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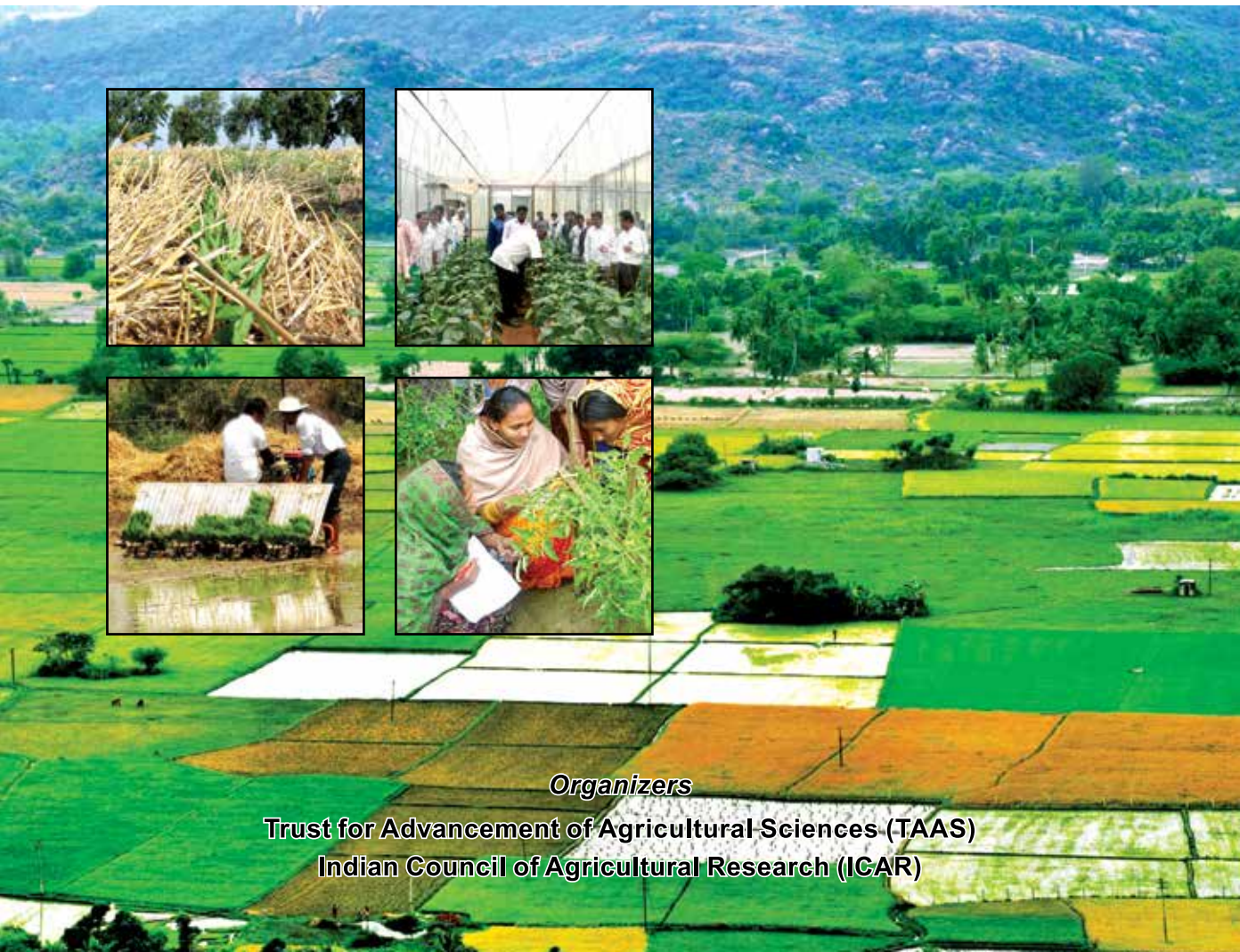
ICAR

Policy Dialogue on Incentives and Strategies for Scaling-out Innovations for Smallholder Farmers

NASC Complex, New Delhi; 30-31 October, 2017

Proceedings & Recommendations



Organizers

Trust for Advancement of Agricultural Sciences (TAAS)
Indian Council of Agricultural Research (ICAR)

Trust for Advancement of Agricultural Sciences

The Trust for Advancement of Agricultural Sciences (TAAS) was established on 17 October 2002. Its mission is to promote growth and advancement of agriculture through scientific interactions and partnerships. The major objectives are: (i) to act as think tank on key policy issues relating to agricultural research for development, (ii) organizing seminars and special lectures on emerging issues and new development in agriculture sciences in different regions of India, (iii) instituting national awards for the outstanding contributions to Indian agriculture by the scientists of Indian origin, and (iv) facilitating partnerships with non-resident Indian agricultural scientists. The main activities include organizing foundation day lectures, special lectures, brain storming sessions/symposia/seminars/ workshops on important themes, developing strategy papers on key policy matters, promoting farmers' innovations and conferring Dr. M.S. Swaminathan Award for Leadership in Agriculture. For more details, please visit: www.taas.in

Indian Council of Agricultural Research

The Indian Council of Agricultural Research (ICAR) is an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture, Government of India. The Council is the apex body for coordinating, guiding and managing research and education in agricultural systems in the country. The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development. It has played a major role in promoting excellence in higher education in agriculture. It is engaged in cutting edge areas of science and technology development. For more information, please visit: www.icar.org.in

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Preface

Agricultural development is now largely driven by technological innovations. These innovations are influenced by a number of factors like innovation capacity, resources for their outscaling and the strength of the agencies responsible for the outscaling. There are multiple sources of innovations but most of them are still originating from the public research system, which needs support of private sector and other agencies for their commercialization and outscaling. It is commonly believed that the public innovations are not fully commercialized and outscaled because of various reasons. Most important among these are lack of a concerted approach to demonstrate these innovations, lack of encouragement to farmers to adopt them and the regulatory environment. Such weaknesses are more common for the innovations related to natural resource management and those needing capital investment for commercialization.

The Trust for Advancement of Agricultural Science (TAAS) in collaboration with Indian Council of Agricultural Research (ICAR) organized a "Policy Dialogue on Incentives and Strategies for Scaling-out Innovations for Smallholder Farmers" at New Delhi on 30-31 October, 2017. This dialogue was attended by policy makers, researchers, research managers and representatives of development agencies and private sector. The dialogue covered issues like innovation capacity, regulatory environment, business models and partnerships. Special cases of innovations like conservation agriculture, protected cultivation, animal health, farm machinery, micro-irrigation, etc. The publication summarizes main points and recommendations which emerged during the discussion. The main recommendation is for establishment of Agricultural Innovation Fund for scouting, upsacling and outscaling innovations which can immediately benefit farmers and improve sustainability of the production systems.

I am grateful to the ICAR for supporting this policy dialogue and bringing out the proceedings. I extend my sincere thanks to the National Institute of Agricultural Economics and Policy Research, New Delhi for technical support. Thanks are also due to all my colleagues, particularly Dr Y.K. Alagh and Dr Uma Lele for their immense contribution in the discussion and to Dr Suresh Pal for his support and help in organizing this event. Thanks are also due to other colleagues in TAAS and NIAP for providing help in various ways for the success of Policy Dialogue.

I am sure, this publication will be immensely useful to the policymakers, researchers, farmers and other stakeholders in effectively promoting the outscaling of innovations.

(R.S. Paroda)
Chairman, TAAS

Acronyms and Abbreviations

AR4D	Agricultural Research for Development
ASSOCHAM	Associated Chambers of Commerce and Industry of India
ARYA	Attracting Rural Youth in Agriculture
BIRAC	Biotechnology Industry Research Assistance Council
BIS	Bureau of Indian Standards
CII	Confederation of Indian Industry
CGIAR	Consultative Group on International Agricultural Research
CBD	Convention on Biological Diversity
CSIR	Council of Scientific and Industrial Research
CRISPR-Cas9	Clustered Regularly Interspaced Short Palindromic Repeat- CRISPR associated protein 9
DAC	Department of Agriculture and Cooperation
FPO	Farmer Producer Organization
FICCI	Federation of Indian Chambers of Commerce and Industry
GDP	Gross Domestic Product
GM	Genetically Modified
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
IIT	Indian Institute of Technology
IPR	Intellectual Property Right
IP	Intellectual Property
KVK	Krishi Vigyan Kendra
MGMG	Mera Gaon Mera Gaurav
MSP	Minimum Support Price
MNC	Multinational Companies
NASC	National Academy of Agricultural Science

NARS	National Agricultural Research System
NSQF	National Skill Qualification Framework
NRM	Natural Resource Management
NGO	Non-Governmental Organization
NIF	National Innovation Fund
NITI	National Institution for Transforming India
NARI	Nutri-sensitive Agricultural Resources and Innovations
PPP	Public Private Partnership
RKVY	Rashtriya Krishi Vikas Yojana
R&D	Research and Development
SAUs	State Agricultural Universities
SITARE	Students Innovations for Advancement of Research Explorations
SDG	Sustainable Development Goal
TAAS	Trust for Advancement of Agricultural Sciences
UPOV	Union for the Protection of New Varieties of Plants
USA	United States of America
VATICA	Value Addition and Technology Incubation Centres in Agriculture
ZTMC	Zonal Technology Management Centre

Proceedings and Recommendations

PREAMBLE

In India, agriculture plays a pivotal role in ensuring food security, reducing poverty and malnutrition, and promoting overall economic development. Innovations and their dissemination contribute significantly in acceleration of agricultural development and in realization of the Sustainable Development Goals (SDGs). Therefore, greater emphasis has been given on scaling-out agricultural innovations. Since industrialization, agricultural innovations in the developing countries were predominantly developed by the public sector. Private sector, including multi-national companies (MNCs), has entered in this arena quite lately. With the economic liberalization of agricultural sector in India, private investments in agricultural innovations have increased. A number of national initiatives in policy-making (e.g. IPR policy) and in flagship programmes (Make in India, Skill India, Start-up India, Digital India) have been started to foster innovations.

The National Agricultural Research System (NARS) had undergone many policy reforms in research, intellectual property rights (IPRs) and technology transfer. Appropriate seed money was also given for producing basic material to spread the technology and to promote the innovation in the technology-delivery system. Later in 2006, the Indian Council of Agricultural Research (ICAR) prepared guidelines for the management and commercialization of intellectual property (IP). The guidelines outlined the incentives and rewards for outscaling innovations and for resource generation through commercialization of IPs. A very large number of agricultural innovations have been commercialized earlier. In order to address the vital issues in agricultural sector in near and distant future, innovations in various fields are the need of the hour. Challenges of food insecurity, climatic change and low profitability of farms are some of the issues where the country needs innovations. Role of private sector, though well realized and appreciated in inputs development and delivery (seeds, fertilizers, pesticides, cold storage/ chain solutions, etc.), still needs to be examined and extended to other non-conventional research and development (R&D) areas like basic research and for long gestation technologies under the public-private partnership (PPP). The business environment, on the other hand, is becoming more and more complex and technical with the passage of time. To be globally competitive and moving on the journey towards curtailing trap of middle income, this is the right time

to develop innovations and upscale them, and promote agri-IPR management activities in the national systems. Hence, there is an urgent need to revisit technology dissemination and commercialization mechanisms and associated policies to draw a road map for enabling policy environment and incentives and rewards for the innovation process.

In this context, a policy dialogue on "Incentives and Strategies for Scaling-out Innovations for Smallholder Farmers" was jointly organized by the Trust for Advancement of Agricultural Sciences (TAAS) and the Indian Council of Agricultural Research (ICAR) at the NASC Complex, New Delhi on 30-31 October, 2017. The programme consisted of three sessions, and was attended by participants from public, private and Consultative Group on International Agricultural Research (CGIAR) systems. The summary of deliberations and road map are as follows:

INAUGURAL SESSION I: AGRICULTURAL INNOVATIONS: GENERAL PERSPECTIVE

The session was co-chaired by Prof. Y.K. Alagh, former Union Minister and Shri J.N.L. Srivastava, former Secretary, Department of Agriculture and Cooperation (DAC). It started with setting of the context by Dr R.S. Paroda, Chairman, TAAS. He elaborated on the role of technology and capital in accelerating growth in agricultural productivity. The Green Revolution was innovation-led, both technologically and institutionally. This success was replicated in other fields of agriculture–dairy, fisheries, and oilseeds, but the process seemingly has slowed down lately. Even though there are many new technologies such as rice hybrids, micro–irrigation, plastic culture, and protected cultivation; their scaling-out is a major concern. In the context of these technologies, countries like China are far advanced. There is a need to think "whether it is a technology fatigue or policy and institutional failure for the situation. Technologies such as single cross maize hybrids and *Bt* cotton, have made significant impacts in the last two decades; while genome-editing/silencing technologies (CRISPR-Cas9), conservation agriculture, genetically modified (GM) crops and micro–irrigation need to be scaled-out in India. The economic profitability of the technologies needs to be validated before planning for outscaling. The strength of private sector in research and delivery of technology needs to be tapped through much needed public-private partnership. Also, there is a need to cascade innovation process in all areas like technology solutions, product and process innovations, and institutional innovations for promoting faster, inclusive and sustainable agriculture. The major policies for scaling-up innovations suggested include incentive (non-subsidy) and reward system; enabling policy environment; increased resource allocation for agricultural research for development (AR4D) (at least

1% of agricultural GDP); scaling innovations through public-private partnership; and policy and institutional reforms.

The presentations covered aspects such as scaling-up innovations from a policy perspective (Dr Suresh Pal); out-scaling innovations for smallholder farmers from an extension system perspective (Dr A.K. Singh); major pre-conditions for scaling up innovations for smallholder farmers from a private industry perspective (Dr Usha Zehr); important initiatives for scaling-up biotechnology innovations by the Department of Biotechnology (DBT) (Dr Renu Swarup), and grass-root innovations for accelerating agricultural growth and improving livelihood (Dr Vipin Kumar).

Dr Suresh Pal underscored the need for innovation capacity of public research and extension system in India. He discussed different policy reforms for encouraging innovations in United States and China and major reforms in the National Agricultural Research System of India, such as on farm experimentation, contract research and consultancy, technology transfer units in public research organizations, intellectual property rights (IPRs), agri-business incubators and public-private partnership. He also highlighted the changing role of agricultural extension in an innovation system perspective.

Major initiatives by ICAR (front-line) extension system for outscaling innovations for smallholder farmers include 680 Krishi Vigyan Kendras (KVKs) across the country; programmes like Attracting Rural Youth in Agriculture (ARYA), Mera Gaon Mera Gaurav (MGMG), National Skill Qualification Framework (NSQF), Value Addition and Technology Incubation Centres in Agriculture (VATICA), skill training, knowledge systems and homestead agricultural management in tribal areas; Nutri-sensitive agricultural resources and innovations (NARI); climate-smart villages; and web and mobile advisory services. Dr A.K. Singh explained the potential role of farmer producer organizations (FPOs) in innovation upscaling.

Dr Usha Zehr emphasized the need for figuring out complementarity between the public and the private research organizations for scaling-out agricultural innovations for smallholder farmers and major barriers in such collaborations. Unlike public sector, private sector concentrates on fewer technologies, and invests heavily on those technologies. The key constraint with the private sector in R&D is longer duration (7-10 years for varietal development) and continued investment in that period. The major pre-condition for scaling-out innovations is that it should be need-based, relevant, have the proof of concept, regulations, cost of compliance, incentives and a sense of urgency.

Dr Renu Swarup talked about many initiatives taken up by DBT, which can act as incentives for scaling innovations in agricultural biotechnology. The major initiative is through Biotechnology Industry Research Assistance Council (BIRAC),

a platform to nurture industry-academia connectivity. Other initiatives include biotechnology parks and bioincubators, science clusters, etc. Even though there are different schemes for agricultural biotechnology such as Biotech-KISAN scheme, the performance in this field is not on par with other sectors like health. There are schemes to encourage scientist/faculty to move to entrepreneurship. The key challenges for the entrepreneurs are lack of finance and market access. The DBT has started initiatives like Students Innovations for Advancement of Research Explorations (SITARE), eYUVA (creating entrepreneurial culture in universities), BioNEST (nurturing entrepreneurship by establishing Bioincubation Centres) for supporting entrepreneurs. She emphasized the need for accelerating entrepreneurship fund and possibility of social immersion programmes for the incubates to assess market needs.

Many initiatives by the National Innovation Foundation (NIF) for promoting grassroot entrepreneurship include Micro Venture Innovation Fund, Grassroot Technological Innovation Acquisition Fund and establishment of NIF Incubation and Entrepreneurship Council. Innovations are also encouraged by organizing exhibitions, awards and scholarships. Participatory research and decentralized fabrication and services are essential for improving technologies for outscaling in India.

Concluding remarks

- Innovation needs to be considered in totality keeping in view the invention, innovations policy and institutions being so essential to develop a strategy for their scaling-out.
- ICAR needs to strengthen existing policies, institutions and incentives for upscaling and outscaling innovations. The existing policies and mechanisms need thorough review in the present context.
- There is an obvious need to have competent human resource with marketing expertise so as to commercialize technologies and taking them to small farmers.
- The BIRAC model of DBT is a good platform for innovations; similar models need to be developed in ICAR.
- Farmer producer organizations could be a good option for promoting agricultural innovations and commercialization of technologies.
- While planning for upscaling and outscaling, adequate care should be taken to avoid planning fallacy (under estimation of time and resource).
- Need to think “Can innovation be really engineered” and applied to address the present-day requirements of smallholder farmers.

SESSION II: PANEL DISCUSSION ON INCENTIVES AND POLICIES FOR INNOVATIONS

In the afternoon session, a panel discussion was held on the topic "Incentives and Policies for Innovations". Dr Uma Lele chaired and Dr P.S. Birthal convened the session. The suggestions put forth by the panelists are summarized as follows:

Dr N.S. Rathore strongly recommended the need for human capital for innovation. He narrated the importance of Invent-Innovate-Invest continuum and concepts of skill, speed and scale in the innovation system. The country needs to place greater emphasis on human capital development, particularly building entrepreneurship and having adequate funds for investment in promoting innovations.

Dr S.A. Patil emphasized on incentives for researchers, and need for central cell/platform to screen innovations at ICAR level. He stressed on the need for creating innovation fund to promote and commercialize new technologies. He also pointed out that the research should be taken-up in systems' approach rather than trend based on disciplines/commodities.

Dr Sachin Chaturvedi stated that first we need to discuss "incentives for whom and policies by whom''? He classified innovations into institutional innovation and technology innovation. In institutional innovation, he flagged the problem of state centricity. He quoted the GM case, where the Government was reluctant to invest in the technology and when private companies came-up with products with higher prices, Government intervened. He argued that Government should move towards a facilitative role and emphasized on the need of science diplomacy.

Dr Arvind Kapoor pointed out issues with scientific policies; based on the experience elsewhere. "We wait for technologies to be developed and available in the market to frame policies, and often look towards American and European counterparts to frame them". He gave the example of CRISPR-Cas9, though the technology is upcoming, we don't have any policy for it. He also pointed out the lack of clarity around India's position on the International Union for the Protection of New Varieties of Plants (UPOV) and confusions around material transfer as the result of Convention on Biological Diversity (CBD) and Nagoya protocol.

Dr P.S. Birthal shared his research findings on the information access and livestock and drew implications for policies for scaling-up and scaling-out innovations. He raised concerns over the abysmal state of credit and information access by the farmers in India, though it would have had huge impact on the income. He raised the concerns with livestock sector insurance (granted only for a year and for high-yielding animals) and issues around taxation of poultry enterprises. He emphasized on value-chain approach both in research and policy.

Remarks by chair

Dr Uma Lele summarized the panel discussion and the highlights are as follows:

- Even though technological innovations are abundant, institutional failures lead to lowering adoption. The problem of lack of appropriate policies, institutions and technologies were present also at the cusp of the Green Revolution during 1960s. Whereas Government has an important role to play even now, the innovation system has become multi-sectoral, involving other actors. There is an urgent need for institutional and policy reforms more appropriate to today's circumstances. Institution or policy failures need to be revisited and more suitable policies and institutions need to be created.
- The lack of internal capacity for negotiating complex trade and other international treaties need to be addressed on a priority.
- The United States of America (USA) has a much stronger private sector activity in venture capital, and European countries have a number of public sector business models for scaling-up and scaling-out innovation in agriculture. Who bears the risk in innovations and how risks and rewards are shared between the public and the private sector? These issues need to be incorporated into various business models.
- Government should also innovate shifting from being mainly directive to a more facilitative role in promotion of inventions and innovations. This would require a cost-effective regulation system for investment and commercialization of technology.

SESSION III: INCENTIVES FOR SCALING–OUT INNOVATIONS

Session III was co-chaired by Dr R.B. Singh and Dr S.A. Patil. The deliberations included experiences related to upscaling and outscaling innovations in livestock, agro-processing, farm mechanization, protected cultivation, micro-irrigation and natural resource management. Policies and incentives for scaling innovations and the ICAR experience in out-scaling technologies were also discussed in the session.

Dr A.K. Srivastava presented technologies needed to be outscaled in the dairy sector. The technologies included animal identification, precision animal feeding, advanced reproductive technologies, disease diagnosis innovations, technologies for detection of adulterants in milk and milk products and fabrication of small-scale farm machineries (such as mobile machine milking). At present, fourth generation technologies are available for improving reproductive health, and these must be scaled-out. Artificial insemination and semen sexing can make a major impact on milk productivity. Kerala and Kolar Model of community milking, and technology for value-added dairy foods are standards needing immediate interventions for their

outscaling. To better understand technology and their spread, people's mind-set of "managing livestock under zero or low input" should be changed to commercial enterprise.

Dr T.R. Sharma narrated experiences in scaling-out innovations in agro-processing and value-addition. He emphasized that exploitation of value-added products from agro-biomass like lignin and algae, bioprocessing, and chemical processing, and composite fruit coating can generate immense benefits for farmers and rural entrepreneurs. He stated that most of those processes are restricted to labs and require scaling-up. He reiterated that there is a need of Government support for upscaling innovation in this sector through R&D and establishment of incubation centres. These supports need to be proactive and facilitate integration with the industry.

Dr Indra Mani shared many opportunities of upscaling and outscaling for small farm mechanization technologies in India. He emphasized the need of involvement of industries for commercialization. He also talked about successful contract research on Urea Ammonium Nitrate Application System funded by Department of Fertilizers and National Fertilizer Ltd. Unique facilities such as 'Design Innovation Centre', a collaborative initiative by the Indian Institute of Technology (IIT), Kanpur and the Indian Agricultural Research Institute (IARI), is a promising model for incubation, design improvements and start-up facilitation. The recommendations put forth by him included need for more public funding for research in agricultural mechanization, establishment of national centres in different zones for mechanization, scaling-up innovations through public private partnership, linking of grass-root level innovations through institutional innovations and establishment of design innovation centres at different institutions.

Innovations in protected cultivation for producing high quality, high value agricultural produce and different constraints and options for its outscaling were presented by Dr Brahma Singh. Innovations in protected cultivation include plastic mulching coupled with fertigation, walk in poly tunnels for vegetables, insect-proof net house, shade- net structures, vegetable farming under rain shelters, naturally ventilated poly houses, climate controlled hi-tech green houses for disease -free nursery raising, hi-tech soil less production, etc. He shared success story of protected vegetable cultivation in Ladakh, and other success stories from farmers. The key constraints pointed out were high initial cost, poor quality material, high cost of input, lack of guidance, knowledge and marketing, nematode problem and lack of refrigerated vehicles. To outscale such technologies, there is a need for furthering research and development (R&D) efforts in developing crop varieties/hybrids suitable for protected cultivation, skilled human resource development, establishment of Bureau of Indian Standards (BIS) for polyhouse materials and their testing facility, cluster approach and streamlining of subsidy.

Low cost polyhouse, mulching and fertigation have proved to be more popular because of cost advantage.

Many state-led institutional and policy reforms for outscaling innovations in micro-irrigation and water management were highlighted by Dr H.P. Singh. Presently, four states, namely, Rajasthan, Andhra Pradesh, Maharashtra and Gujarat cover about 45% area under micro-irrigation; the potential for this technology is estimated to be 8.6 million ha. Andhra Pradesh model of Micro-irrigation Project and Karnataka PPP model are some of the successful examples which can be replicated in other states. NITI Aayog has also come-up with the similar model (micro-irrigation PPP mode). For larger coverage of such technologies, there is a need for additional investment in research and development, improvement in implementation efficiency and technical support services.

Dr P.K. Joshi categorized policies for scaling innovations into four categories: i) ***institutional policies*** (such as facilitation of farmers collectives like FPOs with proper legal framework , establishment of cadre of agri-business professionals at village level, credit to the farmers across value chain, machine rental services, etc.); ii) ***research policies*** (promotion of agro-ecological base research, research for trade policy, agro-processing, value-chain development, sustainable livelihood, new funding models for encouraging research by state government as in Rashtriya Krishi Vikas Yojana (RKVY); iii) ***price policies*** (alternative price policy to minimum support price (MSP), inclusion of efficiency, risk and ecosystem services concepts in price policy) and iv) ***investment policies*** (need for more investment in agriculture rather than subsidies, promoting private investments in irrigation). He stressed the need to ***attract private*** sector in development of wholesale markets, warehouses and cold storages, agro-processing infrastructure, canal irrigation and agricultural extension.

Dr Sanjeev Saxena talked about incentives for patenting, innovations and partnership in the context of ICAR. He detailed intellectual property (IP) management structure in the ICAR, involving institute and zonal technology management units and also regarding national platform Agrinnovate India Ltd. for interface with private sector, including international technology transfer. He said emphasis should also be laid on the role of vision, skill, incentives, resources and action plan for innovations.

Options for outscaling innovations in natural resource management were presented by Dr M.L. Jat. He explained the innovation as an amalgamation of technology, local adaptation, social inclusivity and access to end-users. Big challenges associated with “half innovations” and the successful cases of converting half innovations into full innovations based on the local needs were also explained. Major requisitions for outscaling natural resource management (NRM) innovations

include long-term investment, system approach, portfolio of policies and practices, patience, capacity+, innovation-led business models and robust ex-ante analysis on return on the investment. He emphasized the importance of scientific social responsibility/ science-corporate social responsibility with farmer on the centre. Since these NRM based innovations generate lot of social and environmental goods, this is the area for public investment in their promotion and use.

Dr Neeru Bhooshan talked about many technologies outscaled by the public sector (ICAR-IARI), about strategies adopted by the Zonal Technology Management Centre (ZTMC) of ICAR-IARI for outscaling innovations such as technology commercialization through PPP, assuring access to knowledge and information through PUSA KRISHI-app, partnerships for enhancing service provision and linking farmers with market through the FPO (Beej India Ltd.). The issues and challenges discussed were disconnect between production and marketing, licensing issues with industries, lack of exclusive funding support for start-ups, insufficient delegation of powers to cutting-edge level institutions, lack of strong actions against IP violation, and lack of trained professionals and technology readiness. She pointed out the way forward could be demand-driven R&D, with more industry and research/academia interactions, technology transfer and integration with incubation for start-up, virtual marketing and use of mobile/internet technologies.

Remarks by chairs

- Attractive innovation such as protected cultivation needs to be up-scaled in India. The example of integrated policy for protected cultivation in Karnataka was quoted and studying such success stories and replicating them in other states may be relevant.
- On mechanization issues, distortions in credit market for agricultural machineries (high interest rate for tractor loan as compared to car loan) were discussed and, therefore, a parity in such cases has to be maintained.
- The ICAR need to establish an innovation cell which should look into different aspects of promoting innovations, viz., documentation, options for scaling-out, public-private partnerships, commercialization, etc.
- System-oriented approach in agricultural research is required, scope of farm mechanization, soil-fertility management and agri-business models are to be promoted. There is a need for undertaking outcome pathways analysis for technologies and other innovations for better planning of outscaling them.
- There was an emphasis on disruptive innovations and scaling of differentiated, disaggregated and integrated innovations. Delineating outcome/impact pathways for agricultural innovations must be a priority for ICAR.

RECOMMENDATIONS

- Innovations have played and will continue to play important role in agricultural transformation globally. The innovation process involves multiple stakeholders and the right policy environment to innovate and its outscaling for impact in the broader national agricultural perspective.
- Agricultural research must move from commodity centric to 'systems approach,' and all stakeholders (farmers, private sector, NGOs, etc.) should be part of the research and innovation continuum. Hence, institutional/innovation platforms are essentially needed to encourage much needed scientist-farmer, and public-private partnerships.
- To achieve an innovation-driven agrarian economy, innovation capacity of the research and development systems, civil society organizations, and farmers should be developed. For this purpose, intensity of public investment would have to be enhanced considerably. Also, greater attention would be needed towards capacity development of people responsible for scaling out innovations and their successful commercialization.
- There is an urgent need to strengthen existing technology transfer system within the NARS (front-line extension, Agri-Business Incubator, Agrinnovate India Ltd.) and to establish technology parks for commercialization both in ICAR and SAUs. Also, it requires placement of adequate manpower, financial resources and freedom to operate. Convergence of technology and diversification of extension and other service systems are also critical for outscaling innovations.
- The available innovations, including those that are farmer-led, must be assessed for validation, refinement and prioritization, based on their commercialization potential. This should also entail identification of suitable partners for initiating successful ventures. Financing, risk management and incentives for outscaling innovation are necessary to encourage potential entrepreneurs.
- An Innovation Platform would help accelerate scaling-out innovations, and therefore, an 'Agri Innovation Board' should be established urgently in the Ministry of Agriculture and Farmers Welfare. This Board must be headed by an eminent agricultural scientist and its members should be selected from different Ministries, including Finance, Commerce and Industry.
- To begin with, the Board should have a minimum of Rs 1,000 crores for financing activities to scale-out agricultural innovations. This can be from the existing funding support for innovation (Start-up India, Atal Innovation Scheme), or a separate funding mechanism such as the National Innovation Fund, initiated by the Council of Scientific and Industrial Research (CSIR).

- Concerned ICAR institutes and SAUs must ensure providing skill-based certificate training for entrepreneurship, and in addition should provide much needed backstopping services so critical for successful scaling-out of innovations. The manpower so trained can work as para-innovators or technical service providers. Also, to link with the industry, ICAR would need to develop an effective partnership with organizations, such as the Federation of Indian Chambers of Commerce and Industry (FICCI), the Associated Chambers of Commerce and Industry of India (ASSOCHAM), Confederation of Indian Industry (CII), etc.
- Farmer Producer Organizations, self-help groups, cooperatives, producer companies, etc. could effectively be involved for out-scaling innovations. These organizations should have easy access to technology, financial services, including credit, and hand-holding from public organizations for promoting demand-driven innovations in the broader national interest.
- Participation of private sector in R&D and upscaling and outscaling of innovations need an enabling policy environment and access to public technology and other resources. To facilitate this, the Government should move from “directive” to a “facilitative” role. This may also require revisiting of existing regulations to provide a “predictable and enabling” regulatory framework. Also, incentives and rewards to the innovators should be put in place to sustain their interest in outscaling innovations and providing much needed technical backstopping.

Annexure I

Program

DAY 1: OCTOBER 30 2017

Session I: Agricultural Innovations: General Perspective

Co-Chairs: **Dr Y.K. Alagh** and **Shri J.N.L. Srivastava**
Convener: **Dr J.L. Karihaloo**

14:00-14:10	Setting the Context	**Dr R.S. Paroda**, TAAS
14:10-14:30	Incentives for promoting innovations in agriculture	**Dr Suresh Pal**, NIAP
14:30-14:50	Outscaling innovations for smallholder farmers	**Dr A.K. Singh**, IARI
14:50-15:10	Strategies for promoting proprietary technologies	**Dr Usha Zehr**, Mahyco Foundation
15:10-15:30	Initiatives for scaling innovations in agricultural biotechnology	**Dr Renu Swarup**, DBT
15:30-15:50	Grassroots innovations for accelerating agricultural growth	**Dr Vipin Kumar**, NIF
15:50-16:10	Open Discussion	
16:10-16:20	*Concluding Remarks by Co-Chairs*	
16:20-16:40	***Tea Break and Group Photo***	

Session II: Panel Discussion: Incentive and Policies for Innovations

Chair: **Dr Uma Lele**
Convener: **Dr P.S. Birthal**

16:40-18:00	**Dr N.S. Rathore**, ICAR
	Dr S.A. Patil, Formerly, IARI
	Dr Sachin Chaturvedi, RIS
	Dr Arvind Kapoor, Rasi Seeds
	Dr P.S. Birthal, NIAP

18:00-18:15	Open Discussion	
18:15-18:30	*Concluding Remarks by Co-Chairs*	
19:30	***Reception Dinner***	

DAY 2: OCTOBER 31 2017

Session III: Incentives for Scaling Innovations

Co-Chairs: **Dr R.B. Singh** and **Dr S.A. Patil**
Convener: **Dr Umesh Srivastava**

09:30-09:50	Outscaling technologies for livestock improvement and health	**Dr A.K. Srivastava**, ASRB
09:50-10:10	Scaling innovations in agro-processing and value addition	**Dr T.R. Sharma**, NABI and CIAB
10:10-10:30	Scaling Innovation for small farm mechanization	**Dr I.M. Mishra**, IARI
10:30-10:50	Outscaling protected cultivation - constraints and options	**Dr Brahma Singh**
10:50-11:10	Scaling Micro-irrigation for water-use efficiency and farmers income	**Dr H.P. Singh**
11:10-11:30	***Tea/Coffee Break***	
11:30-11:45	Policies for scaling innovations	**Dr P.K. Joshi**, IFPRI
11:45-12:00	Incentives for patenting, innovation and partnership	**Dr Sanjeev Saxena**, ICAR
12:00-12:15	Outscaling innovations for natural resource management	**Dr M.L. Jat**, CIMMYT
12:15-12:30	Outscaling public sector technologies	**Dr Neeru Bhooshan**, IARI
12:30-12:50	Open Discussion	
12:50-13:00	Concluding Remarks by Co-Chairs	
13:00-14:00	***Lunch Break***	

14:00-16:00	**Plenary Session**	
Co-Chairs: **Dr R.S. Paroda** and **Dr R.B. Singh**		
14:00-15:00	Presentation of recommendations by Conveners of each session	**(Dr J.L. Karihaloo, Dr P.S. Birthal, Dr Umesh Srivastava)**
15:00-15:15	Discussion and finalization of recommendations	
15:15:15:25	Concluding Remarks by Co-Chairs	
15:25-15:30	Vote of Thanks, Dr Suresh Pal, NIAP	
15:30-16:00	***Tea Break***	

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UMA LELE
N S RATHORE
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31st October, 201
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teas


Policy Dialogue on
"Incentives and Strategies for Scaling Out Innovations
for Smallholder Farmers"
Y K ALAGH
J L KARIHALOO


OFFICE BLOCK

Trust for Advancement of Agricultural Sciences (TAAS)

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An accelerated movement for harnessing agricultural science for the welfare of people.

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To promote growth and advancement of agriculture through scientific interactions and partnerships with stakeholders.

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- The Ninth Foundation Day Lecture on "21st Century Challenges and Research Opportunity for Sustainable Maize and Wheat Production" by Dr. Thomas A. Lumpkin, Former DG, CIMMYT, September 28, 2015.
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- Policy Brief on Scaling Conservation Agriculture in South Asia, September, 2017.
- Retrospect and Prospect of Doubling Maize Production and Farmers' Income – Strategy Paper by Dr. N.N. Singh, September 10, 2017.
- Indian Agriculture for Achieving Sustainable Development Goals - Strategy Paper by Dr. R.S. Paroda, October, 2017.
- Strategy for Doubling Farmers' Income - Strategy Paper by Dr. R.S. Paroda, February, 2018.

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