

**PROCEEDINGS OF THE MEETING OF RESEARCH ADVISORY COMMITTEE (RAC)
HELD ON JANUARY 31- FEBRUARY 1, 2020 AT NASC COMPLEX, NEW DELHI**

The meeting was chaired by Dr.P Das, Former DDG(AE) and the Chairman of Research Advisory Committee (RAC) constituted for all the 11 ATARIs. The list of the participants is enclosed as **Annexure**.

1. The meeting started with opening remarks from Dr.A.K.Singh, DDG(AE), ICAR. He informed the Committee about the innovative achievements of KVK system, bringing the KVK upfront as **ONE-STOP-SHOP**. The good work done by the KVKs in the 117 Aspirational Districts has been highly appreciated. The availability of large data base with the KVKs related to bio-physical and socio-economic aspects of several micro-situations and cropping systems is an asset which has the potential for showing still greater impact of KVKs.

The entire KVK network can be involved in research activities covering various problem/thematic areas. The research projects can be initiated both within ATARI and across ATARIs. DDG indicated that his visit to a good number of European countries indicates that innovation platforms can emerge very shortly at farmers' fields involving other stakeholders.

2. Dr.P.Das, Chairman RAC made three presentations indicating a number of Researchable Issues in the context of Climate Change, Doubling Farmers Income and Extension Methodology.

Researchable Issues in the context of Climate Change

Based on the exhaustive study conducted by CRIDA (Central Research Institute for Dryland Agriculture), Hyderabad, the details of three critical components of vulnerability and also three major approaches for analysis of vulnerability to climate change were presented. The standard procedure of weightage for Exposure, Sensitivity and Adaptive Capacity was also explained. Out of 230 High and Very High vulnerable districts, he specially emphasized on formulating appropriate research programme in the following three areas on network mode:

- **Rise in minimum temperature (114 districts)**
- **Decrease in July rainfall (70 districts)**
- **Increase in drought areas (38 districts)**

After the presentation, the Members of RAC gave their inputs complementing and supplementing the ideas presented by the Chairman.

3. Dr. Joshi specially emphasized on the Mapping of vulnerability presented in great detail by Chairman should form the basis for research projects at ATARI level.

Broadly the research projects that could be taken up by the ATARIs could be categorized into diagnostic analysis, applied research and futuristic research. Diagnostic analysis could be demand driven and bottom up in nature. Under Applied Research, constraints in adoption pattern, and factors contributing to successful adoption of certain technologies - government policies, climatic factors and technology attributes, can be studied. New methods of social science research like RCT can be used for assessing the impact and pathways for up-scaling of potential technologies.

The huge database available with KVKs can be effectively used through artificial intelligence and machine learning, by involving IASRI for analysis. Limited staff at ATARIs should not be a constraint since the vast network of institutions can be considered for research project in partnership mode. He further summarized as follows:

- Need for diagnostic research in climate change-Futuristic Research
- A network project on climate vulnerability, which may include:
 - Mapping of climate change in collaboration with related institutions for respective districts using the standard parameters, may be necessary once in 5 years
 - What impact the climate change is likely to make due to low July rainfall as indicated by the Chairman in his presentation
 - How the farmers are already coping up including the supports/measures like crop insurance
- Under Futuristic Research, integrating micro level data with macro level data and such analysis will generate inputs for technology generation institutes
- Introducing climate smart agriculture could be an important applied research towards development of climate resilient agriculture
 - What are the constrains in adoption of climate resilient agriculture
- Research studies based on experimental evidences will be better appreciated, in the line of the work done by the Nobel laureate Dr. Abhijit Banerjee
- How the up scaling of the pathways of various technologies were evolved/suggested
- Can we predict the behavior of farming through Artificial Intelligence/Machine Learning
- Overall, there is a definite need to work in a partnership mode

The ATARI Directors appreciated the insights given on climate change and found to have great potential for initiating research projects in network mode across the zones.

4. Dr. R. Parshad, former ADG & Member RAC indicated the scope of research in some of the areas of transfer of technologies as follows:

- Extent and adoption of technology our system is dealing with
- Understanding the issues related to the technologies which are not being accepted by the farmers
- Priority setting or research prioritization, “technology – system – environment” framework and designing advisories based on weather, biotic & abiotic stresses and the management strategies adopted by the farmers are also the possible area of research.
- Feedback to research system for generation of appropriate technologies could be the priority of research projects at ATARIs
- Adoption dynamics of the farmer in different farming systems on real time basis

He emphasized for adopting the concept of Staff Research Council in ATARI where the detailed discussion on at least 8-10 topics of research can be discussed and prioritized one or two to take up in depth study on the identified topics.

5. Researchable Issues in the context of DOUBLING FARMERS INCOME

The Chairman explained the **Seven Sources of Growth** as identified by the DFI Committee within the agriculture sector, which are:

- **Improvement in crop productivity**
- **Improvement in livestock productivity**
- **Resource use efficiency or saving in cost of production**
- **Increase in cropping intensity**
- **Diversification into high value crops**
- **Improvement in real prices received by farmers**

Further, the following source of growth operates outside the agriculture sector, but can contribute to farmers’ incomes, by reducing the number of claimants to the income generated in the agriculture sector.

- **Shift from farm to non-farm occupations**

He explained the past trend of Income Growth (2003-13) vis a vis the Accelerated Projected for 2022-2023 for all the major states of each of the ATARI Zones. Finally he explained the definition agricultural extension as redefined by the DFI Committee:

“Agricultural Extension is an empowering system of sharing information, knowledge, technology, skills, risk & farm management practices, across agricultural sub-sectors and along all aspects of the agricultural supply chain, so as to enable the farmers to realise higher net income from their enterprise on a sustainable basis”

Chairman further explained that the emphasis of the definition is not only on transferring the technologies and management practices but also on risk

management practices. The definition draws attention to evidence based decision making, for negotiating the risks which arise during pre-production, production and post-production stages. This definition covers all sub-sectors, namely, field crops, horticulture, animal husbandry, poultry, fisheries, agro-forestry, farm linked activities (secondary agriculture), etc., thus signifying a cross-sectoral approach to the farming system. Most importantly, agricultural supply chain referred to in the definition makes the farmer an active stakeholder and legitimate partner at every stage of the agricultural value system.

THIS OPERATIONAL DEFINITION, IN SUM, CONCLUDES WITH TWO OUTCOMES OF EXTENSION PROCESS I.E. HIGHER INCOME FROM FARMING WHICH IS A NATIONAL VISION AND REALISING THE INCOME GAINS ON A SUSTAINABLE BASIS.

6. Dr. Joshi in his remarks indicated various researchable areas as follows:
 - Assessing various pathways for increasing the farmers income in different regions
 - Demonstration on the contribution of different pathways
 - The available data on these 7 parameters can be converted into modeling and scenario analysis type of research. In order to minimize the possible income disparity, equitability of income is also important
 - Value chain management of important commodities particularly through FPOs can be a potential source of increasing farmers' income
 - Need for market assessment for different pathways
 - Can we demonstrate the efficiency of different pathways for increasing income and reducing the disparities
 - Agricultural Extension Division may consider organizing one day brainstorming on DFI issue before ATARIs take up research projects
7. DDG (AE) suggested that there should be i) Action Research to be taken up on climate resilient agriculture, and ii) Doubling the farmers income
8. Dr.D.P.Ray: In addition to the identified 7 sources of increasing income, post-harvest value addition can be considered particularly for horticultural crops to increase farmers' income.
9. Dr.R.Parshad: The programmes and policies like zero budget farming, natural farming and organic farming may be contradictory for the achievement of doubling farmers' income.
10. Dr. Chahal, ADG (AE) in his remarks mentioned that
 - ATARIs should work on their strengths by forming Teams of Excellence spanning across zones.
 - Case study approach can be considered in some cases.

- The ability to use huge quantum of data available with KVKs, converting the data into useful information and knowledge, has potential for taking up research projects.

11. Directors of ATARIs reflected on the seven sources of increasing farmers' income and acknowledged its huge potential for considering various researchable issues.

12. Researchable Issues in the context of EXTENSION METHODOLOGY

Chairman initiated the discussion by presenting the Modes of Non-adoption and Research Strategies formulated during the period of 1950s to till date. He specially drew the attention on the evolution of the farming system approach including the participatory approaches to research and development.

He explained a number of alternative/improved extension methods since the time Dr. Seaman first used demonstration as an effective extension method as a means of influencing the adoption of new farm practices in Louisiana 124 years back in 1885 and later on in 1902 during boll weevil crises causing great loss to Texas cotton growers and set the stage for launching Dr. Seaman's plan of cooperative demonstration work. The demonstration work and its effects sparked great interest on the farmers of The United States of America and a congressional bill called the Smith-Lever Act was passed in 1914 for "giving instruction and practical demonstrations in agriculture and home economics". The act set up unique program of agricultural education, funded by federal, state, and local governments and administered through the LAND GRANT COLLEGE SYSTEM in each state.

There is need for alternative/improved extension methods, which are necessary specially in the context of today's requirements of multi-dimensional linkage (Research- Extension- Farmer- Civil Society) of the farmers including their linkage with Business, various Systems, Research institutions, Public administration, need for knowledge of Weather, Market information and intelligence, and linkage with other farmers, Open market/ Global scale, and Unlimited partners (some known and more unknown).

In this context, the Chairman explained a number of new innovations in extension methodology including Methodology of Scaling Up and Scaling Out of Technology, Reducing R&D tag facilitating early flow of research benefits – Case of ICARDA, Participatory Plant Breeding Trial (PPB), 3-Year Participatory Varietal Selection (PVS) Expediting Diffusion-Case of WARDA, incorporating the Hardware and Software Aspects of New Technologies, and dealing with the cases of Composite Smart Technology like Weather Smart, Water Smart, Carbon Smart, Energy Smart and Knowledge Smart.

He further explained different types of On-farm Trials and variation in its design based on their suitability for establishing Biophysical response, Profitability, Acceptability, Feasibility, Farmers assessment of a particular prototype, Farmers assessment of a practice, and Identifying farmer innovations.

The Sustainable Livelihoods Framework and Sustainable rural livelihoods Framework for Analysis were explained in detail. As far as the ICT Enabled Extension Methodology is concerned, he particularly emphasized on developing various Decision Support Systems, Agropedia as a Unique Model for a comprehensive and seamlessly integrated model of digital content both for crop production and protection technology, and finally the Time Line based Package of Practices for the major crops.

Return on Investment (ROI) for Extension Programs is another key area of research, which is essentially measures performance by assessing the efficiency of an investment. The ROI values help to communicate the worth of Extension programs to key stakeholders and show the net return on investments.

Chairman indicated the need for research in micro level institutional restructuring, management of extension programme, models of research-extension-civil society linkage, capacity building of farmers, models of empowerment, mainstreaming gender implication in agriculture, and overall sustainability of agricultural extension as a discipline.

In order to provide impetus the emerging shift from Research-Extension to Research-Research-Farmer- Extension- Civil Society linkage, there is need for paradigm shift in the emphasis of research in transfer of Technology from Discipline to programme mode, Piecemeal to system approach, Open ended to focus technological intervention, Take it or leave to demand-led approach, Integration of biophysical and socio-economic factors, and finally from Institute to inter-institute mode of technology assessment and refinement.

To sum up the participatory research and technology development experiences of ICARDA, WARDA were shared to encourage the ATARIs to plan research projects in similar lines. The essentialities of weather smart, water smart, carbon smart, nitrogen smart, knowledge smart and energy smart agriculture were suggested for impact studies on successful technologies. Livelihood analysis with income, vulnerability and resources access was suggested as research areas which are women and nutrition oriented. In the context of revolution in ICT, content development in local language was highlighted. Characterization of farming systems of a village

can be attempted keeping system characters such as productivity, suitability, equitability, sustainability and profitability. New models of technology transfer that document process, output and outcome in specific terms need attention. The cost effective ToT models commensurate with policies and programmes were detailed. Return on investment in extension can be ascertained with data related to cost of the programme, outcome and impacts, and conversion to monetary values with clear statement of assumptions.

13. Dr. Parshad: Suggested the following areas of research:

- Speed of Adoption
- Shift from Subject-Program-Problem Mode

14. Dr.D.P.Ray: Considering the limited manpower available at the disposal of ATARIs and the diverse nature of work entrusted to the KVKs, it is necessary to have integrated research approach by involving the Zonal Research Stations in the area. Protected cultivation and nutritional gardens could be studied for ensuring profitability and nutrition security in different agro-climatic situations.

15. Dr.Randhir Singh: Theme areas for research at ATARI level can be identified based on the inputs provided by the Chairman and RAC Members. It is necessary to change the mindset of the staff at ATARI level and there is a need to identify individuals and teams to work on identified theme areas.

16. Dr.P.K.Joshi: KVKs and ATARIs have better knowledge of ground realities which should be used for prioritizing the research agenda. Targeting of technologies for higher impact based on typology of technology, typology of resources and typology of social structure can be studied. Market oriented research must identify new opportunities, studying the certain parameters over a period of time among certain a set of farmers.

17. DDG (AE):emphasized further on the following areas of research besides formulating action research both on Climate Change and Doubling the Farmer's Income:

- Return over investment
- Nutrition mapping in the form of Establishment of Nutri-Smart Villages, Nutrition garden for round the year availability of all nutrition
- Impact assessment of KVK in the model of the study conducted by IFPRI indicating that 'One farmer influencing 30 Farmers',
- What could be the mechanism of interaction of more than 5.0 crores of farmers who are the members of Kishan Portal, many of which are associated with the KVKs?

19. Recommendations emerged based on the presentations made by the ATARIs.

- The researchable issues must be restricted to the areas which are within the domain of KVKs and are directly relevant to KVKs.
- Impact analysis/evaluation of flagship programmes of Government need not be taken up as research projects. Research projects on the day today on-going activities of the KVKs also need not be considered for research.
- Few research projects with sufficiently larger sample base across KVKs and across States should be planned in a network mode.
- Research on pure bio-physical aspects of agriculture may not be possible through ATARIs and KVKs, and hence, the focus should be on socio-economic and applied research.
- Projects should be able to complete within 3 years and should have clear measurable indicators of outcome.
- Standardization of the methodology for working out standard procedures to do impact assessment can be a priority area for research.
- Research projects should have an end to end approach than piecemeal approach. For example organic farming related activities must focus on beyond production, with labeling, certification and market segment analysis.
- Research methodology has to be clearer, must use improved and latest designs and tools.
- All research projects must clearly target the end users of the research findings so that the outcomes are clearly specified.
- Yield gap analysis for potential commodities, with “one district-one product” concept can be considered across the country.
- Climate resilient agriculture particularly in the 230 vulnerable districts and 100 water stress districts could be addressed with proper technological and methodological research projects.
- Various extension approaches like farmer-farmer, research-farmer, social media-farmer, and traditional media are the potential areas for taking research.
- Need to increase the capacity of ATARI and KVK Scientists to take up research along with skills related to data management and analysis.
- Impact studies must clearly bring out the contribution of KVK to ensure that proper parameters are used to substantiate/attribute the impact of KVK efforts.
- Value Change Analysis is a potential area of research and building capacity of stakeholders on Value Chain Management can be considered with appropriate research project with possible outcome of a training manual.

- Different PPP models can be studied with specific focus on the indicators of successful partnerships which could be replicated in other similar circumstances.
- The Profile Analysis of successful FPOs highlighting the variables/facts that contributed to the successful management of FPO can be brought out.
- Standard traceability parameters for different commodities/ products have to be considered in all export potential crops/produces

20. All the 11 ATARIs (ICAR-AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE) are mandated to take up research in various aspects of agriculture and allied sectors including the issues related to the farm women. These institutions are attached with more than 700 KVKs each with at least one women scientist covering all the districts of the country.

The RAC recommends that in view of the holistic approach in research taken up by the ATARIs including the farming system as a whole and having a large network of KVKs including a strength of Home Scientists almost at all KVKs across the country, the ICAR-CIWA (Central Institute for Women in Agriculture, Bhubaneswar), which was earlier conceived by the Division of Agricultural Extension way back in 1996 and established with all infrastructural facilities at Bhubaneshwar but later on transferred to the Division of Education, is reverted back to the Division of Agricultural Extension to avail the huge network of ATARIs and equally large strength of Home Scientists in the interest of the effective functioning of ICAR-CIWA jointly with the KVKs and Home Scientist network of the ATARIs.

21. Vote of Thanks: Dr.Chandre Gowda, Member Secretary, RAC proposed Vote of thanks to the Chair, DDG (AE) for specially sparing his valuable times, Hon'ble Members of RAC, ADGs, Directors of all the ATARIs, Scientists and the staff participating from the ATARIs, and everybody helped in organizing the meeting successfully.

ANNEXURE**LIST OF THE PARTICIPANTS****31st January & 1st February 2020, New Delhi**

| Sl. No. | Name | Designation |
|----------------|------------------------|---|
| 1 | Dr.A.K.Singh | Deputy Director General (AE) |
| 2 | Dr.P.Das | Chairman, RAC |
| 3 | Dr.R. Parshad | Member, RAC |
| 4 | Dr.K.M.Bujarbaruah | Member, RAC |
| 5 | Dr.K.M.Bujarbaruah | Member, RAC |
| 6 | Dr.P.K.Joshi | Member, RAC |
| 7 | Dr.Randhir Singh | DDG's Nominee Member |
| 8 | Dr.M.J.Chandre Gowda | Member Secretary |
| 9 | Dr.V.P. Chahal | ADG (AE), ICAR, New Delhi |
| 10 | Dr.Rajbir Singh | Director, ICAR-ATARI, Ludhiana |
| 11 | Dr.S.K.Singh | Director, ICAR-ATARI, Jodhpur |
| 12 | Dr.Atar Singh | Director, ATARI, Kanpur |
| 13 | Dr.Anjani Kumar | Director, ICAR-ATARI, Patna |
| 14 | Dr.A.K. Tripathi | Director, ICAR-ATARI, Guwahati |
| 15 | Dr.Bidyut C Deka | Director, ICAR-ATARI, Umiam |
| 16 | Dr.Lakhan Singh | Director, ATARI, Pune |
| 17 | Dr.Anupam Mishra | Director, ICAR-ATARI, Jabalpur |
| 18 | Dr.Y.G. Prasad | Director, ATARI, Hyderabad |
| 19 | Dr.Keshav | Principal Scientist (AE), ICAR, New Delhi |
| 20 | Dr.Naresh Giridhar | Principal Scientist (AE), ICAR, New Delhi |
| 21 | Dr.Preeti Mamgai | Principal Scientist, ICAR-ATARI, Ludhiana |
| 22 | Dr.Rajesh K Rana | Principal Scientist, ICAR-ATARI, Ludhiana |
| 23 | Dr.M.S.Meena | ICAR-ATARI, Jodhpur |
| 24 | Dr.H.N.Meena | ICAR-ATARI, Jodhpur |
| 25 | Dr.P.P.Rohilla | ICAR-ATARI, Jodhpur |
| 26 | Dr.B.L.Jangid | ICAR-ATARI, Jodhpur |
| 27 | Dr.Sadhna Pandey | Principal Scientist, ICAR-ATARI, Kanpur |
| 28 | Dr.Shantanu Kr. Dubey | Principal Scientist (AE), ICAR-ATARI, Kanpur |
| 29 | Dr.Raghavendra Singh | Principal Scientist, ICAR-ATARI, Kanpur |
| 30 | Dr.K.S.Das | ICAR-ATARI, Kolkata |
| 31 | Dr.Amarendra Kumar | Principal Scientist, ICAR-ATARI, Patna |
| 32 | Dr.Avinash Kumar | Principal Scientist, ICAR-ATARI, |
| 33 | Dr.P.P.Pal | Principal Scientist, ICAR-ATARI, Kolkata |
| 34 | Dr.A Haldar | Principal Scientist, ICAR-ATARI, Kolkata |
| 35 | Dr.S.R.K. Singh | Principal Scientist ICAR-ATARI, Jabalpur |
| 36 | Dr.A.Bhaskaran | Principal Scientist, ICAR-ATARI, Hyderabad |
| 37 | Dr.J.V.Prasad | Principal Scientist, ICAR-ATARI, Hyderabad |
| 38 | Dr.D.V.S. Reddy | Principal Scientist (AE), ICAR-ATARI, Bengaluru |
| 39 | Dr.B.T.Rayudu | Principal Scientist (AE), ICAR-ATARI, Bengaluru |
| 40 | Dr.Mallikarjun B Hanji | CTO (Computer), ICAR-ATARI, Bengaluru |
| 41 | Sri.Jayant Prasad | Assistant, ICAR ATARI, Patna |