



National Dialogue on Innovations in Agricultural Extension: A Way Forward

8-9 April, 2022

Proceedings and Recommendations





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Organized by

Trust for Advancement of Agricultural Sciences (TAAS), New Delhi
Indian Council of Agricultural Research (ICAR), New Delhi
National Institute of Agricultural Extension Management (MANAGE), Hyderabad
Michigan State University (MSU), USA

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Acronyms and Abbreviations

ACABCs	Agri-Clinic and Agri-Business Centres
ADB	Asian Development Bank
ADG	Assistant Director General
AFU	Agriculture and Forestry University
AICC	Agricultural Information Communication Centre
AMB	Agricultural Product Marketing Bureau, Nepal
ARYA	Attracting and Retaining Youth in Agriculture
ATARIs	Agricultural Technology Application Research Institutes
ATIC	Agricultural Technology Information Centre
ATM	Automated Teller Machine
ATMA	Agricultural Technology Management Agency
BAIF	Bharatiya Agro-Industries Foundation
BARC	Bangladesh Agricultural Research Council
BCAC	Block/Cluster Action Plans
BEP	Block Extension Plan
BKC	BKC Weather Systems and Aggregators
BKS	<i>Bharat Krishak Samaj</i>
BTT	Block Technology Team
CA	Conservation Agriculture
CAB	Criyagen Agri & Biotech Private Limited, Bengaluru
CD	Community Development
CDP	Community Development Program
CEO	Chief Executive Officer
CGIAR	Consultative Group on International Agricultural Research
COVID-19	Corona Virus Disease (COVID-19)
CRS	Community Radio Station
CSCs	Common Service Centres

CSO	Civil Society Organization
CSR	Corporate Social Responsibility
DAE	Department of Agricultural Extension
DAESI	Diploma in Agricultural Extension Services for Input Dealers
DARE	Department of Agricultural Research and Education
DBT	Direct Benefit Transfer
DD	Doordarshan
DDG	Deputy Director General
DDM	District Development Manager
DDOs	Development Department Outlets
DG	Director General
DKMA	Directorate of Knowledge Management in Agriculture
DKT	Direct Knowledge Transfer
ED	Executive Director
EELs	Extension Education Institutes
ESPs	Extension Service Providers
FAO	Food and Agricultural Organization of the United Nations
FBS	Farmers' Business School
FFS	Farmers' Field School
FIAC	Farm Information and Advisory Centre
FKGs	Farmers' Knowledge Groups
FLD	Frontline Demonstration
FO	Farmer Organization
FPC	Farmers' Producer Company
FPO	Farmers' Producer Organization
FTC	Farmers' Training Centre
FWKGs	Farm Women Knowledge Groups
FY	Financial Year
GAPs	Good Agricultural Practices
GDP	Gross Domestic Product
GHGs	Greenhouse Gases

GIS	Geographic Information System
Gol	Government of India
GVA	Gross Value Added
GYAI	Global Youth Advancement Initiative
IAAP	Intensive Agricultural Area Program
IADP	Intensive Agricultural District Program
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
ICARDA	International Center for Agricultural Research in the Dry Areas
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
IFFCO	Indian Farmers' Fertilizer Cooperative Limited
IFPRI	International Food Policy Research Institute
IFS	Integrated Farming System
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
ISAP	Indian Society of Agribusiness Professionals
IT	Information Technology
ITC	Indian Tobacco Company
IVLP	Institute Village Linkage Program
JFPO	Jagruti Farmers' Producer Organization
K&SICs	Knowledge & Skill Innovation Centers
KCC	Kisan Call Centres
KSHAMTA	Knowledge Systems and Homestead Agriculture Management in Tribal Areas
KVK	<i>Krishi Vigyan Kendra</i>
LMS	Learning Management System
M & E	Monitoring and Evaluation
MAHA FPC	Maharashtra Farmers' Producer Company (Federation)
MANAGE	National Institute of Agricultural Extension Management
MAYA	Motivating and Attracting Youth in Agriculture

MBA	Master of Business Administration
MD	Managing Director
MGMG	<i>Mera Gaon Mera Gaurav</i>
MoA&FW	Ministry of Agriculture and Farmers' Welfare
MoLMAC	Ministry of Land Management and Agriculture and Cooperation, Nepal
MoU	Memorandum of Understanding
MSU	Michigan State University
MT	Million Tonnes
NAAS	National Academy of Agricultural Sciences
NABARD	National Bank for Agriculture and Rural Development
NAEP	National Agricultural Extension Project
NARI	Nutri Sensitive Agricultural Resources and Innovations
NARS	National Agriculture Research System
NARSC	National Agricultural Research System Complex
NATP	National Agricultural Technology Project
ND	National Demonstration
NES	National Extension Service
NFDB	National Fisheries Development Board
NGOs	Non-Government Organizations
NIAM	National Institute of Agricultural Marketing
NICRA	National Initiative for Climate Resilient Agriculture
NITI	National Institution for Transforming India
NLM	National Livestock Mission
NMAET	National Mission on Agricultural Extension and Technology
NNAJ	National Network of Agricultural Journalists
NRM	Natural Resource Management
NR	Nepalese Rupee
O&M	Organization and Management
PMMSY	<i>Pradhan Mantri Matsya Sampada Yojana</i>
PPES	Private Paid Extension Service
PPP	Public Private Partnership

PRDIS	Participatory Rural Development Initiative Society
R&D	Research and Development
R&E	Research and Extension
RIO	Research Institute Outlet
SAARC	South Asia Association for Regional Cooperation
SAFAE	South Asia Forum for Agricultural Extension
SAMETI	State Agricultural Management & Extension Training Institute
SARATHI	System of Agri-Information Resources Auto-transmission and Technology Hub Interface
SAU	State Agricultural University
SFAC	Small Farmers' Agribusiness Consortium
SHG	Self-Help Group
SKUAST-J	Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu
SMFDA	Small and Marginal Farmers' Development Agency
SMS	Subject Matter Specialist
SRT	Saguna Rice Technique
T&V	Training and Visit
TAAS	Trust for Advancement of Agricultural Sciences
TFRI	Tropical Forest Research Institute
ToT	Transfer of Technology, Training of Trainers
UN	United Nations
UNDP	United Nations Development Program
USA	United States of America
UT	Union Territory
VATICA	Value Addition & Technology Incubation Centres in Agriculture
VC	Vice Chancellor
WARDA	West Africa Rice Development Association

National Dialogue on Innovations in Agricultural Extension: A Way Forward

BACKGROUND

The agriculture and allied sectors in India experienced buoyant growth in the past years registering 18.8 per cent contribution in GVA (2021-22) and a growth of 3.6 per cent (2020-21) and 3.9 per cent (2021-22). The sectoral production performance in India is impressive (foodgrains: 316.05 mt, horticulture production: 341.63 mt, largest producer of milk 210 mt, meat 8.80 mt, eggs: 122.11 billion eggs per annum and fish production: 14.5 mt). The technology dissemination services, both public and private have played significant role in this process, though the performance varied from state to state as also the production systems. In agriculture dependent economies, extension programs have been the main conduit for disseminating information and in enhancing, technical and managerial skills. This essentially requires enabling policy environment, suitable program delivery models, competent field functionaries, empowered farmers, market integration, and intensive use of ICTs, etc.

Series of voluntary projects in pre-independence era, such as Community Development Program (CDP-1952) and National Extension Service Blocks (NES-1953) were the major earlier extension efforts. Subsequently, Pre-Green Revolution interventions implemented include: Intensive Agricultural District Program (IADP, 1961) and Intensive Agricultural Area Program (IAAP, 1964). Followed by Green Revolution (1967), duly supported by intensive extension efforts like National Demonstrations (ND- 1965), Farmers Training Centres (FTC-1966), Small and Marginal Farmers Development Agencies (SMFDAs-1971), *Krishi Vigyan Kendras* (KVK-1974, 732) and lab to land program (1979- that subsumed in KVKs). In 1974-75, a very major extension intervention through World Bank Funded Training and Visit (T&V) system resulted in restructuring of the extension system. Following its significant impact, it was expanded throughout the country from 1984 to 1995 through National Agricultural Extension Project (NAEP). Further, the process of Extension Reforms was strengthened under National Agricultural Technology Project (NATP, 1998) by establishing Agricultural Technology Management Agency (ATMA) at district level, now covers 676 districts in 29 States/3 UTs under the National Mission on Agricultural Extension & Technology (NMAET).

The extension models currently in operation are: i) Research Institution Outlets (RIOs) under State Agriculture/ Horticulture/Veterinary Universities and ICAR institutes provide strong technology outreach windows like adopted villages, blocks & innovative system of KVKs, with focus on technology validation, demonstration and dissemination, ii) Development Department Outlets (DDOs) under the State Departments of Agriculture, Horticulture, Animal Husbandry, Dairy, Fisheries, Sericulture, etc. do carry out extension through various State/Gol schemes. Agricultural Technology Management Agency (ATMA)-a semi-autonomous institution at district level has successfully attempted restructuring field extension services, iii) Commodity Boards (Tea Board, Coffee Board, Spices Board, Coconut Board, Fisheries Board, etc.) operate their extension efforts providing extension, production and market/export promotion support, etc. iv) Private sector extension service providers/ entrepreneurs/input agencies supplement extension efforts while promoting their own products and services, v) Farmer Groups/Organizations/ Cooperatives, etc. are increasingly being recognized as essential institutions for mobilizing farmer participation, vi) Non-Government Organizations (NGOs) operate at local, national, regional, and international level. They intend intense connect through participatory and mobilization approaches, vii) Mass Media (traditional, print and electronic) play important role in information dissemination, viii) Social-media platforms are gaining major space in the information processes, and ix) Extension innovations moving through agri-startups, entrepreneurs, partnerships, internet platforms, machine learning, sensors, artificial intelligence, etc.

MAJOR CONSTRAINTS

Several constraints are observed over different extension models considerably affecting the technology dissemination process. Broadly the crucial ones include: i) policy support and systemic inadequacies, ii) inadequate investments and extension infrastructure, iii) gaps in need based deployment of manpower at various levels, iv) weak extension set-up in allied sectors like horticulture, livestock, fisheries, agro-forestry and specialty agriculture, etc. v) outreach constraints of existing extension models, vi) inadequate capacities of the district/block level extension agencies to respond/address the field problems, vii) need for convergence of extension efforts, viii) need for promoting private paid extension initiatives, ix) need for farm youth and farm women specific strategies, x) scope for strengthening R&E linkages and feedback management, xi) enhancing ICT application, xii) need for value-chain management, greater market integration and business orientation, xiii) technology specific and location specific extension requirements, xiv) skilling farmers, field functionaries, and stakeholders, xv) intensive research required in extension systems, xvi) need for in-built M&E for

timely correctives in extension actions, and xvii) need for capturing international experiences for strategic advantages, etc. These constraints could be addressed through systematic policies, programs, investments and operational interventions at various levels.

EXTENSION INNOVATIONS AND REFORMS

To manage extension services at cutting edge level efficiently, there is need to promote innovations and reforms, viz., i) empower farmer aggregates like SHGs, FIGs, CIGs, FPOs, FPCs, Cooperatives and enhance their skills for better production, marketing, and price negotiating/ program delivery capacities; ii) enhance outreach of the extension models in operation; iii) integrating private sector efforts; strengthen linkages in research and extension; iv) streamline training of the field extension agencies and farmers; v) setting priorities and convergence of extension efforts; vi) use social media (WhatsApp, Facebook, Twitter, Instagram, emails, blogs, App-based services, etc.) that enhance the beneficiary coverage in the shortest time and effectively in networking farmers' and offering context-specific information; and vii) re-visit the extension research areas, inputs from various academic and semi- academic stakeholders to evolve a an efficient extension system. Future extension research needs to focus on systems interplay, convergence, agribusinesses and entrepreneurs, App-based ICTs, extension for unreached, climate change adaptation, etc.

THE NATIONAL DIALOGUE

The Extension delivery is a very complex system dealing with farm technologies on one hand and the socioeconomic dimensions on the other. In a given micro-situation in the absence of reformed extension services, the program delivery to the targeted clientele would be inadequate. Hence, strong extension innovations/ O&M reforms are needed both in public and private systems. Despite the various reforms in extension, there remain critical gaps and limitations, which have a large bearing on livelihoods and well beings of small and marginal farmers, food and nutritional security, agro-ecosystems and their sustainability. Needless to say, that the extension service delivery would be far more visible, efficient and location-specific if it is suitably backed by the public policies, investments, incentive linked good agricultural practices (GAPs), market reforms, scaling innovations and input augmentation.

In view of above, the Trust for Advancement in Agricultural Sciences (TAAS) New Delhi, a neutral & national 'Think Tank', the Indian Council of Agricultural Research (ICAR), Ministry of Agriculture & Farmers' Welfare (MoA & FW), New Delhi in collaboration with the Michigan State University (MSU), East Lansing, USA, and

the National Institute of Agricultural Extension Management (MANAGE), Hyderabad organized a ‘National Dialogue on Innovations in Agricultural Extension: A Way Forward’ on 8-9 April, 2022 with the following objectives: i) to assess current agricultural extension systems/ models and constraints therein, ii) to identify new innovations in agricultural extension for efficient knowledge dissemination and advisory services, and iii) to suggest ‘Way Forward’ for scaling of extension innovations and related O&M reforms.

A total of 220 participants (physical/online) representing National Agricultural Research System (NARS) including SAUs, ICAR institutes, ATARIs, KVKs; state functionaries, MANAGE, SAMETIs, EEs, ATMAs, input support providers, representatives of the Ministry of Agriculture and Farmers’ Welfare (MoA&FW), NITI Aayog, civil society organizations (NGOs, FOs, FPOs, FPCs), extension entrepreneurs, policy makers, and international agencies attended. The dialogue was conducted in hybrid mode with participants attending both in person and virtually

OPENING SESSION

At the outset, **Dr AK Singh**, Deputy Director General (Agricultural Extension), ICAR formally welcomed the participants of the National Dialogue and expressed his happiness to see large number of eminent extension experts, scientists and policy makers joining both physically and virtually. He emphasized the role and importance of agricultural extension in supporting the Indian economy during difficult times, like COVID-19 and also the importance of the Dialogue in framing futuristic extension strategies for the countries in South Asia region. He further highlighted the role of *Krishi Vigyan Kendras* (KVKs) in leading the extension delivery system at the grassroots level. He hoped that the KVKs will be further strengthened to act as the institutions for developing and nurturing the innovative extension mechanisms that will shape the future of Indian agriculture. Dr Singh briefed about achievements of new initiatives of the ICAR in empowering the rural women and youth in agriculture. He then urged the experts and the participants to have in-depth discussions and bring out meaningful and practical solutions to the problems through innovations in agricultural extension.

While setting the context, **Dr VV Sadamate**, Former Advisor (Agriculture), Planning Commission (now NITI Aayog) thanked the organizers for giving him the opportunity to get associated with this dialogue right from inception. Referring to the impressive performance of agriculture and allied sectors in the country, Dr Sadamate noted the significant contribution of the public and private extension services and emphasized on the need to look beyond the present extension operations, making them dynamic, innovative and far more focused in the current changing scenario. He briefly enumerated ongoing extension models and drew attention on the constraints faced by the extension services. He

then enlisted some innovations in specific areas like: empowering the farmers, enhancing outreach of the present models, integrating the private extension services through FPOs (e.g. Mr Yogesh Thorat, Pune, organized over 700 FPOs), strengthening research-extension linkages, priority setting and convergence at the cutting edge level, intensive use of ICTs and use of social media, revisiting the research in extension and promoting paid extension services, etc. Further, he opined that ICAR-ATARIs, MANAGE Centers of Excellence, Selected Extension Directorates/ Departments of SAUs, etc. can serve as laboratories for extension research. Finally, he underlined that the extension delivery is a very complex process linking farmers on one hand and the technologies and markets on other and urged for piloting and scaling the innovations through greater convergence and coordination.

Dr Karim Maredia, Director, International Program, Michigan State University (MSU), USA briefed about MSU and its collaboration with the universities and institutions in India and other countries, namely, Bangladesh, Nepal and Afghanistan. He stated that the MSU's aim is to improve lives through an educational process that applies knowledge to critical issues, needs and opportunities. He talked about his earlier efforts in designing and organizing curriculum for various capacity building programs for different stakeholders across several countries of American, Asian and African continents. He expressed the need to strengthen collaboration between MSU and the ICAR and State Agricultural Universities (SAUs) in India. He briefly described about the MSU's current collaborations with Indian universities and their undergoing activities and hoped for better partnerships for agricultural education, research, extension, policy framing, and capacity building, etc. He emphasized upon the need for mutual learning, experience sharing and multi-dimensional alliances among the different organizations. He further urged for strengthening institutional partnerships for better international linkages for cross learning. He also presented a book on 'Innovations in Agricultural Extensions' brought out by MSU and MANAGE and hoped that the dialogue will lead to developing work plans to put thoughts into action. Finally, he expressed hope that the dialogue will come out with outstanding innovations in extension that can really make a difference in the lives of people. He appreciated the presence of overseas experts from Sri Lanka, Bangladesh and Nepal and hoped that the dialogue would result in developing action plans for regional collaboration in extension in the South Asia region.

Dr Trilochan Mohapatra, Secretary, DARE and DG, ICAR, during his inaugural address thanked the TAAS for organizing the national dialogue on innovative extension which is very timely and stressed that effective transfer of technology (ToT) is very much necessary for faster progress through research with focus on "lab to land" as also "land to lab". He said that we depend heavily on agriculture

for livelihood and food and nutritional security. Agriculture has performed well over the years but now the new emerging challenges must be thoroughly dealt with. Income, ecological sustainability and environmental security are highly dependent on agriculture and we need to think about new approaches for extension to effectively address all these dimensions. The extension now has to be designed considering the current situation and future challenges. He also highlighted on the need for developing suitable extension model for increasing oilseeds production. He further emphasized on providing support to extension in terms of policy, operations, convergence, etc. The schemes like 'One District One Product' must be promoted through niche area extension approach. Engagement of private sector, convergence, partnerships, post production extension, demands of farm youths needs further exploration. He opined that main elements may be identified within the process of extension, viz., knowledge and skills, technical advice and information, farmers' organization, and motivation; and all the channels of extension, social media, and ICT are required to come together. We have institutions, needed skills, and manpower and now the time has come when we need to re-visit the whole extension system, and frame extension strategies as per the requirement of particular niche area. It is the right time when ICAR should introspect, re-examine, re-assess and accordingly improve/develop strategic extension model based on effective innovations/disruptive technologies. He also opined that the extension experts from India, MSU and other participating countries should work together to build efficient extension programs for India as well as other countries in South Asia. Finally, he emphasized on the need to identify potential 'success stories' like Yogesh Thorat's success on FPOs and replicate and integrate them wherever possible.

The Chairman of the Session, **Dr RS Paroda**, Chairman, TAAS, emphasized on the lessons from the COVID-19 pandemic and the need to rethink, replan, and redesign the R&D pathways and stressed on the need of a paradigm shift while revisiting the current extension systems. He also talked about engaging both software and hardware approaches for a disruptive extension to evolve. He opined that the time has come when the private extension has a huge role to play. There should be different extension methodologies for conservation agriculture (CA), fertigation and micro-irrigation. He further emphasized on the need to deploy all the resources be it policy, institutions or human resource for agricultural growth and opined that all 732 KVKs should have agri-clinics, input shops to cater to the needs of farmers, almost like mini ATIC. We have to motivate and attract Indian youth (including women) to remain in agriculture. KVKs can train youth and can prepare agripreneurs in large numbers. To accomplish several additional activities, KVKs are to be made more innovative. There is need for promoting custom-hiring centers, involving private sector 'paid' extension services, addressing extension needs of allied sectors, Institute Village Linkage Program (IVLP) type

approach, scientist working with the farmers directly, and providing opportunities for income enhancement, etc. He further stressed the need for promoting the use of 'protected cultivation', solarization, fertigation and multiplication of good saplings/tissue-cultured small plants (e.g. Jain irrigation). Also, we need to have effective extension strategies for livestock, fisheries and horticulture wherein we are lacking currently. While emphasizing the fact that agriculture in South Asian countries has similar issues and challenges, he hoped for a strong alliance for South-South cooperation in terms of research and extension. Dr Paroda expressed his desire to envision and foresee emerging national, regional and international scenarios in framing suitable and most appropriate approaches and effective strategies in agricultural extension. Lastly, he urged the participants as well as institutions to design innovative action plan to set the way forward for agricultural extension.

TECHNICAL SESSION I: THEMATIC PRESENTATIONS

Dr AK Singh, Deputy Director General (Agricultural Extension), ICAR in his presentation on 'Innovations in Frontline Extension' highlighted on: i) stakeholders role in agricultural extension systems both public and private, ii) role of frontline extension services, iii) promoting innovations, iv) focus areas in extension like farmer- driven approach, v) public private partnerships in extension, vi) convergence of extension efforts and its sustainability, etc. Dr Singh further elaborated on growth of KVKs in the country (currently 732) and the innovative approaches being followed by them. He specifically mentioned the programs like NICRA, FLDs on pulses, data management in extension, farmer FIRST, attracting and retaining youth in agriculture (ARYA), *Mera Gaon Mera Gaurav* (MGMG), extension in tribal areas, nutri-sensitive agriculture, nutri sensitive agricultural resources and innovations (NARI), value addition & technology incubation centres in agriculture (VATIKA), ICT application in extension, FPO promotion, agri-business incubators, impact of KVKs, etc. Dr Singh further stressed upon techno-centric extension, group approach (e.g. FPOs), multi-agency extension services, eco-system approach to remunerative and sustainable agriculture, *in situ* management of crop residues, intelligent agri-food value-chain management, nutri-food systems, climate resilient agriculture, energy-efficient agricultural technologies for empowering small and marginal farmers, mobile apps, innovative training of large number of farmers and convergence of extension programs at the operational level.

Dr P Chandra Shekara, Director General, MANAGE gave a comprehensive presentation on institutional innovations by MANAGE. He specifically referred to innovative programs like involvement of former extension professionals (SEVA-MANAGE Program in order to bring retired professionals at one platform to

work together), national network of agri-journalists (NNAJ-MANAGE Program), *Krishi Gyandeeep* Knowledge lectures by eminent extension scientists, video talks by eminent professionals, initiating MANAGE FPO academy, promoting national extension facilitators, leveraging CSR funds for agri-extension, promoting ex-servicemen as agri-entrepreneurs, promoting agri-start ups, recognition to best academic works in extension, agri-films festival, MANAGE internship program for PG and PhD candidates in agriculture, *Jai Jawan Jai Kisan* (due to lack of knowledge they hesitate going to villages; should be given basic knowledge, agricultural logistics in their area of interest) etc. Dr Chandra Shekara, concluded emphasizing on group extension, market-led extension, public-private partnerships, agripreneurship led strategies and intensive ICT applications in extension delivery.

Dr Quentin Tyler, Director Extension, Michigan State University (MSU), East Lansing, USA, in his presentation emphasized on the mission of the MSU Extension-improving lives through educational process through science, expertise, programs and optimal use of resources. He stressed upon increased digital reach of the University during and post- pandemic period. He further mentioned that MSU focuses on agricultural and agribusinesses, community food and environment, children and youth and health and nutrition. MSU-Extension leadership program was also highlighted which is implemented through district extension directors. As regards funding for extension services, he indicated three sources like federal investment, state investment and local county investment. Dr Quentin also highlighted the revenue generation system of MSU. Other notable programs mentioned by him were: remote learning and resource website, pandemic and moving forward, impact measurement, data analytics, virtual education through agri-business institute. Further, Director Extension of MSU listed out innovations in extension on-campus and off-campus like campus partners evolution as extension leaders, promoting community relationships, involving children and youth, health and nutritional programs, addressing farm stress, improving lives of people of Michigan and help solving problems across the world; and preventing farmers suicide, etc.

Dr Rajeshwar Rao, Director, Tropical Forest Research Institute, Jabalpur (Madhya Pradesh) highlighted that development of value-chain for any forestry/agro-forestry intervention is a primary requisite for adoption and horizontal spread of new technology. Involvement and agreement among researchers, wood based industry, nurserymen, harvesters and transporters is must before embarking on horizontal spread of forestry/agro-forestry technology. Survey for the market demand by wood-based industry (pulpwood, pencil wood, plywood, matchwood, poles etc) should be conducted and depending on their demands only forestry/agro-forestry interventions should be developed and suggested. R&D organizations

should provide base material for quality planting material to nursery men who mass multiply them and sell to farmers, farmers should have tie up with industry with buy-back guarantee, and then only the system would work effectively. There is need to have custom hiring centers for primary processing of NTFP raw materials; and use of ICTs enabled extension tools for dissemination customized forestry/agro-forestry interventions to the targeted stakeholders should be encouraged. He further added that both traditional and new breeding methods be deployed for germplasm conservation. Quality of planting material and tribal community education was also focused by him wherein he emphasized involving nurserymen for developing planting material. There is a dire need for aggressive and vibrant extension efforts on agro-forestry for carbon sequestration right from seed to consumer with value chain approach to ensure economic and ecological sustainability of farming, he added.

The Co-Chair **Dr Rita Sharma** while summing-up the session observed that all the presentations were comprehensive, innovative with lot of clarity on future extension needs. She suggested multi-agency extension scenario with due emphasis on public-private partnerships, adequate funding for extension services especially for public sector extension, promoting 'paid' extension services, etc. She laid emphasis on issues like need for innovative financial support to extension services, farmer-to-farmer extension, intensive use of ICT in extension, women and youth empowerment, extension services for allied sectors, promotion of resources conservation technologies like SRI, involvement of FPOs in policy dialogues, and ATMA can take up role for governance at district level; and for that there is need to re-visit agroforestry extension, etc. **Dr Tej Partap**, Co-Chair broadly agreed to the suggestions provided by Dr Rita Sharma and appreciated the lead presenters in raising crucial issues for strengthening the extension delivery system in the country.

Salient points emerged from the session are given below:

- There is need to adopt pluralistic approach involving multi-agencies such as civil society organizations, NGOs, small business entities besides big corporates. Various ways of financing such as paid extension, private extension, revenue model of extension, etc. need to be explored for financial sustainability of extension system.
- There is need to promote techno-centric extension and ecosystem approach for remunerative and sustainable agriculture. Intelligent agri-food value chains and nutri-food systems need to be in place for empowering farmers in enhancing their farm income through the establishment of nutri-smart villages at the cluster level. Evidence based health and nutrition programs may be integrated in the extension system. Also, commodity specific cluster approach may be promoted to provide end to end services.

- Outreach programs such as front-line and field extension system may be given due emphasis on addressing depression, stress-strain and psychological issues faced by farmers and to improve their mental health. ICT platform should be used effectively, especially during the pandemic and such crisis situations.
- The use of emerging technologies such as artificial intelligence (AI), 'Big data' analytics, machine learning, etc. needs to be promoted to provide appropriate and evidence based advisory services.
- A state-specific online platform for networking of agri-journalists needs to be created, their knowledge and skills related to agriculture be updated and this platform be utilized for quick dissemination of agricultural technologies through their magazines, newspapers, electronic and other media.
- As practiced by MANAGE at the national level, agri-film festivals need to be organized in every state to encourage capturing the local innovations and success stories and the best films may be used in extension activities for motivating farmers.
- Value-added 'agromet agro-advisories' need to be provided to the farmers below block level and climate resilient village model of the ICAR needs to be replicated and up-scaled suiting to different agro-ecosystems. Greater focus needs to be given on energy efficient agriculture to minimise the GHGs emissions to move towards carbon neutral economy.
- Youth should be involved in entrepreneurship and value chain development programs to create gainful rural employment and retain them in agriculture. Similarly, business managerial skills of rural youth may be enhanced to enable them to venture into small agri and allied start-ups.
- Farmer-scientist interaction has to be increased through village adoption program. Also, mechanism for convergence of schemes and programs for effective extension delivery for the benefit of farming community needs to be developed. The best extension worker and extension organization at state and district level needs to be recognized and awarded. To bridge the shortage of manpower in the extension system, the facilitator model of MANAGE may be replicated by other extension organizations.
- The services of retired agriculture professionals from State department, SAUs, ICAR institutes, KVKs, research organization, NGOs, agri-business sectors should be gainfully utilized in technology dissemination, capacity building and program implementation, etc. by creating appropriate network.
- The farmers and farmer producer organizations (FPOs) need to be involved in planning, implementation and monitoring of extension activities right from the beginning. MANAGE FPO academy should strengthen the emerging FPOs

through capacity building of office bearers and hand-holding in terms of business plan development, and facilitating forward and backward linkages, etc.

- Appropriate extension systems need to explore and leverage CSR funds for agriculture development and facilitate transformation of the retired agri-professionals,
- There is need for promoting ex-servicemen as agripreneurs through appropriate training programs and involving them in secondary agriculture.
- There is a dire need for aggressive and vibrant extension efforts on agro-forestry for carbon sequestration right from seed to consumer with value chain approach to ensure economic and ecological sustainability of farming.

TECHNICAL SESSION II: PRIVATE SECTOR EXTENSION INITIATIVES

In her opening remarks, **Dr (Mrs) Neelam Patel**, Senior Advisor, NITI Aayog, and Co-Chair expressed the need for developing a framework for private sector involvement in extension services in the form of operational PPPs. **Dr VV Sadamate**, Co-Chair of the session, emphasized on the importance of private extension innovations in agriculture and allied sectors. He focused on targeted extension like ITC which is aiming at 4,000 FPOs in selected crops. He added that private sector has expertise and finances to supplement the extension efforts and it could play an important role in developing and operating PPPs in extension services across the sectors. He reiterated on trust building measures and conflict resolution mechanisms while promoting PPPs. He further underlined that the partnerships would keep moving if dividends are shared as per agreed terms, and the roles and responsibilities are spelt out in the contractual obligations, etc.

Mr C Shashidhar, Head Agri. Services, ITC in his presentation mentioned that smallholder farmers (1.5 ha average holding) do not have bargaining power, have meager access to real time information (prices, weather), and cannot get customized knowledge advice (on farm practices, risk management). He further added that under *e-Choupal*, small farmers are aggregated and the link provided to them to various entities in the supply-chain, their transaction efficiency improved, real time information delivered to many farmers, and customized solutions provided and the farm yields improved. ITC's *e-Choupal* is an integrated platform orchestrating various stakeholders of value-chain for improving farm incomes and rural livelihood through market oriented crop production programs. In fact, it is a platform that provides an integrated solution framework across the agri-value chain. He further stressed upon farmer empowerment, and provision of digital platforms in production, marketing and value chain approach through ICT interventions in targeted crops.

Shri Harvir Singh from Rural Voice emphasized that all the three formats of media, text, audio and video must be used to disseminate the information on the new technology, crop production and market information for the farmers. As an example, 'Rural Voice' has made a humble beginning on 15 August, 2021 and already released 17 episodes of 'Rural Voice Agri. Tech. Show' of different technologies. Such shows and information on uses and benefits of agricultural technology should be promoted among farmers at different platforms and in regional languages for better understanding of farmers. Public institutions and private sector must come forward for partnership with media platforms for this purpose. There is a dire need for aggressive and vibrant extension efforts on agro-forestry for carbon sequestration right from seed to consumer with value chain approach to ensure economic and ecological sustainability of farming. Undertaking such knowledge sharing activities should be encouraged at the level of government and private sector also. He further expressed the need to share knowledge to farmers through YouTube and strongly pleaded for media back-up (print, electronic and digital form) interventions in right proportion as per demand of the farming situation and desired strong market and technology linkages.

Dr Basavaraj Girenavar, CAB Pvt. Ltd, Bengaluru made an online presentation on 'Extension in the Era of Digital Agriculture and Farming 4.0'. These technologies can provide the agricultural industry with tools and information to make more informed decisions and improve productivity. Satellite imagery in agriculture is turning out to be a valuable asset powering and optimizing the day-to-day agricultural activities. Market Price Prediction (MPP)- powered by ICT/IoT/'Big Data' envisioned to help the farmers for the forecast of the crop production and probable market price. Under Digital technology, one can work on the principle 'More from Less Agro-Chemicals', powered by AI/ML/Vision. Also, the farm needs to be treated as a natural factory wherein playing fields are different and hence there is need for new approach, cross learning from IT/ICT/Web 1/2/3 products and services, digital first and problem specific, engineering principles for extension and use of powerful methodologies such as design thinking and agile, standardize the solutions and use AI/ML to scale and also localize the extension solutions.

Dr Shaik N Meera, Senior Technical Expert - Digital Agriculture, IFAD, Cairo, Egypt spoke on the Role of ICT in Agricultural Extension and opined that efforts need to be made to incorporate ICT in all endeavours related to agricultural development. The organizations and departments concerned with agricultural development need to realize the potential of ICT for the speedy dissemination of information to farmers. Government at the national and state level in India has to reorient agricultural policies so that a full-fledged strategy is formed to harness ICT's potential for assisting overall agricultural development. He also

expressed about the future of digital extension- full stack thinking and actionable approach. He emphasized on the data generation at the block or KVK level to infuse digital solutions. Importance of IT platforms, sensors, machine learning, drone technology, etc. was reiterated by him and he urged for next generation extension to move on these lines.

Sardar Balwinder Singh, CEO, Jagriti FPO, Amritsar (Punjab) in his presentation on 'Extension through Custom Hiring Services' highlighted his interventions, namely, technology and innovation adopted by FPO to bridge technological gaps (direct seeding of rice - DSR under *tar-wattar* technology of Punjab Agricultural University (PAU) with NABARD support, IPM in *Basmati* rice, happy seeder (usage for stubble management). He stated that wheat- paddy is the main cropping pattern in the FPO command area and *in situ* recycling of the crop residues need to be practiced. Farmers hire skilled youth for operating CRM machinery among the members of FPO. They charge relatively less rent of machines as compared to private service providers, and services provided on first-cum-first serve basis irrespective of land holdings through Custom Hiring Centres (CHCs), that facilitated crop residue recycling and prevents stubble burning, reduce the cost of cultivation and increase in direct profits with increased crop intensity, and above all the employment opportunity to skilled labour to operate these machines. The FPO also helps in extending various facilities provided by allied departments by making farmers aware of different schemes and benefits during farmer to farmer interactions.

Summarizing all the presentations, Dr Neelam Patel, Co-Chair of the session highlighted that there is need to promote private sector extension interventions in a big way along with public sector. She urged for PPP Framework to emerge in extension management at the cutting edge levels and in various production systems. Salient points emerged are given below:

- *e-Choupal* which aims at integration of services using mobile platform has potential for developing integrated frameworks for strong agri-value chains. It links the physical infrastructure (demonstration fields, *e-Choupal* centers and input flow mechanisms) with new digital layers like mobile Apps and customized SMS in local language supported by the presence of field extension workers at critical times and be used on wide scale.
- ICT enabled simple mobile Apps that cater to the needs of specific group of farmers with customized, data-driven and sensor-supported "crop-on-fingertips" models need be developed using engineering principles for the discipline of extension education. Digital applications for price discovery and price prediction also needs urgent attention.
- Block Chain Technology, supply chains having traceability features can transform future transactions with real-time responsive farm solutions and need to be

paid attention. With the help of state-of-the-art algorithms and data centric perspectives, there is a need to revamp *Kisan SARATHI 2.0* and KVK Portal. KVK driven multi-language chatbox can be operationalized using personal voice of subject matter specialists. Digital applications for extension must be designed for scale with robust mechanisms for re-use and replication as per the needs of each sub-sector in agriculture.

- Promote integrated extension knowledge network in KVKs by promoting them as Knowledge Skill Innovation Centres. There is a need to developing framework for integrating private sector initiatives like *e-Choupal* into public extension system.
- To achieve the required extension results, we need an effective media strategy to reach the farmers. All the three formats of media, Text, Audio and Video must be used to disseminate the information on the crop, technology, crop production and market information for the farmers.
- The curriculum changes are required for making future ready/industry ready agri-graduates capable of harnessing digital tools. The digital extension should focus on three levels of actions: i) bringing multiple actors for knowledge sharing and coordination ii) digital solutions-products/ services directly to farmers, consumers, businesses, and iii) digital platforms- facilitate direct interactions between multiple users.
- For effective and fair extension services, the participation of private sector needs to be enhanced considerably.

TECHNICAL SESSION III: SECTORAL EXTENSION SERVICES

The session was Co-chaired by Dr P Das and Dr KD Kokate, Former DDGs (Agricultural Extension), ICAR. Dr Das emphasized that extension is a powerful tool for promoting sustainable land management. Integrating the concerns of sustainable agriculture, conservation, natural resource management, and land reform is challenging but necessary. The priority actions need to be identified through the systematic deliberations. National cross-sectoral services are required to be grouped into three categories, viz., maintaining and growing the community of practice, mobilising coordinated action, and building capacity through integrative training and monitoring.

Dr Praveen Malik, Animal Husbandry Commissioner, Government of India, in his presentation entitled 'Extension Services in Animal Husbandry Sector' mentioned that there are about 250 million people who are involved directly or indirectly with animal husbandry. The prime focus of the department is to provide technology support to the stakeholders to face the emerging challenges in livestock sector. Inclusiveness of extension services remain a major concern

considering the smallholders. There is need for addressing health and nutritional aspects and greater coordination among credit, extension and publicity functions at the central and state level, he added. He emphasized on skill development of para-veterinary workers, focus on breeding, feeding, animal health, clean milk production technology and popularization of the existing government schemes among the stakeholders through intensive extension efforts, public and private. Further, he informed that the National Livestock Mission (NLM) has provision of 100 per cent funding support to animal husbandry-based enterprises and sheep and goat rearing, poultry, piggery as also start ups are also included in the scheme.

Dr Bharat Kakade, BAIF, Uruli Kanchan (Pune) spoke on 'Role of NGOs in Agricultural Extension with Focus on Integrated Development' and informed that work has now been initiated on development of indigenous breeds and application of genomics. BAIF implements the goat development program in 6 states benefitting over one lakh families. In keeping with its mission of sustainable livelihood, facilitated by climate resilient and sustainable agro-horti models, BAIF conceptualized the '*wadi* model' as a holistic 'Tree-Based Farming System' that would ensure food security and gainful self employment in tribal areas of Gujarat. Dr Kakade indicated that the project we are able to harness approximately 23 tons of carbon/ha in a 10 year old *wadi*. The program has now been extended to over 22 States. This initiative helped in making over 71,000 ha of degraded land productive and ensuring food security and sustainable livelihood to over 2 lakh tribal families, he informed. He further added that BAIF has adopted the latest Information and Communications Technology (ICT) tools to strengthen its field-based initiatives. Work on multiple ICT platforms has been taken up to develop a greater connect with people on the ground. Further, in collaboration with Tata Consultancy Services (TCS), BAIF has launched the '*Godhan Seva App*' powered by mKRISHI® platform, which enables the end-to-end data management of livestock breeding services offered by BAIF. *Samvadini*, a rural-focused out-bound call centre operated by rural women has been established at Urulikanchan to offer telephonic value-added services to livestock owners, farmers and other members of the rural communities.

Shri Vijay Kumar Yaragal, Executive Director (Tech.), NFDB, Hyderabad while delivering his presentation on 'Extension Activities of NFDB' informed that the Fisheries Experimental Centre at Barrackpore established during 1940s paved the way for providing extension services to the fish farmers in India. The growth rate in the fisheries sector is very high with great export potential. Fish consumption per capita is 5-6 kg in the country which is very low. The target of the Ministry is to reach per capita fish consumption to 10-12 kg. The existing government schemes like *Pradhan Mantri Matsya Sampada Yojana* (PMMSY) has been launched

to bring about 'Blue Revolution' through sustainable, responsible and holistic development of fisheries sector including welfare of fishers. PMMSY is being implemented in all the States and Union Territories for a period of 5 years from financial year 2020-21 to 2024-25. The scheme is designed to address the critical gaps in the fisheries value chain from fish production, productivity and quality to technology, post-harvest infrastructure and marketing. He further added that the department is focused to provide extension services to the fish farmers on improved fish seed production technologies, improved fresh water fish farming, brackish water fish farming, sea safety, responsible fishing, fish processing and value addition, fish feed management, sea weed farming, etc. Regular trainings are being organized on health management in aquaculture. Similar trainings are also organized in fresh water farming, brackish water farming, and aquaculture in association with the stakeholders. Improved technologies for capture fisheries include fishing vessels, potential fishing zones, design of crafts and design of nets need to be provided to the stakeholders of fish farming. Fish festivals and workshops are organized for enhancing awareness among the stakeholders including the consumers.

Dr SV Reddy, Executive Chair, PARDIS, Hyderabad in his presentation on 'Futuristic Agricultural Extension Model' stressed on the importance of human, economic, environment and social capital for bringing in livelihood security. The major extension methods suggested by him are Farmer Field Schools and Farmer Business Schools for entrepreneurship development; Farmer Life Schools for livelihood improvement, ICT enabled extension, systematic training, capacity building and credibility check, FPOs, and convergence of public, private and people's partnerships. Dr Reddy added that the outputs are formation of groups (FPO), increased knowledge and skills on eco-friendly technologies, strong linkage with market and credit institutions. The outcome suggested by him are empowered farmers and facilitators, increased service provision, improved collective procurement and sale, better price for commodities, conservation of natural resources and adoption of integrated farming system (IFS) approach. The impacts envisaged are: improved livelihoods, better health and safety, reduction in child labour, better living standards. Dr Reddy suggested that the FPOs can bring in such tangible rewards through collective farming and collective marketing. There is a need to have one stop shop at the farmer level for delivery of extension services. *Rythu Bharosa Kendram* is a good example for single window system of extension delivery in India productive.

Shri Shekhar Bhadsavle, Saguna Farm, Karjat (Maharashtra) in his presentation on 'Extension for Regenerative Agriculture' explained Saguna Rice Technique (SRT), a conservation agriculture (CA) with 'Zero Till' method of farming, which does not cause atrocity of tillage, completely stops soil erosion, promotes natural

production of earthworms, increases organic carbon of soil, considerably increases productivity of the land and added effect of amazing happiness and confidence to the farmers. He called it as regenerative farming wherein no tillage ensures conservation of CO₂ and H₂O in the soil. Carbon sequestration is achieved in the process and it also ensures better water infiltration in the soil. The SRT has become popular through farmer-farmer knowledge sharing process. He opined that simplicity in extension information and providing better knowledge to the farmers rather than the subsidy are the critical factors for bringing in desirable change. The minimum knowledge input changed the lives of thousands of farmers, dissemination losses are minimized in farmer-to-farmer extension and this has motivated the youths to remain in agriculture. There are some issues in SRT like increase in weed intensity every year, highly laborious, requires de-silting of furrows after every crop in a year and no yield incremental advantage and such technologies require validation from NARS as these are very location specific.

Dr BK Singh, Chairman and MD, BKC, Noida made a presentation entitled 'Advanced Weather Advisory Services' and explained that direct, timely and actionable information can improve yield and income of the farmers. Skymet Company incubated by BKC Weather provides target oriented application like 'met GIS', wherein a forecaster work station is being used. "FASAL SALAH" is an informative 'Mobile App' which is designed to help the farmers by providing real time personalized crop advisory based on current and forecast weather. FASAL SALAH provides accurate weather forecasts (temperature, humidity, wind speed and direction, rainfall) for next 10 days at *taluk* and village level. It is unique and farmer friendly and takes care of real time weather information and forecasting, personalized crop advisory, local *mandi* prices.

The Co-Chair **Dr KD Kokate** concluded saying that the most of the approaches presented are based on the results of application in a relatively small scale. There is need for scaling-up and scaling-out of these approaches. The CGIAR institutions like the International Center for Agricultural Research in the Dry Areas (ICARDA) and West Africa Rice Development Association (WARDA) have created various evidence-based technology dissemination approaches across the region by reducing the time lag. In agriculture scenario, a particular technology hardly makes a significant impact. It is, therefore, essential to work out and standardize various extension approaches for taking composite technology to the farmers. Use of information and communication technologies (ICT) for decision support system is to be knowledge driven, communication driven, data driven, document driven, model driven and overall problem solving. Extension approaches need to be focused rather than open ended. Extension needs to be value chain based including market led. Livestock, fishery sectors need much more attention as these sectors have great potential to enhance the farmers' income. Extension should also focus

increasing resource use efficiency, cropping intensity, diversification in agriculture, and shifting focus from farm to non-farm-based approach. The ICT mode cuts down the extension costs by 80 per cent and provides weather advisories 24x7. It works like direct benefit transfer (DBT) in terms of knowledge. The “DBT” if supported by direct knowledge transfer (DKT) could more than double the farmers’ income.

Salient points emerged from this session are given below:

- There is need for addressing health and nutritional aspects under animal husbandry programs. Greater coordination is needed among credit, extension and publicity functions at the central and state level.
- ‘Godhan Seva App’ launched by BAIF, powered by mKRISHI® platform enables the end-to-end data management of livestock breeding services offered by BAIF. *Samvadini*, a rural-focused out-bound call centre operated by rural women provided value-added services to livestock owners, farmers and other members of the rural communities. These services need to be used on wide scale.
- *Pradhan Mantri Matsya Sampada Yojana* (PMMSY) launched to bring about ‘Blue Revolution’ through sustainable, responsible and holistic development of fisheries sector including welfare of fishers needs to be implemented effectively. The FPOs can bring in tangible rewards through collective farming and collective marketing. There is a need to have one stop shop at the farmer level for delivery of extension services. *Rythu Bharosa Kendram*, Andhra Pradesh is a good example for single window system of extension delivery.
- ‘Regenerative agriculture’ focused on conservation agriculture (CA) with ‘Zero Till’ method of farming increased organic carbon of soil, productivity of the land and developed confidence among the farmers and hence its use needs to be expanded on a large scale.
- *FASAL SALAH* provided accurate weather forecasts (temperature, humidity, wind speed and direction, rainfall) for next 10 days at *taluk* and village level. It is unique and farmer friendly app that takes care of real time weather information and forecasting, personalized crop advisory and local *mandi* prices and need to be scaled.

TECHNICAL SESSION IV: REGIONAL PARTNERSHIP FOR ADVISORY SERVICES - COUNTRY PERSPECTIVE

The session was co-chaired by Dr Karim Maredia and Dr P Chandra Shekara. Dr Meredia expressed partnership with members of the Michigan Association of Regions. He stated that human resources are a critical element of the extension system, but most countries do not achieve sufficient coverage, and many extension

agents are unmotivated due to lack of career paths, low salaries and status, and little or no incentives such as transportation and rewards. He expressed happiness that three countries Nepal, Sri Lanka and Bangladesh will make presentations and will highlight the issues and way forward and we may learn with their experiences to improve the extension programs. Dr Chandra Shekara also expressed that presentations from these countries will also explore practical considerations for contracting, accounting and project management processes, and also throw light on the ways to maximize effective regional collaboration, and ways to leverage other state and federal funding priorities to achieve regional development goals.

Dr Arjun Kumar Shrestha, Director of Research and Extension, Agriculture and Forestry University, Nepal presented status paper from Nepal and highlighted some of the notable agricultural extension initiatives taken: i) the Provincial Ministry of Land Management, Agriculture and Cooperatives (MoLMAC) Bagmati Province established the Agri-Product Marketing Bureau (AMB) to facilitate linkages between farmers and traders; ii) agriculture ambulance- aiding farmers during the crisis of COVID-19; iii) online training platform for Extension Officers and returnee youth due to COVID-19 pandemic; iv) initiation of Agriculture and Livestock Business Plan Automation System; v) online seed demand and supply management Balance sheet; v) sourcing local food- shortages of food items in markets have increased the popularity and importance of consuming locally sourced food. People have started searching for local seeds and varieties to cultivate them, instead of searching for improved or hybrids seeds. This is a good move towards improving the self-sufficiency of individual households and food security; vi) roof-top gardening and farming by women- health professionals increasingly recognize the value of farms and garden-scale urban agriculture. Women in Nepal are getting more engaged in roof-top farming, and terrace-farming for the cultivation of vegetables and other agricultural commodities in urban and peri-urban areas; and vii) promotion of value-added products through post-harvest technologies.

Prof G Mikunthan, Senior Professor, Agriculture Biology, Faculty of Agriculture, University of Jaffna, Sri Lanka covered the extension scenario in Sri Lanka starting from Tea Estates in 1880 to COVID-19 times where the agricultural extension system was brought under the provincial governments and 9 provinces in Sri Lanka executed the system with the minimum manpower. It was highlighted that extension in Sri Lanka suffers from lack of updated national agricultural extension policy, limited recognition of agricultural extension service at all levels, poor linkages among research, extension, and other agri-support services, shortage of competent extension professionals, inadequate research in extension, limited application of technology in extension and no strategy developed to regain from the economical setback due to COVID-19. Sri Lankan economic crisis was discussed

at length where the investments ending ethnic war and its impact experienced on agriculture, livestock and tourism were highlighted.

Md Hamidur Rehman, Former DG, Agricultural Extension and President, Bangladesh Agricultural Extension Network, Ministry of Agriculture, Dhaka, Bangladesh while presenting the status paper of Bangladesh highlighted major extension innovations which included: i) location specific effective agricultural services at farmers' finger tips ii) digital farmer database and agriculture profile for quick grip on dynamic and diversified agriculture of Bangladesh under Agriculture Portal (*Krishi Batayon*): iii) direct communication with the localized extension workers under *Krishak Bandhu Phone Sewa*; iv) under farmers' window- problem identification by matching image library; v) disseminating agricultural modern technologies by YouTube video channel under the scheme *Krishi Bioscope*: vi) all agricultural information site links in a single platform (Farmers' Digital Address) and e-pesticide prescriber-instant pesticide related all information digitally; vii) on field and mobile agriculture extension services (*Digital Crop Clinic*): viii) urban agriculture- one stop rooftop and urban agriculture information and services; ix) Farmers' Information and Advisory Centre (FIAC)- Agriculture Information and Communication Centre (AICC).

The session highlighted extension innovations and reforms in neighbouring South Asian countries, namely, Nepal, Sri Lanka and Bangladesh. Salient points emerged from this session include:

- As adopted in Nepal, there is need for establishment of Agri-product Marketing Bureau (AMB) to facilitate linkages between farmers and traders; agriculture ambulance aiding farmers during the crisis like COVID-19; and initiation of agriculture and livestock business plans etc. in other countries in South Asia.
- There is need to revisit and reorient the National Agricultural Extension Policy, incorporation of appropriate ICTs to advance the extension delivery, encouraging entrepreneurs etc. different countries as done in Sri Lanka.
- The use of innovative approaches such as Agriculture Portal (*Krishi Batayon*), digital farmer database and agriculture profile, farmer-friendly call service-3331, *Krishi Bioscope*- use of YouTube video channel, etc. followed in Bangladesh may be adopted in other South Asian countries

PANEL DISCUSSION

Dr RS Paroda, Chairman, TAAS chaired the Session on Panel Discussion. The highlights of interventions made by the panelists are as follows:.

Shri Ajay Jhakar, Chairman, *Bharat Krishak Samaj* stressed concerns/ issues relevant for improving the performance of the extension services: i) private sector

should supplement and complement the extension operations, particularly in commercial production systems; ii) public sector would need to continue to support the smallholder farmers especially in building their capacities, in providing the technological options, technological back-up and aggregated approach to market linkages; iii) there is an urgent need to systematically build the capacities of the farmers, field functionaries, the private sector, entrepreneurs, etc. so as to deliver the extension services effectively; iv) promotion of App-based technical knowledge of the farmers; v) there is need to have a strong Gol policy intervention on strengthening extension services with adequate funding and proposing defined space to the state agencies; vi) the funding support under the Centrally Sponsored Extension Reforms schemes should be revised to 90:10 between Gol to State from the existing 60:40 per cent; vii) animal husbandry extension in the States has been found to be very weak, and needs to be strengthened; and viii) the KVKs needs to be strengthened in terms of manpower, funding support and extending the system's outreach.

Dr JP Sharma, Vice Chancellor, SKUAST, Jammu, in his intervention, focused on: i) processing and value addition, as widely followed-up in honey production in the State of Jammu and Kashmir and informed that the value-addition to organic honey resulted in income enhancement from Rs. 250 per kg to Rs.600 per kg with proper technology, branding, labeling and intensive product marketing efforts; ii) promotion of integrated farming systems approach with focus on low volume and high-value crops for better income realization resulted in wide scale adoption and has moved the State to third position in the overall ranking on income realization basis, next only to Punjab and Haryana, iii) focus on promotion and production of the specialty items, keeping in view the strength of each district, for example the district of Jammu is being promoted as a dairy district, iv) moving gradually towards more of private sector extension intervention by promoting agri-incubators, agri-startups, agri-entrepreneurs, PPPs, etc. v) intensive use of ICTs in technology delivery focused on gathering feedback from the producers and providing timely solutions, vi) management of post-harvest operations is important to minimize the losses incurred from farm to the marketing operations, and vi) enhanced focus on scientific production of saffron, for which certification and testing lab support is augmented in the State through SAUs.

Dr Suresh Babu, Head of Capacity Strengthening, International Food Policy Research Institute (IFPRI), Washington DC, highlighted that agricultural development is critical to the livelihoods of small-scale farmers and other rural populations in developing countries. Low productivity levels, persistent food insecurity and malnutrition, environmental degradation, and climate change directly impact adversely the agriculture sector and rural development. Agricultural extension

and advisory services can help address these challenges in many ways such as providing to farmers the advice and information, facilitating innovations and relationships, solutions to address risks and disasters situations. Some key points to develop efficient extension systems proposed are as follows: i) extension policies and strategies need to explicitly recognize the role of markets in agriculture and in rural areas. The development of cost and labor-saving mechanization of agriculture and better market management skills are necessary to make agriculture a more profitable venture, ii) with increasing technological need and demand, partnerships with diverse range of extension agencies is necessary to deliver the technical services to the farmers in more effective and efficient manner. Convergence among the related agencies is the need of the hour to deliver extension services in the form and amount demanded by the end users, iii) need-based trainings and exposure visits to farmers' fields and farmer-led extension service delivery can increase the effectiveness of technology dissemination and adoption by both small and large farm holders, iv) strengthen youth capacity at the university level for greater returns in research productivity and, therefore, could lead to increase in the quality of extension, v) strengthen linkages to value-chains to develop market-led extension systems, vi) as agriculture becomes more commercialized and demand for need-based and timely solutions become critical, the space for private sector involvement will increase and vii) need to reorient public extension to save resources and improve efficiency and effectiveness. This can be done through innovative and efficient technology and delivery system. Extension services should be decentralized at the state and district levels.

Mr Yogesh Thorat, Managing Director, MAHA FPC, Pune emphasized on promotion of village/cluster based farmer organization which is the prime focus adopted by MAHA FPC, associated with identification of the farmers' technological problems and finding need based solutions. He informed that in all, 780 FPOs have been organized around 4.5 lakh farmers, covering important commodities like pulses, oilseeds and onions. Formulation, dissemination and adoption of integrated modules (production to marketing) were the key interventions. The FPOs are providing the best of the production technologies, capacity building of the farmers, synergetic partnerships with the farmers, linking farmers with the markets through digital platforms; convergence of extension efforts at the cluster level; and the member farmers are provided need-based financial, technical and extension back-up

Dr RN Padaria, Head, Agricultural Extension Division, ICAR-IARI New Delhi stated that agriculture has become more knowledge-intensive, technology-driven and market-oriented. A few changes in approaches and mechanisms could further strengthen the extension system in India. The salient points emerged from his intervention are: i) coordination and convergence among various agencies, schemes,

programs and technologies are important to optimize their contribution for which there is need to delineate the roles and responsibilities of the converging partners and providing them operational flexibilities; ii) information technology based extension needs to be given greater attention, and hence there is need to promote expert systems, self-learning modules, mobile applications, digital repositories of extension literature, videos of technologies, virtual training system, digital platforms for farmers-scientists and other stakeholders' interactions, networking of innovative farmers, access to marketing and custom hiring services; app based extension approaches, etc, iii) the existing training curricula for extension professionals need be restructured to integrate knowledge base beyond crop production to value addition, iv) it is suggested to increase the educational qualification and remuneration of first line extension workers and should be provided with electronic gadgets (tab/laptop/smart phones) to respond to the queries of farmers with real time information, iv) the extension professionals need to be empowered to interact with the office bearers and other stakeholders for which there is need to make them knowledgeable, tech-smart and having confidence in technological/entrepreneurial options, v) systematic on- farm research with engagement of farmers and extension professionals is necessary with adequate monitoring and assessment options. There should be strong emphasis as well as recognition of on-farm research along with mainstream research.

Participant's View

Dr RS Dalal, Professor, International Institute of Veterinary Education and Research, Rohtak (Haryana) stated that there is need to establish a single window system for farm entrepreneurs on the pattern of industry. This window should receive all applications at one place and get them processed by different departments in a time bound manner for electric connection, water connection clearances from different departments such as pollution control board, town planning, etc. This could be tried on a pilot basis in a few districts. He further mentioned that NABARD may be requested to develop a scheme for finance by banks of integrated farming models developed by research institutions. Subsidy for different components of the system may be merged. Farmer may approach the bank for the whole farming system or part of it and need not go to each and every department. Here again we may take a clue from business and industry where a limit is fixed by the bank. Flexibility may be allowed in the schemes for their effective implementation.

The salient actionable points emerged out of panel discussion and general discussions are as follows:

- In order to increase the income of farmers, there is a need to give focus on innovative extension services beyond production. Post-harvest and value-addition

opportunities should be brought into extension advisories, so that the farmers and their organizations become aware and avail the benefits of various provisions. Their capacity for secondary agriculture and specialty agriculture also needs to be enhanced.

- There is need for greater attention to specialty agriculture including the low-volume and high-value crops which give higher net returns to the farmers with efficient use of resources. Therefore, a separate agricultural development program needs to be started by shifting agricultural resources to high-value options.
- Farmer's interests should be promoted and protected under PPPs led by the corporates.
- In view of higher growth potential of allied agriculture and subsidiary agri-enterprises, the Central and State government should give adequate attention and increase funding support for providing extension services in these areas. The funding provision for NMAET also needs to be augmented.
- Farmers' capacity building should be strengthened by the KVKs, State Agricultural Universities (SAUs), the state departments and other stakeholders for forming the FPCs. The capacity building and hand holding support programs for Directors of existing FPCs/FPOs should be organized on large scale. The Directorates of Extension of the SAUs should be adequately funded for this task.
- The Government officials should also be sensitized in all respects for effective monitoring and evaluation of extension services provided to FPCs/FPOs to build greater trust among various stakeholders. There is a need for developing a digital platform for monitoring and evaluation of existing FPCs/FPOs. Effective management and monitoring of extension programs should be initiated and operated by MANAGE and NAARM.
- There is a need for starting internship program for agricultural students for placing them in the existing FPCs/FPOs, agri-entrepreneurs and agri-start ups, partnerships, convergence models, ICT platforms, market integration, etc.
- In view of changing extension scenario, it is time to relook and update the course curriculum both at graduate and post-graduate levels.
- There is a need for removing disparity in resource allocation for agricultural extension education and services so that eco-system for innovation in extension could be strengthened and synergy between science of discovery and science of delivery could be fostered. This would enable effective coordination and convergence between KVKs and ATMAAs at operational level.

CONCLUDING SESSION

The Session was Co-Chaired by Dr Raj Paroda, Chairman, TAAS and Secretary, DARE & Director General, ICAR.

Dr AK Singh suggested that partnership is a priority in the present context. There should be clear roles and responsibilities for convergence and enforcement. In the changing scenario, ICT driven extension is needed for which extension workers and farmers need to be oriented. Extension system needs a set of skills in advocating and sustaining a holistic approach. Sustainable system should be advised to the farmers for which thorough orientation of the field functionaries, front-line extension workers and private extension agencies is urgently needed. He further added that farmer to farmer extension should be systematically promoted as it focuses on “Seeing is Believing” principle of extension education. Progressive farmers practicing successful enterprises could be used for this purpose.

Dr P Chandra Shekara highlighted the need to move towards group-led extension than individual; production-led extension to market-led extension; public-led extension to public/private-led extension. ICT-led extension may promote app-based interventions. MANAGE has started the DAESI 2.0 program for orienting the input dealers (71,000) who can work as extension workers. It is the right time to train agricultural and allied sector graduates as agripreneurs for creating employment opportunities. The extension workers should be oriented to mobilize farmers. Monetization of gains by extension services is important to influence the policy makers about role of extension in diffusion of the information and technology.

Dr Karim Maredia stated that post COVID-19, we need to position ourselves appropriately on training of trainers (ToT) platforms. We need to put emphasis on co-creation with global partners for the larger benefit of the global community. There is a need for exchange of students, scholars and extension specialists at international level because markets and food systems are globally linked. Experiences of India are relevant and applicable to other countries in Asia and Africa and hence there is need to foster networking and information exchange. Scholarly publications should be brought out and shared globally. He informed that Dr Verghese Kurien Lecture Series’ has been initiated at MSU and India could play an important role by identifying suitable speakers in coming years. Special Centres of Excellence need to be established through MSU and MANAGE partnership to further advance agricultural extension capacity building programs in developing countries.

Prof RB Singh in his concluding remarks stressed on the need for higher allocation of resources for extension sector which is generally fund starved in the States. He emphasized on the issues like: strategies for involving youth in

high-tech agriculture, strong need for PPPs, higher investments in allied sectors, promoting vocal for local approach, convergence of extension efforts down the line at block or cluster level, etc. Dr Singh with his long international experience emphasized on urgent need for establishment of regional South Asia Forum for Agricultural Extension (SAFAI) for exchange of experiences and sharing extension innovations. Possibility of funding support from International agencies like CGIAR, University System like MSU, FAO, World Bank, SAARC Secretariat, etc. also needs to be explored.

While finally concluding, **Dr RS Paroda** raised a number of issues pertaining to extension services. He mentioned that we need to change from within and adopt farmer-centric approach. Farmers' happiness and income realization are the key indicators of the agricultural extension services, when farmers are happy, everyone is happy, he emphasized. The concept of 'Farmer Professor' is novel and needs to be applied for the benefit of other farmers. ICT can provide fast and efficient communication at a low cost and needs to be promoted. Further, Dr Paroda added that extension system has evolved over a period of time and a number of programs like CDP, ND, IVLP/MGMG, ATMA were started and we need to build on our past experiences. It is the time to reorient the roles of KVKs keeping in view the requirements of the farmers. Right knowledge at right time should be provided. Weather based standardized advisories should be provided to the farmers. It is time to have ATIC/Agri-Clinics/ Tech shop at each KVK so that the reliable inputs like seeds, planting materials, etc are provided to the farmers on time. Each KVK should have at least one Model FPO to provide a platform to farmers. Proper convergence of ATMA and KVK is desirable. There is need to involve all the stakeholders including NGOs, public and private organizations and farmers to work in 'Mission-mode'. Also, there is need to bring the best practices of NGOs in public institutions involving youth in the whole process. We need to think about vocational degrees/diplomas, strengthening South-South cooperation for exchange of knowledge and experiences and developing a road map for integrating innovative extension services.

The Concluding Session ended with vote of thanks by **Dr Randhir Singh**, ADG (Agricultural Extension), ICAR to the Chair, dignitaries and the participants.

In the end, **Dr Bhag Mal**, Secretary, TAAS profusely thanked Dr RS Paroda, Chairman TAAS for his overall guidance in organizing the National Dialogue. He also expressed sincere thanks to Dr T Mohapatra, Secretary, DARE & DG ICAR for his inaugural address and to Dr AK Singh, Dr Karim Maredia, and Dr Chandra Shekara for their full support for this event. Sincere thanks were also extended to the Technical Session Co-Chairs, namely, Dr Rita Sharma, Dr Tej Partap, Dr Neelam Patel, Dr P Das, Dr KD Kokate and all the speakers, panelists, and conveners, and also the overseas participants especially Dr Quentin Tyler, Dr Arjun Kumar Shreshtha, Dr

Md H Rehman, Dr G Mikunthan for their valuable inputs He also profusely thanked Dr VV Sadamate for his association in the present exercise from the inception of the idea and to Dr Umesh Srivastava, Ms Simmi Dogra and TAAS Secretariat staff for their support and cooperation in organizing this event successfully

RECOMMENDATIONS

I. Strengthening Agricultural Extension Systems

1. There is an urgent need to have a paradigm shift in extension systems now to approach the farming communities or groups instead of individual farmers. Hence, addressing farmer aggregates like SHGs, FOs, FPOs, FPCs, Cooperatives, etc. by both public and private extension agencies using innovative extension methods are likely to be more rewarding. Special efforts for skill enhancement of these aggregates in the area of business planning, production techniques, market integration, legal and financial compliances both by central and state extension agencies would be more effective.
2. Farmers Field Schools (FFSs) have proved to be quite an effective extension system for farmer-to-farmer knowledge dissemination and for faster adoption of new innovations. Hence, FFS and Farmer Business Schools (FBSs), as promoted by FAO need to be strengthened as an effective technology transfer mechanism.
3. *Krishi Vigyan Kendras* (KVKs) being a strong institutional mechanism at the district level need to be strengthened to function as Knowledge - Skill - Innovation Centers (KSICs), mini ATICs and Agri-Clinics to provide good knowledge as well as quality inputs. KVKs also need to support both public and private extension services, initiate more vocational training programs, generate public awareness programs and extend need based expert services. The additional manpower, as recommended by High Power Committee under the chairmanship of Dr RS Paroda on KVKs, needs to be created on priority by the government. Also, other important recommendations for efficient functioning and additional role of KVK be quickly implemented for letting the benefits of research reach the end users. Further, Institute Village Linkage Program (IVLP), now being taken up as *Mera Gaon Mera Gaurav* (MGMG) by each KVK/Research Institute, be strengthened and provided additional funds on priority.
4. Efficiency of field extension services needs to be enhanced by innovative measures like flexible funding options, pooling of extension resources and their need based allocation, greater focus on FPO and FPC formation, convergence of extension efforts through block/cluster extension plans, creation of extension M&E cell in each SAMETI and to have a periodic feedback mechanism in place.

5. There is an urgent need to ensure greater convergence and coordination between ATMA and KVK at the district level with delineated responsibilities, supported fully through requisite manpower and funding. This aspect must receive the highest priority being the most critical for delivery of the current public extension system.
6. The field functionaries of agricultural and allied departments should focus on motivating farm youths, organizing district level farmers' clubs, developing agri-portals, apps and videos and ensuring an effective involvement of progressive farmers as farmer professors.

II. Enhancing Farmer Awareness

7. The DDM (NABARD), ATMAs and KVKs need to organize orientation camps jointly at the district/block level involving FPOs, NGOs, *Gram Panchayats* and retired extension professionals, for enhancing awareness of farmers (including women and youth) to take advantage of existing central and state sponsored schemes. Farmer FIRST approach needs to be promoted with focus on critical needs of farmers and options for their redressal. The schemes like One-District-One-Product and Agricultural Infrastructure Fund need to be promoted using niche area extension approach.
8. Advanced technologies like drones, robotics, remote sensing applications, sensors, machine learning, data analytics, block chain, internet of things (IoT) as well as artificial intelligence (AI) need to be extensively used for precision farming, improved farm management, and providing real-time data. To ensure this, extension agents and progressive farmers must be oriented and trained by the state agriculture universities, ICAR institutes, MANAGE, EEIs, and SAMETIs, etc.
9. Social media (WhatsApp, Facebook, Twitter, Instagram, Emails, Blogs, App-based services, etc.) needs to be used effectively by networking farmers and offering them context-specific information eco-regionwise. Farm-portals like "*Kisan SARATHI*" providing information on production/ protection technologies, e-advisories, inputs/prices, e-marketing, e-platforms and mobile applications need to be promoted. There is urgent need for organizing farmer/farm women knowledge groups (FKGs/FWKGs) eco-regionwise around the commodities/farming systems through FPOs. It will be advantageous if the use of internet in rural India enabling direct link to the farmers and *e-Choupal* like initiatives is enhanced for supply chain efficiency.
10. The linkage between common service centres (CSCs), operating under the Ministry of Information Technology and KVKs must be built to reach the last mile. Further, *Kisan* Call Centres (KCCs) providing country wide common

eleven-digit toll free number 1800-180-1551 could be used effectively. The rural tele-centres could also be used for better information management.

11. The dedicated channel on agriculture - DD *Kisan*, radio broadcasts and community radio stations (CRS) need to be strengthened for effective farmer related knowledge dissemination. For this, there is need to revisit these programs and have an external review to make them more efficient, relevant and effective. This needs to be done on priority by constituting a high level committee by the Ministry of Agriculture and Farmers Welfare.
12. Also, the use of field-days, farmers fairs, campaigns, vernacular press, etc. needs to be promoted as supportive extension methods. Specific role of media in extending advisory services to farmers should be recognised and promoted as per agro-climatic and socioeconomic needs. National Network of Agri-Journalists (NNAJ), initiated by MANAGE, and YouTube channel program initiated by IARI and other institutions need to be replicated at the State/district level involving SAUs and KVKs-ATMA jointly.

III. Extension Outreach and Efficiency

13. The outreach, interplay and performance of extension models need to be improved by widening the sectoral and area coverage, promoting partnerships and resource sharing, enhancing integrated delivery, improving penetration to the small producers, and promoting chains of extension agents across the production systems and also to build human resource capacities for efficient program delivery. Extension in allied sectors like horticulture, animal husbandry, dairy, poultry, fisheries, agro-forestry, nutri-cereals, etc. needs strengthening and must be re-organized by: i) providing additional SMS to KVKs/ATMAs, ii) promoting growers' associations, commodity groups, entrepreneurs, iii) promoting dairy/fish cooperatives, iv) using farmer entrepreneurs as extension agents, v) providing value-added 'agromet advisories' to farmers, and vi) promoting climate-smart agriculture.
14. Market-led extension strategies need to be developed/enhanced involving farmer aggregates. Investments are urgently needed in market infrastructure (electricity, warehousing, rural roads, ICT, etc.) by the Government, private sector and local communities. Extension for disadvantaged areas/groups needs be addressed through innovative extension solutions like combination of: i) extension service providers (ESPs), ii) involving NGOs/Para-techs, iii) intensive use of ICTs, and iv) participation of local communities and institutions. Further, the extension services must be oriented towards NRM efficient conservation agriculture to reduce GHGs emission and to benefit farmers through carbon trading, options of which are now emerging.

15. There is need to sensitize/reorient the extension services on gender and nutrition issues, promoting nutri-gardens and alternate nutri-foods, women empowerment through access to credit/inputs and gender sensitive home scale nutritional extension services, enhanced use of digital networks, public awareness and stakeholder participation through pilot studies in vulnerable areas. Nutri-smart villages need to be established at least one at the cluster level. Evidence based food and nutrition programs are also to be integrated as an innovative extension system.
16. Greater emphasis is needed to motivate and attract youth in agriculture (MAYA) for which, their attention is to be drawn towards high-tech farming, secondary and speciality agriculture, agri-insurance, processing and value-addition, agri-entrepreneurships, efficient marketing, commercial enterprises, such as floriculture, vertical farming, protected cultivation, etc. Youth (including women) in agriculture needs to be provided institutional support by SAUs, KVKs, agri-clinics, financial institutions, etc. for making them progressive farmers, extension agents, input providers or entrepreneurs, Also, their business management skills will have to be enhanced. In the process, they need not be job seekers but become job creators. Youth engagement strategies would require dignified and rewarding livelihoods; increased equity and rights to resources; enhancing knowledge, education and skills; and scaling sustainable innovations to help farmers in reducing cost on inputs and enhance their income by linking to markets for better livelihood. MSU's Global Youth Advancement Initiative (GYAI) model could also be experimented to motivate youth.
17. There is an urgent need to promote dealers/distributors of agricultural inputs as extension agents (trained/certified input providers) and their outreach efforts could be managed by trained agricultural graduates. Private sector needs to come forward to support establishment of Agri-clinics and Agri-business Centres (ACABCs) and the training of agri-extension functionaries, agri-entrepreneurs, agri-start-ups, e-platforms, etc. Such activities are gaining space in extension operations and hence be given due attention. Agribusiness MBAs, IT graduates and farm youths (including women) be encouraged for providing advisory services on 'payment basis (paid extension). This will ensure best advisory services to the farmers without any dissemination loss. In this context, the Corporate Sector could play an important role by investing part of their Corporate Social Responsibility (CSR) funds to create a private and more efficient extension systems/models to complement the on-going Government extension activities.
18. It will also be worthwhile to outsource some extension services to the FPOs like 'Maharashtra State Grape Grower Association', etc. In fact, there is need

to promote private paid extension (PPE) services in commercial/ horticultural crops, secondary and speciality agriculture requiring specialised technical backstopping. Further, efficient input quality testing, soil and water testing, organic produce testing, value chain etc. could be the options for involving youth in agriculture, requiring skill oriented extension innovations. Learning from successful private sector models innovated by BAIF, ITC, Jain Irrigation, IFFCO, etc. could be a good beginning to accelerate this process.

IV. Research and Extension Linkages

19. The research and extension (R&E) linkages in agriculture and allied sectors need strengthening at the national, regional, state, district and even block level. Technological options specific for different agro-climatic conditions be worked out through joint-coordination committees involving all stakeholders. These be then scaled out and monitored periodically. Impact of these technologies be assessed for further spread. For effective technology transfer, direct involvement of scientists is essential to eliminate dissemination loss especially in areas such as NRM, IPM, INM, conservation agriculture (CA), organic agriculture, farm mechanization, climate-smart agriculture, crop diversification, etc. Multi-disciplinary, inter-institutional efforts towards translational research could also accelerate adoption of new technologies backed by enabling policies and commensurate funding.
20. Strong research-extension partnership and coordination mechanisms for scaling new technologies are the key for faster agricultural growth. As such, holding of *Kharif* and *Rabi* Conferences each year at the Central and State levels are essential and be further strengthened. The future extension-research coordination strategies may also involve and learn from international and private sector organisations.
21. MANAGE, SAMETIs, ATARIs and the Directorates of Extension of the SAUs should have a strong extension research window. MANAGE needs to consider promoting “Field Extension Labs/ Centres of Excellence” in the critical areas in the selected SAUs/private extension systems. Extension research outcomes be ploughed back for reforming existing operations and policies for which suitable State-specific mechanisms also need to be developed.

V. Capacity Building

22. The trained human resource needs to be created for efficient extension at various levels, viz., farmers, NGOs, Government field functionaries, private sector, rural youth (including women), etc. For this, Extension Directorates and Extension Education Departments of SAUs, MANAGE, SAMETIs, ATARIs, KVKs, FTCs, NGOs, etc. could play greater role. Interplay and coordination

of these institutions need to be worked out systematically for accelerating the outcome. Intensive skill enhancement training programs for ATMA field functionaries and farmer friends by specialists in KVKs will be more rewarding. Also, SAUs must now diversify their educational activities beyond regular degree programs to embrace also the vocational training programs around diploma/certificate courses to impart specialised skills to become extension agents, input providers, marketing specialists and entrepreneurs.

23. The SAUs need to play leadership role in coordinating the extension training activities in a State in collaboration with the SAMETIs/ATARIs. Their roles need to be reviewed in the changing agricultural extension scenario (Incubation-Startups- Entrepreneurships - Partnerships - Internet Platforms - eNAM etc.). The Extension Division of ICAR and MANAGE could provide necessary guidance in this regard. The Directorates of Extension of the SAUs and farm information wings of the State departments need to revisit their roles in view of increasing participation of private players through media, IT platforms, etc. ICAR-Directorate of Knowledge Management in Agriculture (DKMA) and the Extension Directorate of the MoA&FW could take lead in providing policy guidelines for print media role in strengthening agricultural extension.

VI. Reforms and Policy Interventions

24. The SAUs must urgently revisit their course curricula for agricultural extension and bring in needed reforms to meet the current expectations and make them more relevant and purposeful. Diversified agriculture, secondary agriculture, speciality agriculture, value chain and agricultural marketing, including export options, etc. now demand innovations in agricultural extension education. This is an important and urgent matter which must be addressed to while aligning with the expectations of New Education Policy (NEP).
25. Funding for extension services needs to be enhanced substantially to make them more effective and efficient. This is possible through: i) doubling allocation for agricultural extension activities by MoA&FW and ICAR, ii) ensuring higher allocation for extension activities under the CSR by corporate sector related to agriculture and allied fields, iii) revisiting and strengthening National Mission on Agricultural Extension and Technology, iv) ICAR to initiate urgent action for National Agricultural Extension Project (NAExnP) funded by the World Bank linked to reforms in agricultural extension programs, v) creating a Mission on Youth for motivating them to become extension/ advisory agents and entrepreneurs, and vi) establishing Agriculture Innovation Fund to promote farmer-led innovations for enhancing production and productivity.

26. Public-private partnerships (PPPs) is likely to promote and improve the competence and capacities of young extension agents to provide advisory services on payment basis for faster scaling of innovations and desired benefits to the end users. Hence, involvement of private sector to play proactive role in agricultural extension has to be ensured through enabling policy environment by the Government.
27. The activities of KVKs and ATMA could be multiplied and made more effective by converging roles and pooling the resources as well as programs related to rural and agricultural development at the district level. In fact, twin pillar coherent strategy is likely to have multiplier effect, For implementation of programs, a well coordinated approach with delineated responsibilities to the Heads of KVK would have a multiplier effect.
28. There is need to collate feedback from the farmers and field functionaries by the Assistant Technology Managers (ATMs) of ATMA and Subject Matter Specialists (SMSs) of KVKs which could be documented to assess specific needs of farmers to be addressed. SMSs of the KVKs need to mentor the block technology teams (BTT) of ATMA. Also, there is strong case for upgrading the positions of KVK Coordinators at Professor level, being critical for administrative reasons. Also, there should be an in-built mechanism for improving the technical competence of subject matter specialists.

VII. South-South Collaboration

29. Promising innovations and reforms in agricultural extension promoted in India, Bangladesh, Nepal and Sri Lanka need to be clearly understood for their suitability for adoption in the respective countries.
 - ◆ Crucial extension reforms being promoted and practiced in India include: i) innovating institutional arrangements in public sector for technology delivery ii) strengthening public-private partnerships, iii) integrating extension needs of allied sectors and disadvantaged areas/groups in outreach programs of frontline extension, iv) empowering farmers, FOs, FPCs, FIGs, Farmer Cooperatives, etc., v) augmenting R&E linkages at various levels, vi) intensive use of media, ICTs and internet platforms, vii) promoting agri-start-ups, entrepreneurships, business incubation, value chain and market-led extension interventions, viii) involving farm youth and women through focused extension strategies with institutional support (ARYA, RAFTAR), and ix) skilling farmers, field functionaries and other stakeholders, facilitating enhanced adoption of organic agriculture, climate resilience, agri-business opportunities, etc.
 - ◆ Establishment of Agri-product Marketing Bureau (AMB) to facilitate linkages between farmers and traders; agriculture ambulance aiding farmers during

the crisis like COVID-19; initiation of agriculture and livestock business plans; online seed demand and supply management; sourcing local food and roof-top gardening and farming by women as done in Nepal.

- ◆ Revisiting and reorienting the National Agricultural Extension Policy, preparedness for combating similar incidences as COVID-19, incorporation of appropriate ICTs to advance the extension delivery, expansion of industrial investments to promote commercialization of farming, encouraging entrepreneurs and promoting sustainable agriculture as done in Sri Lanka.
 - ◆ Agriculture portal (*Krishi Batayon*), digital farmer database and agriculture profile, farmer-friendly call service-3331, direct communication with the local extension workers, farmers' window-problem identification by matching image library, *KrishiBioscope*- use of YouTube video channel, e-pesticide prescriber, digital crop clinic, and urban agriculture as practiced in Bangladesh.
30. There is an urgent need for the establishment of a regional 'South Asia Forum for Agricultural Extension (SAFAE)' for knowledge sharing relating to extension innovations, strategies, experiences relating to successful models etc. Such a Forum could also exchange expertise, organize regional dialogues and take-up mutually agreed collaborative pilot projects. For this, institutional support could be ensured through ICAR Extension Division, MANAGE, TAAS, etc. in India and concerned nodal organisations in Bangladesh, Nepal and Sri Lanka. Adequate funding support from national lead organizations and international organizations/funding agencies such as World Bank, IFAD, ADB, USAID, SAARC Secretariat, etc. could be sought. Institution like MSU with strong extension system and outreach in the region could be involved to facilitate such an initiative.

Technical Program

DAY 1 : FRIDAY, 8 APRIL, 2022

09.30-10.00	REGISTRATION
10.00-11.15	OPENING SESSION
Chair	: RS Paroda, Chairman, TAAS
Convenor	: Rajbir Singh, Director ICAR-ATARI, Ludhiana
10.00-10.10	Welcome AK Singh, DDG (Agril. Extn.), ICAR
10.10-10.20	Setting the Context VV Sadamate, Former Advisor (Agriculture), Planning Commission
10.20-10.30	Special Remarks Karim Maredia, Director, Intl. Prog. MSU, USA
10.30-10.45	Special Remarks Abhilaksh Likhi, Additional Secretary, MoA&FW
10.45-11.05	Opening Address Trilochan Mohapatra, Secretary, DARE and DG, ICAR
11.05-11.20	Chairman's Remarks RS Paroda, Chairman, TAAS
11.20-11.40	Tea/Coffee Break
11.40-13.30	TECHNICAL SESSION I : Thematic Presentations
Co-Chairs	: Rita Sharma, Former Secretary, Dept. of Rural Development, Gol
	: Tej Partap, VC, GBPUAT, Pantnagar
Convenors	: N Balasubramani, Director, MANAGE, Hyderabad
	: P Adhiguru, Agril. Extn. Division, ICAR/NV Kumbhare, I/C ATIC, ICAR-IARI, New Delhi
11.40-12.00	Innovations in Frontline Extension AK Singh, DDG (Agril. Extn.), ICAR
12.00-12.20	Institutional Innovations in Agricultural Extension P Chandra Shekara, DG, MANAGE

12.20-12.40	MSU Agril. Extension Innovations	Quentin Tyler , DE, MSU, East Lansing, USA
12.40-13.00	Innovations in Forestry/ Agroforestry Extension	G Rajeshwar Rao , Director, TFRI, Jabalpur
13.00-13.30	Discussion and Concluding Remarks	
13.30-14.30	Lunch Break	
14.30-17.00	TECHNICAL SESSION II : Private Sector Extension Initiatives	
Co-Chairs :	Neelam Patel , Sr. Adviser (Agriculture), NITI Aayog, Gol : VV Sadamate , Former Advisor (Agril), Planning Commission (now NITI Aayog)	
Convenors :	MJ Chandre Gowda , ICAR-ATARI, Bengaluru : Rashmi Singh , ICAR-IARI, New Delhi	
14.30-14.50	Extension Through e-Chaupal	C Sashidhar , ITC
14.50-15.10	Agrotech Show to Share New Knowledge	Harvir Singh , Rural Voice
15.10-15.30	Entrepreneurial Extension	Basavaraj Girenavar , CAB Pvt. Ltd., Bengaluru
15.30-15.50	Tea/Coffee Break	
15.50-16.10	Future of Digital Extension: Full stack Thinking & Actionable Approach	Shaik N Meera , Senior Technical Expert - Digital Agriculture, IFAD
16.10-16.30	Extension Through Custom Hiring Services	S Balwinder Singh , CEO, JFPO
16.30-17.00	Discussion and Concluding Remarks	

DAY 2 : SATURDAY, 9 APRIL, 2022**09.30-12.20 TECHNICAL SESSION III : Sectoral Extension Services**

Co-Chairs : P Das, Former DDG (Agril. Extn.), ICAR
 : KD Kokate, Former DDG (Agril. Extn.), ICAR

Convenors : Lakhan Singh, Director, ICAR-ATARI
 : RR Burman, Principal Scientist, Extn. Division, ICAR-IARI

09.30-09.50	Extension Services in Animal Husbandry Sector	Praveen Malik , Animal Husbandry Commissioner, Gol
09.50-10.10	Role of NGOs in Agricultural Extension with Focus on Integrated Development	Bharat Kakade , BAIF
10.10-10.30	Extension Services in Fisheries Sector	Vijaykumar Yaragal , ED (Tech.), NFDB, Hyderabad
10.30-10.50	Futuristic Agricultural Extension Model and Innovations for Promoting Sustainable Agriculture Development and Increasing Farmers Income	SV Reddy , President & ED, PRDIS

10.50-11.10 Tea/Coffee Break

11.10-11.30	Extension for Regenerative Agriculture	Shekhar Bhadsavle , Saguna Farms, Karjat, Maharashtra State
11.30-11.50	Weather Advisory Services	BK Singh , Chairman and MD, BKC Weather, Noida

11.50-12.20 Discussion and Concluding Remarks**12.20-13.20 TECHNICAL SESSION IV : Regional Partnership for Advisory Services - Country Perspective**

Co-Chairs : Karim Maredia, Director, Intl. Prog. MSU, USA
 : P Chandra Shekara, DG, MANAGE, Hyderabad

Convenor : SK Singh, Director, ICAR-ATARI, Jodhpur
 : MS Nain, Principal Scientist, ICAR-IARI, New Delhi

12.20-12.40	Nepal	Arjun Kumar Shrestha , Director (Research and Extension), Agriculture and Forestry University, Rampur, Nepal
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12.40-13.00 Bangladesh **Md. Hamidur Rahman**, Former DG (Agril. Extn.) & President, Bangladesh Agriculture Extension Network, Ministry of Agriculture, Dhaka, Bangladesh

13.00-13.20 Sri Lanka **Gunasingham Mikunthan**, Senior Professor in Agricultural Biology, Faculty of Agriculture, University of Jaffna, Ariviyal Nagar, Kilinochchi, Sri Lanka

13.20-14.30 Lunch Break

14.30-15.30 PANEL DISCUSSION

Co-Chairs : AK Singh, DDG (Agril. Extn.), ICAR
 : Samuel Praveen Kumar, JS (Extension), MoA&FW
Convenor : VP Chahal, ADG (Agril. Extn.), ICAR

Panelists

V Praveen Rao, VC, PJTSAU, Hyderabad
 JP Sharma, VC, SKUAS&T, Jammu
 Suresh Babu, IFPRI, Washington
 Anupam Mishra, VC, CAU, Imphal
 Ajay Vir Jakhar, Chairman, BKS, New Delhi
 PN Mathur, Former DDG (Extn), ICAR, New Delhi
 Yogesh Thorat, MD, MAHA FPC, Pune
 RN Padaria, Head, Division of Agril. Extension, ICAR-IARI, New Delhi

15.30-16.00 General Discussion on Way Forward

16.00-16.50 CONCLUDING REMARKS

AK Singh, DDG (Agril. Extn.), ICAR
 P Chandra Shekara, DG, MANAGE
 Karim Maredia, MSU, USA
 RS Paroda, Chair, TAAS
Convenor : Randhir Singh, ADG (Agril. Extn.), ICAR

16.50-17.00 Vote of Thanks **Bhag Mal**, Secretary, TAAS

17.00 *Tea/Coffee Break*

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