing their incomes.
- The yield potential can be enhanced by exploiting hybrid vigour and biotechnological interventions. Technologies and cultural practices need to be utilised in an integrated manner in order to achieve the desired goals of efficiency, equity and sustainability in the agricultural production system.

Integrated/Collaborative Approach Towards Development and Diffusion of Innovations

- Establishment of a wide range of institutions for transmitting high-tech messages of agricultural research is needed urgently. The expansion of educational, organisational and technology exchange services for location-specific agricultural research and its efficient dissemination need to be
identified as a priority area. This would convince the farmers that extension systems and the information they communicate are valuable for income-generation in particular and for improving their living standards in general.

- Pluralism of extension providers through coordinated partnerships with NGOs and farmer organisations/private extension providers would prove important to reduce costs and maintain quality of the agricultural produce for better remuneration is needed to be explored.

Identification of Location-Specific Research and Extension Linkages

- Systematic research is needed to empirically measure the research impact on social welfare and conservation of natural resources in each agro-climatic setting separately. It was realised that an appropriate policy environment, infrastructure, and institutions are the preconditions for a greater impact of agricultural research.

- A constant R&D effort is the most effective way of sustaining productivity growth. The need of the hour is to conduct context-based, client-oriented, problem-focused research in a system perspective was to improve its efficiency and efficacy. Till now, qualitative and informed judgements have formed the basis of problem definition. However, more concrete socio-economic data are required to make judicious research planning.

- There is an urgent need to focus on research and extension for those states which fall under the negative productivity growth and have poor performance/stagnating or low productivity growth. If the issue of sustainability in the crop system is not addressed properly, it will adversely affect the long-term growth as well as the national food security and household nutritional security.

Investment in Agriculture

- At present, research investment is thinly spread on need-based priority areas. The studies on economic feasibility of research investment will provide feedback to the research community in order to justify future funding. This would also provide a framework for short-term and long-term investment strategies for research system and draw the attention of policymakers.

- There is urgent need to enhance investment in agricultural sector uniformly across the regions of the country. Comprehensive investigation into different areas of investment would help in allocating the resources under different items based upon their marginal impact on growth indicators. Effective public-private alliance in this regard would help to harness long term gains from capital investments.
Evaluation of existing policy environment for exploring possibility of reforms in rural institutions and overall planning mechanism could prove instrumental in pursuing food security and sustainable livelihood of farming community.

REFERENCES