Weather Agriculture
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Proceedings & Recommendations

Brainstorming Workshop on Strengthening Regional Capability for Effective Utilization of Meteorological Services in Agriculture and Allied Sectors

May 31st - 1st June, 2024

ICAR-CRIDA, Hyderabad, Telangana, India

Association of Agrometeorologists
https://agrimetassociation.org/

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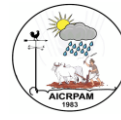| Chapters	Chairman	Chapters	Chairman
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Contents

Summary of Recommendations

1. *Expertise for accurate interpretation of weather forecasts with different spatial resolutions in relation to synoptic situations / climate data base and identify the domain area of the forecast are prerequisite for providing dependable / reliable operational Agrometeorological Advisories to the farmers / stake holders. Infrastructure development either by establishing forecasting units or for feeding access to forecasting tools and capacity building require immediate attention.*

   (Action: ICAR / IMD: Capacity Building; IMD / SAUs: Infrastructure Development)

2. *Agrometeorological Advisories should be based on strong research hypothesis. There is need to reorient research programs in Agricultural Meteorology to address issues for which farmers can't make their own decisions based on weather forecasts. ICAR may consider constituting an Expert Group to address the same. Mere Agronomic Advisories in which farmers have enough knowledge have to be avoided.*

   (Action: ICAR)

3. *There is urgent need to strengthen climatic / agroclimatic data base for domain areas of SAUs / CAUs. AICRP on Agrometeorology may develop / document methodologies for analysis and interpretation of climate data base with respect to agricultural planning and management.*

   (Action: IMD / SAUs / CAUs / AICRPAM)

4. *All SAUs/CAUs must have a Department of Agricultural Meteorology to undertake research and develop expertise to guide farmers / stake holders in taking operational decisions based on weather forecasts.*

   (Action: SAUs / CAUs)

5. *It may be timely and appropriate to organize a National level workshop of the faculty of Agricultural Meteorology for promoting quality, professional competence and excellence in Agricultural Meteorology education.*

   (Action: AAM / IMS / ICAR)
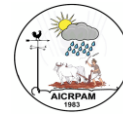
Climate Change and Indian Agriculture

Climate change and its variability are emerging as the major challenges influencing the performance of Indian agriculture. It has been well documented now that overall climate is changing particularly in respect of temperature over the Indian region. Besides, climatic variability leading to extreme events like drought, flood, occurrence heavy rainfall etc. is increasing during last one and half decades. Thus, both climate change and climate variability are causing concern on the biodiversity and ultimately eco-system in different parts of the country. Long-term changes in shifting weather patterns result in changing climate, which threaten agricultural productivity through high and low temperature regimes, increased rainfall variability, and rising sea levels that potentially deteriorate coastal freshwater reserves and increase risk of flooding. Climate change (and global warming) impacts all sectors of human life. Agriculture is particularly vulnerable to it. Higher temperatures tend to reduce yields of many crops; and encourage proliferation of weeds and pests. Although yield increases in some crops and other positive benefits have been noted in some regions of the world, the overall impact of climate change on agriculture is likely to be negative. Climate change will have a negative effect on yields of irrigated crops across regions, both due to increase in temperature and changes in availability of water. Rainfed agriculture will be primarily impacted due to rainfall variability and reduction in number of rainy days. Climate change might result in price hike of agricultural commodities, feed supplies and consequently livestock products like meat and milk

Each year one or the other part in the country is affected by droughts, floods, cyclones, hailstorm, frost and other climatic events. The latest IPCC reports clearly brought out the global and regional impacts of projected climate change on agriculture, water resources, natural eco-systems and food security. Among the several highly populated regions of the world, South Asia is categorized as one of the most vulnerable. Although climate change impacts are being witnessed all over the world, countries like India are more vulnerable in view of the huge population dependent on agriculture, excessive pressure on natural resources and poor coping mechanisms. Significant decline in production is likely to be caused by shortening of growing period, which will have negative impact on reproduction and grain filling particularly due to terminal heat stress and decreased water availability. Biodiversity will be also adversely affected, which in turn, will affect agricultural production.

The Indian agricultural production system faces the daunting task of having to feed 17.5 percent of the global population with only 2.4 per cent of land and 4 per cent of the water resources at its disposal. With the continuously degrading natural resource base compounded further by global warming and associated climate changes resulting in increased frequency and intensity of extreme weather events, "business as usual"
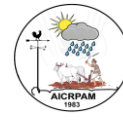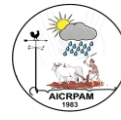
approach will not be able to ensure food and nutrition security to the vast population as well as environmental security (the need of the hour). The challenge is formidable because the agriculture sector must produce more food for a growing world population, which is expected to increase from 7 billion to about 9 billion by 2050. Comprehensive planning to reduce the economic and ecological impacts of extreme events as well as adoption of technologies for improved land and water management to enhance water efficiency in agriculture are needed. Indiscriminate use of pesticides and fertilizers critically imbalances the biodiversity in the natural ecosystem. Therefore, linking of weather information with the application of agrochemical could maintain the biodiversity and ultimately ecosystem. Besides, potential approaches to success include knowledge sharing and cultivation of critical thinking, the promotion of effective tools and technologies, and proper understanding of user priorities and needs. Recognizing that solutions exist but time is short, the biodiversity/conservation/ecosystem sectors need to closely collaborate with National Meteorological & Hydrological Services to promote more environmental friendly and sustainable development. India possesses a wealth of biodiversity, have experienced severe weather variability, crop failure and recurrent famine throughout their histories. To tackle the problems that arise as a result of climate change and the resultant droughts, floods, land degradation, losses of crop and biodiversity, famine, malnutrition and poverty, there is a need for greater awareness on managing the natural resources. The country needs a new integrated approach for advancement of improved technologies and good practices to manage crops and livestock, as well as the soil, land and agroclimatic resources of the region. This include improvement and strengthening of agrometeorological networks, development of new sources of data for operational agrometeorology, improved understanding of natural climate variability, promotion and use of seasonal to inter-annual climate forecasts, establishment and/or strengthening of early warning and monitoring systems, promotion of geographical information systems, remote sensing applications, agro-ecological zoning for sustainable management of farming systems and forestry & livestock. Other priorities includes use of improved methods, procedures and techniques for the dissemination of agrometeorological information, development of agrometeorological adaptation strategies to climate variability and climate change, mitigation of the effects of climate change with more active applications of models for phenology, yield forecasting etc., active promotion of tactical applications such as response farming at the field level and promoting a better understanding of the interactions between climate and biological diversity are needed. These present important challenges and great opportunities for Agrometeorologists to play a proactive role in promoting sustainable and resilient farming.

To achieve this task of paving the way for sustainable and resilient farming, we need to take several measures that will have enabling policies, institutions and infrastructure in place and the farming community be better informed and empowered with necessary resources. With the above backdrop, the issues and challenges of climate change and mechanisms of agricultural resilience to its impact and possible policy options and actions were discussed at a Brainstorming Workshop jointly organized by Association of Agrometeorologists, ICAR-Central Research Institute for Dryland Agriculture and Indian Meteorological Society by inviting select group of experts and stakeholders on the May 31st – 1st June, 2024 at ICAR-CRIDA, Hyderabad.

Inaugural Session

During the inaugural session, **Dr SK Chaudhari, DDG (NRM)**, gracing the occasion as chief guest strongly advocated the importance of weather forecasts in preparing Agrometeorological Advisory Services. Dr Chaudhari assured full support of Council's NRM division for the endeavor.

Dr RC Agrawal, DDG (Ag Education) while attending the inaugural session as guest of honor expressed his support towards implementing the revised model Agricultural Meteorology syllabus suggested by the domain experts.
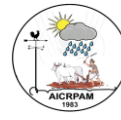
Dr VK Singh, Director of ICAR-CRIDA also highlighted the importance of the weather information to the farmer for making field-level decisions.

Dr KK Singh, President of the Association of Agrometeorologists and former ADGM cum Head AAS of IMD affirmed that Agrometeorological Database Management and Automation of Agrometeorological Bulletins must be on top priority. He sincerely thanked all the delegates for supporting the Agrometeorology cause and on behalf of association.

The workshop started with a technical session consisting of presentations by experts from IMD, NCMRWF, IITM and PJTSAU regarding the current status and prospects of seasonal, medium, short-range, and extended-range weather forecasts and agrometeorological advisory services. Feedback from progressive farmers also shared regarding Agrometeorological Advisory Services – and its economic benefits they received and the improvement further required.

Three working groups (WGs) were constituted to discuss following tangible issues sub-theme wise:

WG -1: Short Range Forecast - Short-range weather forecasts play a crucial role in agriculture in India, particularly during critical phases like sowing, pest management and harvesting including routine day today farm management for resilient farming.
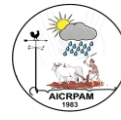
➢ Reduced accuracy: Inaccurate forecasts can lead to misinformed decisions by farmers regarding planting, irrigation, and crop protection. At times short-range forecasts may struggle to accurately predict localized weather events such as thunderstorms, hailstorms, or sudden temperature changes, impacting crop management strategies.

➢ Monsoon dependence: Short-range forecasts are crucial for predicting the onset, duration, and intensity of monsoon rains. Inaccurate forecasts can lead to improper water management practices, affecting crop yields.

➢ Pest and Disease Management: Weather conditions influence the prevalence and spread of pests and diseases in crops. Short-range forecasts help farmers anticipate outbreaks and plan timely interventions such as pesticide application or crop rotation. Inaccurate forecasts can result in ineffective pest management strategies, leading to crop losses.

➢ Resource Management: Farmers rely on short-range forecasts to optimize resource management, including irrigation scheduling, fertilizer application, and labor allocation. Inaccurate forecasts can lead to suboptimal resource utilization, affecting both crop yields and economic sustainability.

To mitigate these issues, continuous improvements in weather forecasting technology, coupled with effective communication channels to disseminate timely and accurate information to farmers, are essential.

WG-2: Medium Range Forecast - Medium-range weather forecasts typically cover a timeframe of around 3 to 10 days and are vital for agricultural planning and decision-making. However, several challenges can arise with medium-range forecasts, impacting agricultural activities:

➢ Limited Accuracy: Medium-range forecasts are inherently less accurate than short-range forecasts due to the increased uncertainty associated with predicting weather patterns beyond a few days. This reduced accuracy can pose challenges for farmers in making informed decisions regarding crop management practices, such as irrigation scheduling and pest control.

➢ Uncertain Monsoon Predictions: The Indian agricultural sector heavily depends on the monsoon season for water supply. Medium-range forecasts play a crucial role in predicting the onset, progression, and intensity of the monsoon rains. However, uncertainties in medium-range monsoon predictions can lead to challenges in water management and crop planning.

➢ Variability in Weather Patterns: India's diverse geography results in significant variability in weather patterns across different regions. Medium-range forecasts may struggle to capture this variability accurately, leading to challenges for farmers who rely on precise weather information to plan agricultural activities.
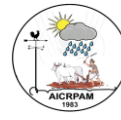
➤ Impact on Crop Health: Medium-range forecasts are essential for anticipating weather conditions conducive to the spread of pests and diseases in crops. However, uncertainties in medium-range forecasts can affect the timing and effectiveness of pest management measures, potentially leading to crop damage and yield losses.

➤ Resource Allocation: Farmers use medium-range weather forecasts to allocate resources such as labor, fertilizers, and pesticides effectively. Inaccurate forecasts can disrupt resource allocation plans, leading to inefficiencies and increased production costs.

➤ Market Dynamics: Medium-range weather forecasts also influence market dynamics, as they can affect crop yields and supply levels. Uncertainties in medium-range forecasts may lead to market volatility, impacting both farmers and consumers.

To address these challenges, continued advancements in weather forecasting technology, including the use of advanced modeling techniques and satellite data, are crucial. Additionally, efforts to improve the communication and dissemination of medium-range weather forecasts to farmers, along with the promotion of climate-resilient agricultural practices, can help mitigate the impact of forecast uncertainties on agricultural productivity and livelihoods.

WG-3: Seasonal and Extended Forecast - Long-range and extended weather forecasts typically cover periods beyond two weeks up to several months. While they can provide valuable insights into seasonal trends, they come with their own set of challenges for agriculture in India:

➤ *Reduced Accuracy:* Long-range and extended forecasts are inherently less accurate than short and medium-range forecasts due to the increased complexity and uncertainty of weather patterns over extended periods. This reduced accuracy makes it challenging for farmers to make precise decisions regarding crop planning, water management, and pest control.

➤ *Monsoon Prediction Challenges:* Long-range forecasts are critical for predicting the behavior of the monsoon season, which is vital for India's agriculture. However, uncertainties in long-range monsoon predictions can lead to challenges in water management, crop selection, and overall agricultural planning.

➤ *Climate Change Impacts*: Long-range forecasts need to account for the potential impacts of climate change on weather patterns. However, accurately predicting these long-term changes and their implications for agriculture remains a significant challenge. Climate change can lead to increased weather variability, making long-range forecasts even more uncertain.

➢ *Crop Selection and Planning*: Farmers rely on long-range forecasts to make decisions about crop selection, planting schedules, and other farm contingencies. However, inaccuracies in these forecasts can lead to mismatches between crops and prevailing weather conditions, impacting yields and profitability.

➢ *Water Management*: Long-range forecasts are crucial for water management in agriculture, especially in regions prone to droughts or floods. Uncertainties in long-range forecasts can lead to challenges in water allocation, irrigation scheduling, and reservoir management, affecting crop yields and farmer incomes.

➢ *Market Dynamics Insight*: Long-range weather forecasts influence market dynamics by affecting crop yields, supply levels, and commodity prices. However, uncertainties in these forecasts can lead to market volatility, impacting both farmers and consumers. Need to understand the relationship between monsoon activity and markets and stressed the need for mapping market supplies and demand. There are situations leading to decline in prices due to excess production during favorable growing seasons. Need to understand the influence of weather on productivity of small holdings compared to productivity of monocropped areas under consolidated land holdings. The meteorologists should work in close collaboration with economists in modeling market supplies in relation to seasonal weather during growing season at regional level.

Meteorological Services in Agriculture and Allied Sectors
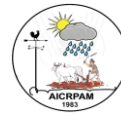
Further to Strengthen regional capabilities for the effective utilization of meteorological services in agriculture and allied sectors is crucial for enhancing productivity, ensuring food security, and mitigating the impacts of climate change, various strategies were discussed to achieve resilience in agriculture:

1*. Capacity Building and Training*

- Training Programs: Organize regular training sessions for agricultural extension workers, farmers, and other stakeholders on interpreting and utilizing meteorological data.
- Workshops and Seminars: Conduct workshops on the application of weather information in agricultural planning, pest management, irrigation scheduling, and disaster preparedness.

2*. Infrastructure Development*

- Weather Stations: Establish a dense network of automated weather stations to ensure real-time data collection and dissemination.

- Communication Systems: Develop robust communication systems, including mobile apps and SMS services, to deliver timely weather forecasts and advisories to farmers.

3. Data Integration and Analysis

- Integrated Platforms: Create platforms that integrate meteorological data with agricultural databases, satellite imagery, and soil information for comprehensive analysis.
- Decision Support Systems (DSS): Develop DSS tools that provide actionable insights based on weather forecasts, helping farmers make informed decisions regarding planting, irrigation, and harvesting.

4. Customized Weather Products

- Localized Forecasts: Provide localized weather forecasts that are specific to different agricultural zones and crops.
- Agrometeorological Advisories: Issue regular agrometeorological advisories that include recommendations on crop management practices based on weather conditions.

5. Community Engagement and Awareness

- Farmers' Groups: Establish and support farmers' groups and cooperatives to enhance collective access to meteorological services and information.
- Awareness Campaigns: Conduct awareness campaigns to educate farmers on the benefits of using meteorological information in agriculture.

6. Research and Development

- Collaborative Research: Promote collaborative research between meteorological institutions, agricultural research centers, and universities to develop innovative Met solutions.
- Pilot Projects: Implement pilot projects to test and demonstrate the effectiveness of new meteorological applications in agriculture.

7. Policy Support

- Government Policies: Advocate for policies that support the integration of meteorological services into agricultural planning and risk management strategies.
- Funding, Incentives and input support: Secure funding, provide incentives and input support for the adoption of meteorological services in agriculture.

8. Public-Private Partnerships

- Collaboration with Private Sector: Engage with private sector entities such as agri-tech companies, insurance firms, and financial institutions for input support further to enhance service delivery and innovation.
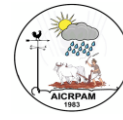
- Market-Based Solutions: Develop market-based solutions for weather insurance and climate-smart agriculture practices.

9. Monitoring and Evaluation

- Impact Assessment: Regularly assess the impact of meteorological services on agricultural productivity and resilience.
- Feedback Mechanisms: Establish feedback mechanisms to continuously improve the relevance and accuracy of meteorological information provided to farmers.

Through intensive deliberations, it was agreed upon that more comprehensive and focused agrometeorological research is required to understand weather and climate, their variability to develop appropriate policy frame work and further blending with agrometeorological services for resilient and sustainable farming depending upon weather abrasions and/or the progress of Indian monsoon during the growing season.

Strengthening regional capability for the effective utilization of meteorological services in agriculture requires a multi-faceted approach involving capacity building, infrastructure development, data integration, customized services, community engagement, research, policy support, public-private partnerships, and continuous monitoring and evaluation. By implementing these strategies, regions can enhance their agricultural productivity, reduce vulnerability to climate risks, and improve overall food security.

Fine tuning of Agrometeorological Advisories

Agrometeorological Advisories too are essential for providing farmers with timely and accurate information about weather conditions, which can significantly affect agricultural activities. Improving these advisories can lead to better decision-making, increased agricultural productivity, and reduced losses. Through in-depth discussions among various working groups following structured outline aimed at improving agrometeorological advisories were finalized:

- *Climate Smart Agrometeorological Advisories*
    - Capacity building of manpower at AMFUs
    - Information on Crop wise / livestock
    - Thumb rules
    - ITKs
    - FAQs
- *Agrometeorological Data Bank*
    - Strengthening Agromet databank at ICAR-CRIDA and setup an operation system Involving stakeholders
    - Data quality check and its inclusion in database
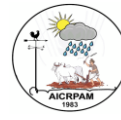
- Create Database of Extreme weather events based on the modified criteria suggested by the expert committee
- *Setup mechanism of fine tuning of location specific MRWF through Video Conference by obtaining feedback and local input from AMFUs*
- *Knowledge Bank*
    - Crop specific agrometeorological information capturing crop, livestock-weather relationships
    - Collect cardinal weather parameters and crop weather calendars and prepare hand book
    - List of available tools for agroclimatic analysis and set up mechanism for their online usage (AICRPAM)
    - Crop Contingency Plans (CRIDA / SAUs)
- *Research Input*
    - Package of practices
    - Experimental and Modeling (Analytical / Simulation)
    - Climate analogues for suitable crop areas
    - Research bulletins
    - Developing crop specific weather-based Insurance products
    - Crop climate risk matrices
- *Tools*
    - Share decision making tools to facilitate AABs
    - Automation (AI, ML etc.) of preparation of AABs
    - Develop and collate required information required for preparation of AABs and technical bulletins
    - Develop monitoring tools and facilitate access to useful RS/GIS information
    - Simulation modeling
    - Dissemination tools (Community radio, Internet media, TV, WhatsApp etc)
    - Establish Agrometeorological Service Portal to support AMFUs and other users. All above information and data may be shared through such mechanism
- *Research Issues*
    - Develop strong research hypothesis
    - There is need to reorient research programs in Agrometeorology to address on which the farmers can't make their own operational decisions based on weather forecasts
    - All SAUs/ CAUs must have an Agrometeorology Department
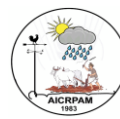   - All SAUs / CAUs should have an AICRPAM Center
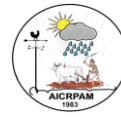
Major Recommendations

The major recommendations emanated from the respective working group meetings were vetted on concluding day of the workshop regarding the importance of agrometeorological services and its ease of implementation. The summary of recommendations thus emerged for immediate actions are as:

1. Expertise for accurate interpretation of weather forecasts with different spatial resolutions in relation to synoptic situations /climate data base and identify the domain area of the forecast are prerequisite for providing dependable/ reliable operational Agrometeorological Advisories to the farmers/stake holders. Infrastructure development either by establishing forecasting units or for feeding access to forecasting tools and capacity building require immediate attention.

2. Agrometeorological Advisories should be based on strong research hypothesis. There is need to reorient research programs in Agricultural Meteorology to address issues for which farmers can't make their own decisions based on weather forecasts. ICAR may consider constituting an Expert Group to address the same. Mere Agronomic Advisories in which farmers have enough knowledge have to be avoided.

3. There is urgent need to strengthen climatic / agroclimatic data base for domain areas of SAUs / CAUs. AICRP on Agrometeorology may develop / document methodologies for analysis and interpretation of climate data base with respect to agricultural planning and management.

4. All SAUs/CAUs must have a department of Agricultural Meteorology to undertake research and develop expertise to guide farmers / stake holders in taking operational decisions based on weather forecasts.

5. It may be timely and appropriate to organize a National level workshop of the faculty of Agricultural Meteorology for promoting quality, professional competence and excellence in Agricultural Meteorology education.

In view of above recommendations, the Association of Agrometeorologists (AAM) in conjunction with AICRP on Agrometeorology (AICRPAM) at ICAR-CRIDA endorse that the Indian Council of Agricultural Research (ICAR), MoA&FW; India Meteorological Department (IMD), MoES; Govt of India along with other stakeholders must take immediate necessary steps to strengthen regional capabilities for the effective utilization of meteorological services in agriculture and allied sectors which is very crucial for enhancing productivity, ensuring food security, and mitigating the impacts of climate change.

Agenda Program

Day 1 : May 31st, 2024 - Friday	
09.30 – 10.00 hrs	Registration of Delegates
Opening Session	
10.00 – 11.00 hrs	Inaugural Program
11.00 – 11.30 hrs	Group Photo & High Tea

Setting the Workshop

Co Chairs: Dr LS Rathore, Former Director General of Meteorology, IMD, New Delhi
                    Dr B Venkateswarlu, Ex VC, VNMKV, Parbhani & Director ICAR-CRIDA
Rapporteurs: Dr KK Dakhore, Agrometeorologist, VNMKV, Parbhani
                    Dr MA Sarath Chandran, Senior Scientist, ICAR-CRIDA

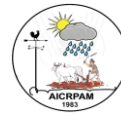|	
11.30 – 11.45 hrs	Current Status of Seasonal Forecast – Dr DS Pai, Scientist-G and Head (Hydrology & Agromet), IMD, New Delhi
11.45 – 12.00 hrs	Weather Forecasting (Short & Medium Range) and related Services – Challenges and Way Ahead – Dr Anumeha Dube, NCMRWF, N Delhi
12.00 – 12.15 hrs	Current Status and Future Prospects of Extended Forecast – Dr Raju Mandal, Scientist-D, IITM, Pune
12.15 – 12.30 hrs	Present Status, Gaps and Future Perspectives of Agromet Advisory Services – Dr G Sreenivas, ADR Jagtial Campus, PJTSAU, Hyderabad
12.30 – 13.30 hrs	Discussions
13.30 – 14.30 hrs	**Lunch Break**
14.30 – 14.40 hrs	**Setting the tone for discussion by Working Groups** Dr Surender Singh, Coordinator Working Groups & Professor, CCS HAU Hisar
14.40 – 17.30 hrs	Working Group Meetings 1. Working Group I: Seasonal Forecast Co Chairs: Dr D Raji Reddy, Ex-Director Extension, PJTSAU, Hyderabad Dr KV Rao, Head-DRM, ICAR-CRIDA, Hyderabad Rapporteur: Dr MA Sarath Chandran Senior Scientist, ICAR-CRIDA 2. Working Group II: Short & Medium Range Forecast Co Chairs: Dr VUM Rao, Ex-PC, AICRPAM, ICAR-CRIDA, Hyderabad Dr KPC Rao, ICRISAT, Hyderabad Rapporteurs: Dr SB Yadav, AAU, Anand & Dr Timmanna, ICAR-CRIDA 3. Working Group III: Extended Range Forecast Co Chairs: Dr S Pashupalak, Ex-Vice Chancellor, OUAT, Bhubaneswar Dr Anand Sharma, President-IMS &Ex-ADGM, IMD, New Delhi Rapporteur: Dr KK Dakhore, VNMKV-Parbhani

Day 2 : June 1ˢᵗ, 2024 - Saturday	
09.30 – 11.30 hrs Report Back Session & Discussion Co Chairs: Dr LS Rathore, Former Director General of Meteorology, IMD, New Delhi Dr S Pashupalak, Ex-Vice Chancellor, OUAT, Bhubaneswar Rapporteurs: Dr MA Sarath Chandran & Dr Timmanna, ICAR-CRIDA	
09.30 – 09.45 hrs	Working Group I
09.45 – 10.00 hrs	Working Group II
10.00 – 10.15 hrs	Working Group III
10.15 – 11.45 hrs	Discussion
11.45 – 12.00 hrs	Tea Break
12.00 – 13.00 hrs	Concluding Session
13.00 – 14.00 hrs	Lunch Break
14.00 – 16.00 hrs	Report Writing Session

Inaugural Program

31ˢᵗ May, 2024 (09.30 to 11.00 hrs)

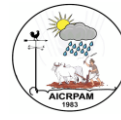| 09.30 – 10.00 hrs	Registration	
10.00 – 10.05 hrs	Welcome Remarks	Dr N Subash Vice President – AAM & IMS
10.05 – 10.10 hrs	AAM Initiatives and Plans for Agromet Development	Dr KK Singh President–AAM
10.10 – 10.15 hrs	Future Outlook	Prof BVR Ramana Rao Chairman, Advisory Board–AAM
10.15 – 10.25 hrs	Address by	Dr Vinod Kumar Singh Director, ICAR-CRIDA
10.25 – 10.35 hrs	Remarks by	Dr RC Agrawal DDG (Ag Edu), ICAR
10.35 – 10.55 hrs	Address by Chief Guest & Chairman Working Groups	Dr Suresh Kumar Chaudhari DDG (NRM), ICAR
10.55 – 11.00 hrs	Vote of Thanks	Dr SK Bal PC-AICRPAM

List of Participants in Brainstorming Workshop

- *ICAR Headquarter, New Delhi*
  - **Dr SK Chaudhari, Dy Director General (NRM), ICAR, New Delhi**
  - **Dr RC Agarwal, Dy Director General (Ag Education), ICAR, New Delhi**

- *ICAR-CRIDA, Hyderabad*
  - Dr VK Singh, Director, ICAR-CRIDA, Hyderabad
  - Dr KV Rao, Head, DRM, ICAR-CRIDA, Hyderabad
  - Dr M Srinivasa Rao, Head, DCS, ICAR-CRIDA, Hyderabad
  - Dr M Prabhakar, Principal Scientist (Entomology), ICAR-CRIDA, Hyderabad
  - Dr G Pratibha. Principal Scientist (Agronomy), CRIDA, , Hyderabad
  - Dr V Venugopalan, Scientist, ICAR-CRIDA, Hyderabad

- *AICRPAM-CRIDA, Hyderabad*
  - Prof BV Ramana Rao, Ex-PC, AICRP on Agrometeorology
  - Dr GGSN Rao, Ex-PC, AICRP on Agrometeorology
  - Dr VUM Rao. Ex-PC, AICRP on Agrometeorology
  - Dr P Vijay Kumar, Ex-PC, AICRP on Agrometeorology
  - Dr SK Bal, Project Coordinator, AICRP on Agrometeorology
  - Dr AVM Subba Rao. Principal Scientist (Agrometeorology)
  - Dr MA Sarath Chandran Senior Scientist (Agrometeorology)
  - Dr Timmanna, Scientist (Entomology)

- *SAUs / CAUs / Institutes / ICRISAT / Others*
  - Dr B Venkateswarlu, Ex VC, VNMKV, Parbhani & Director, ICAR-CRIDA
  - Dr S Pashupalak, Sr Agrometeorologist & Ex VC, OUAT, Bhubaneswar
  - Dr D Raji Reddy, Sr Agrometeorologist & Ex Director of Ext, PJTSAU, Hyderabad
  - Dr GSLHV Prasada Rao, Sr Agrometeorologist & Ex Head, KAU, Thrissure
  - Dr (Mrs) C Tara Satyavathi, Director, ICAR-IIMR, Hyderabad
  - Dr A Raja Reddy, Dean of Agriculture, Malla Reddy University, Hyderabad
  - Dr G Sreeniwas, ADR, Jagtial Campus, PJTSAU, Hyderabad
  - Dr KPC Rao, ICRISAT, Hyderabad
  - Dr N Subash, Head, Division of Agril Physics, IARI, New Delhi
  - Dr Surender Singh, Principal Scientist, CCS HAU Hisar & Ex-Vice President, AAM
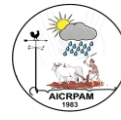
- *India Met Department / NCMRWF / IITM*
  - Dr LS Rathore, Ex Director General of Meteorology (IMD) & Consultant-World Bank
  - Dr DS Pai, Scientist-G and Head (Hydrology & Agromet) IMD, New Delhi
  - Dr Anumeha Dube, Scientist-E, NCMRWF, New Delhi
  - Dr Raju Mandal, Scientist-D, IITM, Pune

- *Associations (AAM, IMS) / Others*
  - Dr KK Singh, President- AAM & Ex ADGM & Head Agromet, IMD, New Delhi
  - Dr Anand Sharma, President-IMS & Ex-ADGM, IMD, New Delhi
  - Dr SB Yadav, Secretary- AAM & Agrometeorologist, AAU, Anand
  - Dr KK Dakhore, Jt Secretary- AAM & Agrometeorologist, VNMKV-Parbhani

- *Innovative Farmers / Others*
  - Sri Ramasamy, Village - Shettipally, Mandal - Amangal, District - Rangareddy.
  - Sri Suresh Kumar Reddy, Village & Mandal - Yalal, District - Rangareddy.
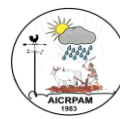 - Sri Arjun Rao, Village- Hegdoli, Mandal- Rudrur, District - Nizamabad.

- **Photo Gallery**

During Inaugral Sessions Digntaries on Dias while releasing the Book entitled 'Agricultural Meteorology' authored by Prof BV Ramana Rao & Dr V Uma Maheshwara Rao

Group Photograph

Acknowledgments

*The Association is deeply indebted to **Dr SK Chaudhari, DDG (NRM), Indian Council of Agricultural Research** for assured pledge of Council's NRM division in promoting advance research in agrometeorology and related services particularly in use of weather forecasts in preparing Agrometeorological Advisories.*

*The Association also wishes to place on record the tactical support of **Dr RC Agarwal, DDG (Ag Education)** for commendable recommendation towards implementing the revised model Agricultural Meteorology syllabus suggested by the domain experts.*

On behalf of Association of Agrometeorologists, I take this opportunity to express a deep sense of gratitude to Dr VK Singh, Director, CRIDA; Dr LS Rathore, former DGM, IMD & Permanent Representative of India at WMO, Geneva; Dr B Venkateswarlu & Dr S Pashupalak (former Vice Chancellors); Prof BV Ramana Rao (Chairman, Advisory Board-AAM); Dr GGSN Rao, Dr VUM Rao, Dr P Vijay Kumar (all former PCs of AICRPAM); Dr SK Bal, PC of AICRPAM, ICAR-CRIDA; Dr N Subash, Vice President, AAM; Dr Surender Singh, Professor-Agril Meteorology, CCS HAU Hisar & former Vice President-AAM; Dr SB Yadav, Secretary-AAM & Agrometeorologist, AAU, Anand; Dr Anand Sharma, President-IMS; Other Officers/Experts from CRIDA, AICRPAM; SAUs/ CAUs/ IMD/ NCMRWF/ IITM/ ICRISAT/ Private Institutes etc, Office bearers of Association of Agrometeorologists and other stake holders for their active participation, expert opinion, prophet guidance and precious input for making tangible recommendations to strengthen regional capability for effective utilization of meteorological services in Agriculture and Allied Sectors.

June 5th, 2024   *(**Dr KK Singh**)*

President- Association of Agrometeorologists
Former Head, Agromet Division & Additional Director General / Scientist 'G'
India Met Department, Ministry of Earth Sciences, New Delhi, India

June 2024

Weather & Agriculture

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