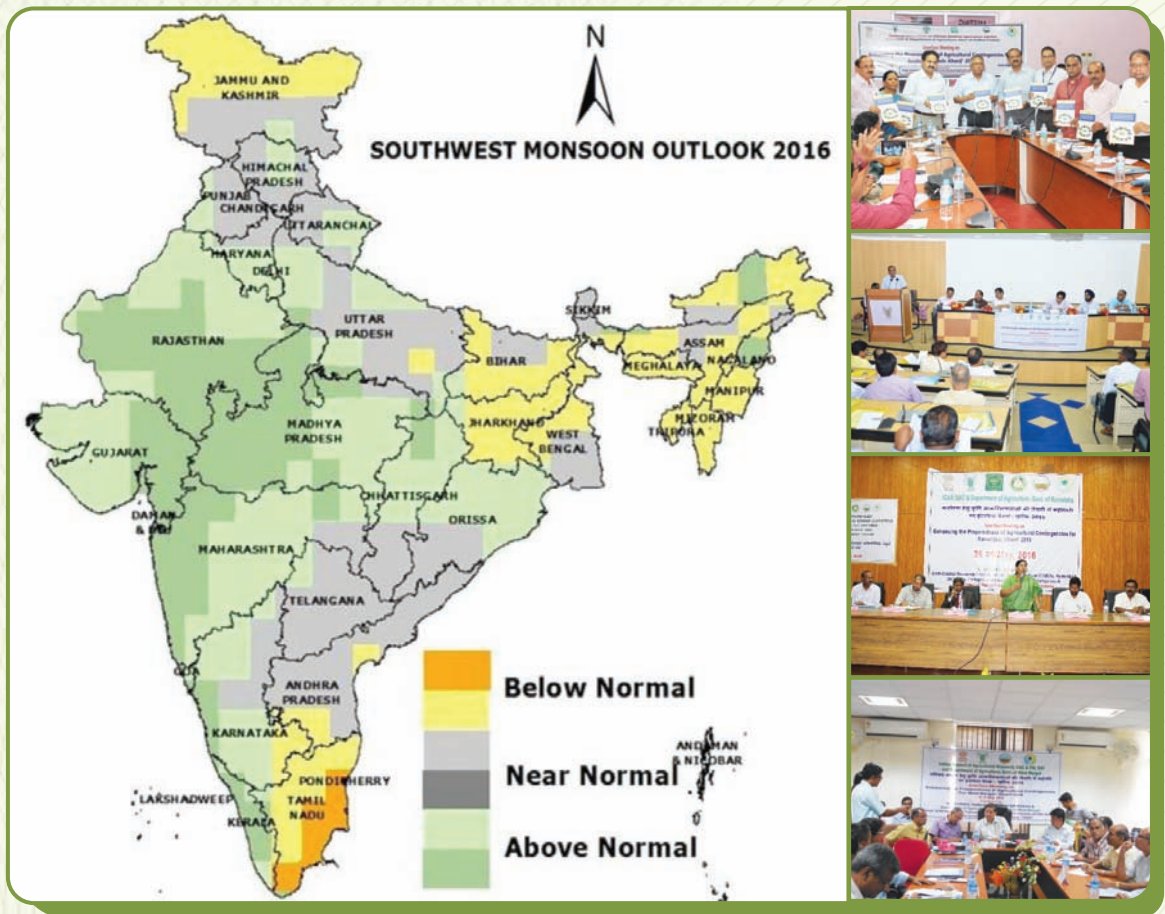




## Preparedness for Agriculture Contingencies - Kharif, 2016 Summary of Interface Meetings and Way Forward



ICAR-Central Research Institute for Dryland Agriculture (ICAR-CRIDA)  
Hyderabad  
Indian Council of Agricultural Research, New Delhi



# Preparedness for Agriculture Contingencies-Kharif, 2016

## Summary of Interface Meetings and Way Forward

Ch. Srinivasa Rao, K.V. Rao, S. Desai, A.V.M. Subba Rao,  
Md. Osman, I. Srinivas and S.S. Balloli



**ICAR-Central Research Institute for Dryland Agriculture  
Hyderabad, India**

Indian Council of Agricultural Research, New Delhi



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**TRILOCHAN MOHAPATRA, Ph.D.**  
SECRETARY & DIRECTOR GENERAL



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## FOREWORD

Increased frequency of occurrence of extreme weather such as droughts, floods, hailstorms, unseasonal rains and heat wave, etc., are inflicting serious economic losses especially to small and marginal farmers in the country leading to agricultural distress. To cope with such contingency situations, District Agricultural Contingency Plans for 614 districts have been developed by ICAR-CRIDA in technical collaboration with stakeholders from National Agricultural Research Systems including SAUs, KVKs and line departments. These plans are placed on the websites of Ministry of Agriculture & Farmers' Welfare, Government of India, ICAR and Kisan portal for utilization by State Governments. It gives me pleasure to share that this effort of ICAR was recognized at the highest level, Government of India.

Since 2014, ICAR-CRIDA along with DAC and State Government Departments is organizing interface meetings both at national and state level before the commencement of *kharif* season to enhance preparedness of the State governments to overcome anticipated weather aberrations during crop season. In these meetings, an appraisal is made on the critical analysis of the weather during crop season based on weather forecast by IMD and other agencies (SASCOF) and advocating the steps to be taken to face any weather related aberrations to state Government departments.

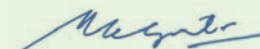
During 2016, such meetings were held across 12 states, viz., Andhra Pradesh, Assam, Bihar, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Rajasthan, Telangana and West Bengal by involving various stakeholders. I am happy to note that State Governments are sensitized about the agricultural contingencies and the systems are evolving to address these issues in a holistic way for the ultimate benefit of the farming community of the country. In addition, model systems are being developed at cooperating centres of AICRPDA for operationalization of these plans on real time basis through NICRA, which are shared during these interactions.

These interface meetings in different states will not only help the state Government officials to develop district action plans in terms of interventions to be adopted by the farmers but also policy fillip for smooth operationalization of these plans. Participation of the SAUs and ICAR Institutes present in the State help to identify researchable issues to find out plausible solutions to meet contingencies.

I am very happy that ICAR-CRIDA has compiled the proceedings of the interface meetings of 2016 in the form of a bulletin along with a way forward to address several issues relating to operationalization. There is an urgent need for establishment of Agricultural Contingency cells in State Governments as well as in SAUs and Centralized Nodal Institutions within DAC to deal with agricultural contingency implementation.

I hope this effort will continue in the years to come by ICAR for the betterment of farming fraternity for managing weather aberrations and extreme climatic events so that Indian Agriculture becomes more resilient, which ultimately contributes to the food security of the country.

Dated the 13<sup>th</sup> October, 2016  
New Delhi

  
(T. MOHAPATRA)





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## 1. Introduction

During the last few years, extreme weather events leading to drought, floods, unseasonal rains, etc., necessitated the Central-and-State-Governments to initiate short-and long-term measures to overcome them so that the losses to agriculture production in India are minimized. However, for planning and executing such measures, there is a need for a technical document prepared in consultation with all stakeholders to ensure that the measures deliver the desired benefits to the targeted clientele. In this backdrop, ICAR-CRIDA in association with NARS and one such initiative by the Department of Agriculture and Cooperation, Ministry of Agriculture and Farmers' Welfare, Government of India was to prepare the District Agriculture Contingency Plans (DACP) covering all sectors of agriculture including field crops, horticulture, livestock, poultry, fisheries, etc., so that the line departments at district level implement suitable actions following the event.

A total of 614 DACPs were prepared so far out of targeted 651 rural districts of India (Fig. 1) and are available on websites <http://farmer.gov.in/>; <http://agricoop.nic.in/acp.html>; and <http://crida.in/>.

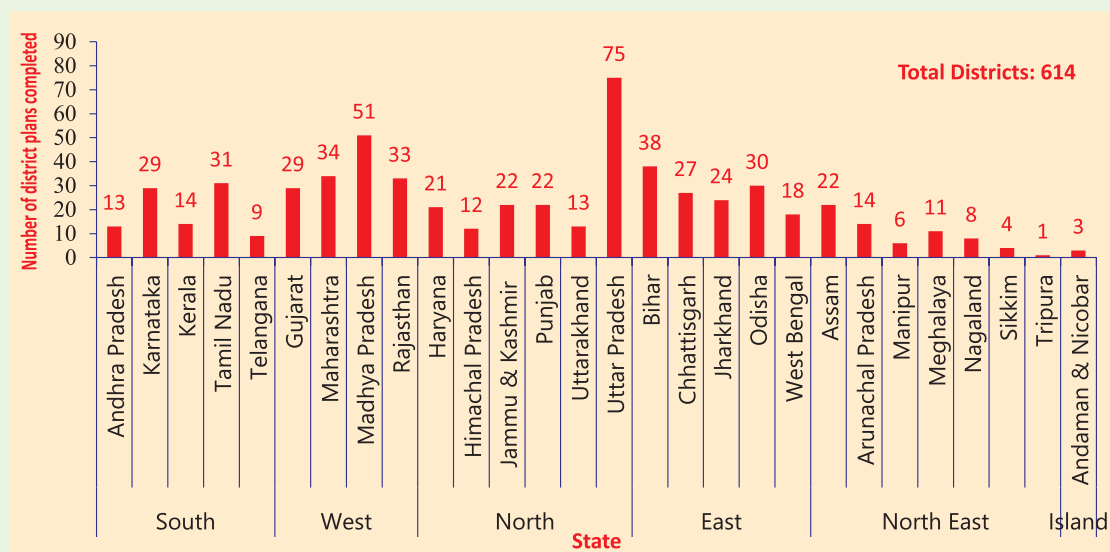


Fig. 1. Region wise district agricultural contingency plans developed till date (state-wise)

For enhancing preparedness and implementation of these plans, ICAR with DAC organizes national and state-level interface meetings which are coordinated by ICAR-CRIDA. During the months of May, June and July 2016, interface meetings on '**Enhancing the Preparedness for Agricultural Contingencies during Kharif 2016**', were arranged across the country, details of which are given in Table 1.



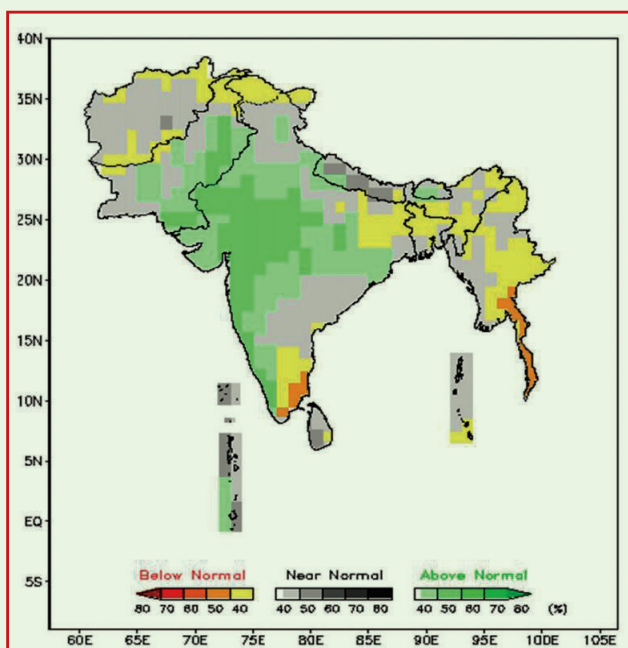
Table 1. State-wise interface meetings held for enhanced preparedness during May-July, 2016

S.No	Date	Location	State
1.	11 <sup>th</sup> May	Kurnool	Andhra Pradesh
2.	14 <sup>th</sup> May	Pune	Maharashtra
3.	17 <sup>th</sup> May	Hyderabad	Telangana
4.	24 <sup>th</sup> May	Ranchi	Jharkhand
5.	26 <sup>th</sup> May	Bengaluru	Karnataka
6.	30 <sup>th</sup> May	Patna	Bihar
7.	31 <sup>st</sup> May	Kolkata	West Bengal
8.	21 <sup>st</sup> June	Bhopal	Madhya Pradesh
9.	23 <sup>rd</sup> June	Ahmedabad	Gujarat
10.	27 <sup>th</sup> June	Guwahati	Assam
11.	28 <sup>th</sup> June	Umiam, Shillong	Meghalaya
12.	4 <sup>th</sup> July	Jaipur	Rajasthan

The main purpose of these meetings was to appraise the seasonal weather forecast for South-west monsoon (SWM) of India Meteorological Department (IMD) the thrust was on anticipated weather aberrations, contingency measures to be taken up and to develop action plan for implementation by involving all stakeholders at district level. The participants of these meetings were State and district/division level senior officials from departments of Agriculture, horticulture, animal husbandary and fisheries; representatives of DAC; senior officials of SAUs; representatives of ICAR institutes, KVKs and AICRPs in the state; seed agencies; other relevant line department officials and progressive farmers under NICRA-TDC.

## 2. Forecast for South-west Monsoon over South Asia -2016

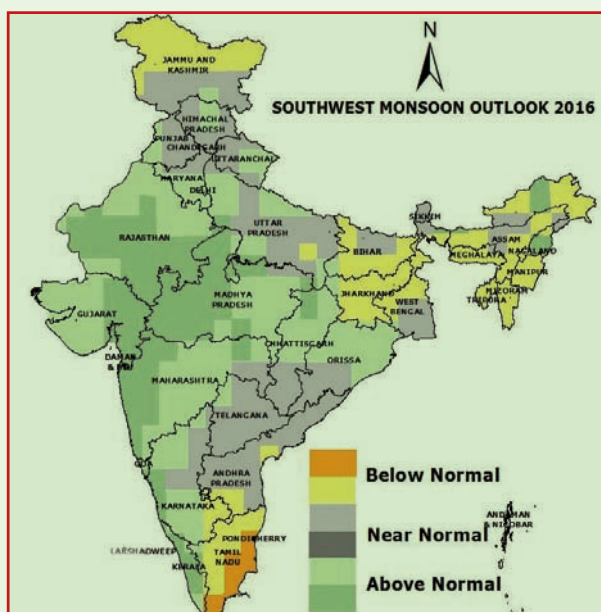
Considering several factors over the globe, the **South Asian Climate Outlook Forum (SASCOF-8)** under WMO has provided a Consensus Statement during 25-26 April 2016 on the likely performance of SWM 2016 over South Asia (Fig. 2). The report suggested above-normal rainfall (most likely) during (June – September). However, more specifically, above-normal rainfall was forecasted over broad areas of central and western South Asia and below-normal rainfall over eastern parts of the region and the south-eastern part of the peninsula and normal rainfall over the remaining areas with higher probabilities.



*Fig. 2: Forecast of likely South-west monsoon rainfall during 2016 for South Asia (1° lat x 1° long grid)*

## 2.1 Forecast for South-west monsoon over India

The forecast for India has been extracted which indicated that rainfall will be near normal to above normal (Fig. 3). Parts of Bihar, Jharkhand, North-eastern states, parts of Andhra Pradesh, Karnataka and Tamil Nadu are likely to receive below normal rainfall. Further, district boundaries were overlaid to look at the district-wise probability of SWM rainfall for each state. This helped in identifying the likely situation at district level of a state during the season, based on which the preparedness campaigns were taken up. Similar forecast was made by IMD predicting all India average rainfall around 106% of long period average (LAP) with a deviation of 5%.



*Fig. 3: All India forecast of South-west monsoon rainfall during 2016*



## 3. State-level Contingency Preparedness Interface Meetings

### 3.1 Andhra Pradesh

The SWM rainfall situation was near normal across the state except in parts of districts of Anantapur, Chittoor, Kadapa and Guntur (Fig. 4).

Figure 5. shows that (a) around 28 mandals located in southern Anantapur district were likely to get below normal rainfall, whereas (b) more than half of Chittoor district was likely to experience below normal rainfall situation. In Kadapa, around 12 mandals and in Guntur district around 30 mandals were likely to face the deficit rainfall condition.

Rainfall situation in Krishna and Prakasham districts was likely to be near normal except around 11 mandals of southern Krishna district and 12 mandals of eastern Prakasham district were likely to face below normal rainfall condition during the season (Fig. 6)

In the light of deficit monsoon rainfall prediction in central and southern Andhra Pradesh, an interface meeting for enhanced preparedness for *kharif*, 2016 was jointly organized by ICAR-CRIDA, Government of Andhra Pradesh and DAC on 11<sup>th</sup> May, 2016 at Kurnool, Andhra Pradesh. Sri T. Vijay Kumar, Special Chief Secretary, Government of Andhra Pradesh, Sri K. Dhananjay Reddy, IAS, Director of Agriculture, Managing Director of Andhra Pradesh Seed Corporation, University officials of ANGRAU, State Agriculture Department officials, Heads of KVKs, representatives of local ICAR Institutes and AICRPDA, DAATT Centres, farmers from NICRA-TDC villages, press and media attended the workshop.

Sri T. Vijay Kumar, thanked ICAR for this initiative and opined that contingency plans should entail augmenting the seed supply along with equal focus on management aspects. He also explained various development programs initiated by Government of Andhra Pradesh towards climate change and resilient agriculture like "Million Farm Ponds", Tree-Water, renovation of tanks, integrated farming systems, drought proofing of villages, river linkages, etc., Sri Dhananjaya Reddy, while presenting the impacts of contingency plans during 2015-16 drought year, appreciated the combined effort made by ICAR-CRIDA, ANGRAU and Government of AP in managing drought

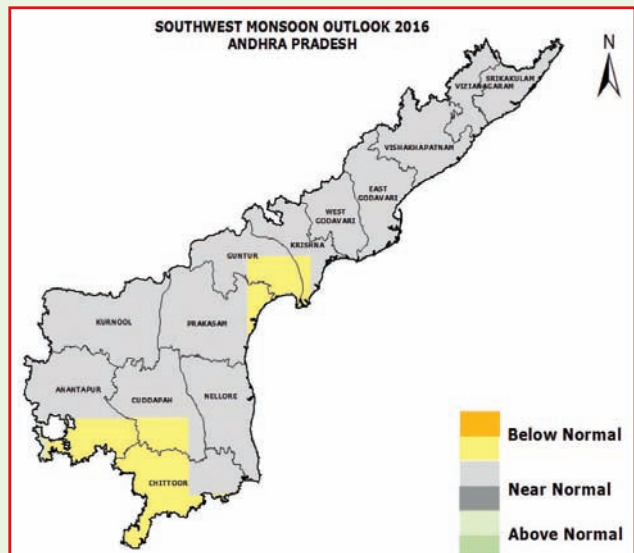


Fig. 4: Forecast of South-west monsoon for Andhra Pradesh during 2016

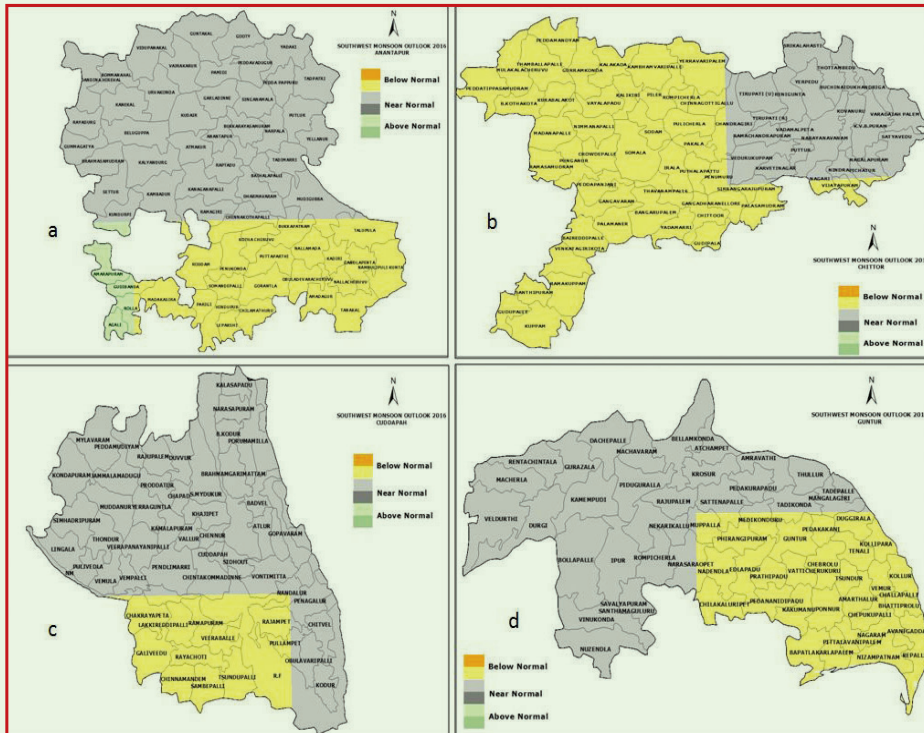


Fig. 5: Forecast of South-west monsoon for selected (a) Anantapur, (b) Chittoor, (c) Kadapa and (d) Guntur districts of Andhra Pradesh

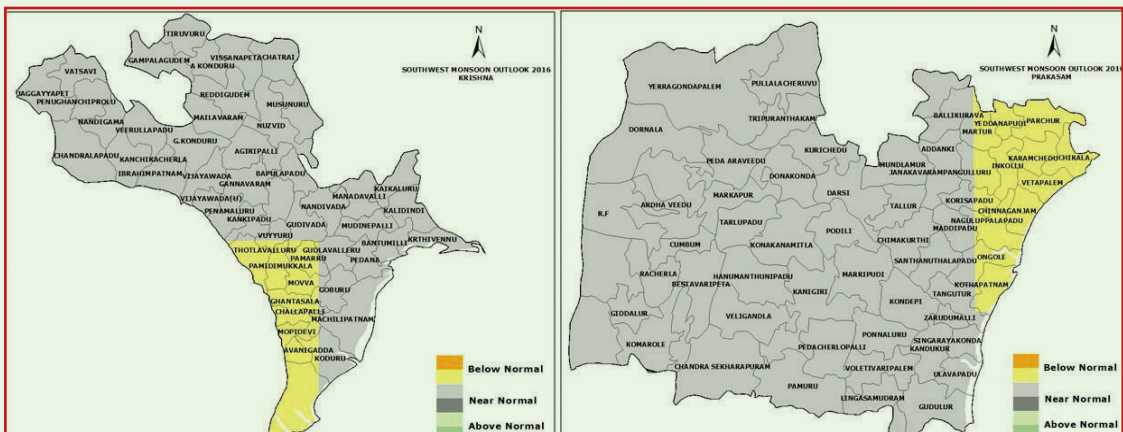


Fig. 6: Forecast of South-west monsoon for Krishna and Prakasam districts of Andhra Pradesh





in Rayalseema region and also in Krishna basin where river water releases were less. Action plans on contingency preparedness and interventions for all 13 districts were presented by ADA/JDA and finalized covering short, medium and longterm interventions including increased cropping intensity, cover crops, etc. Farmers from NICRA adopted villages explained as how they were benefited by various technologies for drought-proofing implemented under NICRA to save their crops and in achieving higher productivity.



## Recommendations

1. In-season management of rain water holds the key compared to seed, therefore, more emphasis need to be on resource management to cope with adverse impacts of weather aberrations.
2. Advisory to be issued to farmers not to grow cotton in light textured soils, if grow it is to be combined with suitable *in-situ* and farm pond technology is essential with.
3. Promotion of intercropping systems involving millets and pulses like :
  - a. Setaria + pigeonpea.
  - b. Groundnut + pigeonpea in Anantapur.
4. District authorities were advised to prepare contingency plans for irrigated areas of Krishna basin.
5. The advisory should clearly mention the sowing window of a particular crop and later it shouldn't be grown.
6. Promote mechanization in general and for sowing in particular as the sowing window is very narrow.
7. District-wise seed requirement for contingency crop and varieties to be made considering 10% of area cultivated for each crop.
8. Multi crop models (*Navadhanya* model) to be encouraged in low to medium rainfall zones.
9. Regular video conference meetings to be held with district authorities on updated weather forecast and progressive monsoon situation.
10. Training plan to be developed for MPEOs (Multi Purpose Extension Officers) in the agriculture department on contingency planning.
11. Supply of farm equipment like wetpod thresher, Ananta Planter in groundnut growing areas on village basis in custom hiring mode to promote timely operations.



12. Promotion of innovative tree plus crop models to have green canopy cover over the soil round the year for improving soil health.
13. Fodder-based systems to be encouraged as livestock suffer the most during natural calamities.
14. In tail end command areas, promote greengram/ blackgram crops and varieties which are disease tolerant and bold seeded.
15. Area under summer cotton to be reduced drastically to break the pest cycle.
16. Government of Andhra Pradesh has planned one million ponds, the water use efficiency of harvested water needed to be enhanced and made use for commercial crops and promotion of micro irrigation system.

### 3.2 Maharashtra

Above normal rainfall was expected in Maharashtra state except some parts of Nagpur division. Nasik, Konkan and parts of Pune divisions were expected to get above normal rainfall with 80% probability, whereas some parts of Pune division, Aurangabad division and Amravati division were likely to get above normal. Some parts of Nagpur division and Amravati division were likely to experience near normal rainfall (Fig. 7).

An interface meeting on enhanced preparedness in Maharashtra for *Kharif* 2016, was jointly organized by ICAR-CRIDA, DAC, Government of Maharashtra and DAC on 14<sup>th</sup> May, 2016 at Pune, Maharashtra. Sri Vikas Deshmukh, Commissioner (Agriculture), Sri KV Deshmukh, Director (Agriculture), Dr KD Kokate, Director (Research), MPKV, Rahuri, Representatives of IMD, Officials from Mahabees, University officials of VNMKV, Parbhani, MPKV, Rahuri, PDKV, AKola, KKV, Dapoli, State Agriculture Department officials, Heads of KVKs, representatives of local ICAR Institutes and AICRPDA, AICRPAM centres, NICRA farmers attended the workshop.

More emphasis was made to address high intense rainfall events which may occur during above normal rainfall years through land management efforts.

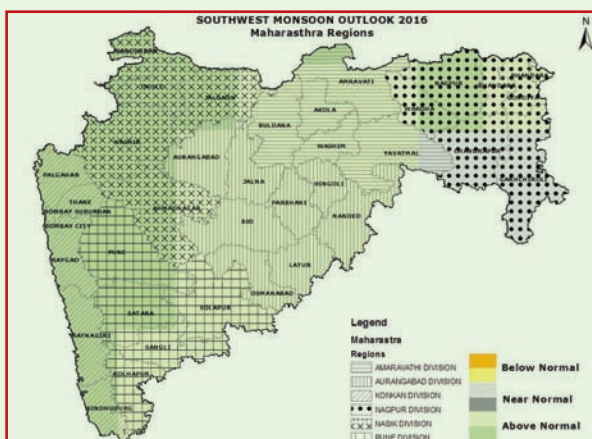


Fig.7: Forecast of South-west monsoon 2016 for different divisions of Maharashtra during 2016





Important aspects discussed was water logging in black soils region during intense rains. The discussions also focussed on measures for horticulture, livestock, horticulture systems, updation of contingency plans by Universities, utilisation of harvested water in case of mid-season dry spells, developing contingency measures for dry spells of more than 40 days, crop diversification as long term measures, use of micro irrigation system on a large scale, supply of breeder seed by universities for contingent crops, etc. The Chief Scientists of AICRPDA centres, Heads of NICRA-TDC- KVKs located in Maharashtra informed about efforts made during last year to overcome dry spells of different duration through management interventions.

### Recommendations

1. Updating of district wise contingency plans considering past drought years experiences.
2. Promotion of JS-9305 variety of soybean and intercropping of soybean with pigeonpea (4:2).
3. Supply of sprinkler sets at 50% subsidy for efficient water utilization.
4. Crop diversification as 2/3 area of Maharashtra is under cotton and soybean to other crops like millets and pulses.
5. Awareness campaign on pink boll worm, white fly and their control measures in cotton.
6. Instead of sole cotton, promotion of intercropping of cotton with greengram in 1:1 row ratio.
7. Opening of conservation furrows, recharge of bore wells and promotion of farm ponds for *in-situ* and *ex-situ* conservation of rainwater.
8. Promotion of fodder crops to mitigate short supply of fodder for livestock.
9. Sericulture was found to be an alternate remunerative enterprise in years of drought and need promotion.
10. Promotion of land treatments for draining excess rainfall events as per forecast.

### 3.3 Telangana

The projection of SWM rainfall over Telangana was likely to be near normal in all the districts except some parts of Adilabad and Nizamabad districts. Mandals which were likely to get above normal rainfall (Fig.8).

The district map of Adilabad shows that the western side around 20 mandals were likely to receive above normal rainfall and remaining blocks were likely to get normal rainfall; Whereas, in the Nizamabad district almost three-fourth part of the total blocks were likely to receive above normal rainfall remaining blocks down south were likely to get near normal rainfall (Fig. 9).

An interface meeting on enhanced preparedness for agriculture contingencies in Telangana for *Kharif* 2016 was jointly organized by ICAR-CRIDA, Department of Agriculture, Government of Telangana and DAC on 17<sup>th</sup> May, 2016 at ICAR-CRIDA, Hyderabad. Sri C. Parthasarathi, Principal Secretary (Agriculture), Smt GD Priyadarshini, Commissioner (Agri), Dr D Raji Reddy, Director (Research), PJTSAU, State Agriculture Department officials, Heads of KVKs, representatives of local ICAR Institutes, AICRPDA, AICRPAM centres and NICRA farmers attended the workshop.





Though monsoon forecast was expected to be normal to above normal for different districts of Telangana, a caution was given considering that 40% of rainfed crops are to be sown before the end of June. More emphasis was made on promotion of land management practices (broad bed furrow, conservation furrows in soybean and cotton growing areas) and risk minimization technologies among rainfed farmers including crop diversification from cotton to oilseeds and pulses. The discussion also focused on improving soil health coupled with water harvesting and management for sustainability of rainfed agriculture in the state. Special attention should be paid to prepare contingencies for drought prone mandals and the measures to bring in additional area under *ayacut* on a permanent basis. The sensitization of all farmers including non-loanee farmers to utilize the PMFBY (Prime Ministers Fasal Bima Yojana) to insure their crops.

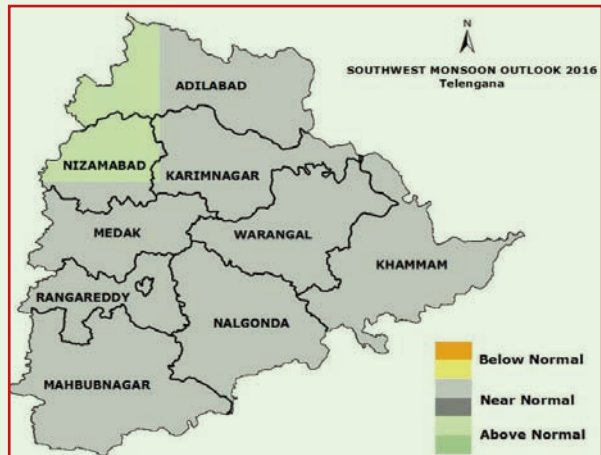


Fig. 8: Forecast of South-west monsoon for the state of Telangana during 2016



Fig. 9: Forecast of South-west monsoon for state of selected districts of Telangana (Adilabad and Nizamabad)



## Recommendations

1. Emphasis need to be given to promote agronomic management practices besides contingent seed supply.
2. Action Plans are to be more broad-based including the estimation of inputs required other than seed.
3. *In-situ* and *ex-situ* conservation measures are to be promoted for conservation of rainfall and reuse as lot of area covers light textured soils.
4. Meetings need to be conducted at district level along with other line departments such as Irrigation, Rural Development to plan for overcoming the long dryspells.
5. Strong efforts be made to utilize the water stored in tanks, farm ponds irrespective of the program under which they have been dug. Officials of agriculture department are advised to identify the sources of water for use during dryspells at village level.
6. Promotion of broad bed furrow technique across different soil types for effective *in-situ* conservation.
7. Adoption of paired row system along with conservation furrows in soybean + pigeonpea (4:2) ratio.
8. Prepare for extended monsoon period to enhance the area and production of pulses and oilseeds.
9. Direct seeding and alternate wetting and drying to be given top priority in cultivation of paddy.
10. Crop diversification, from cotton to millets and pulse crops.

## 3.4 Jharkhand

Above normal rainfall was expected in Garhwa, parts of Palamu, Latehar West Singhbhum and East Singhbhum districts of Jharkhand state, while remaining districts were likely to face deficit condition due to below normal forecast (Fig. 10)

ICAR-CRIDA in collaboration with Department of Agriculture and Cooperation, Gol and Birsa Agriculture University, Ranchi organized an interface meeting for enhancing the preparedness of agricultural contingences in *kharif* 2016 for Jharkhand at Ranchi on 24<sup>th</sup> May 2016. The meeting was chaired by Mr. Jata Shankar Choudhary, Director of Agriculture, Government of Jharkhand. Dr. KK Sharma, Director, IINGR and Dr. AK Singh, Head, ICAR-RCER, Directors of Research, BAU, Director (Seeds), BAU, Senior Agricultural Officers, Heads of KVKs, and other senior officials participated in the meeting.

Weather forecast analysis of the state during last year and efforts made to tackle the situation during 2015 *kharif* was presented by the department. The success of staggered nursery for paddy was highlighted and appreciated. In low rainfall districts like

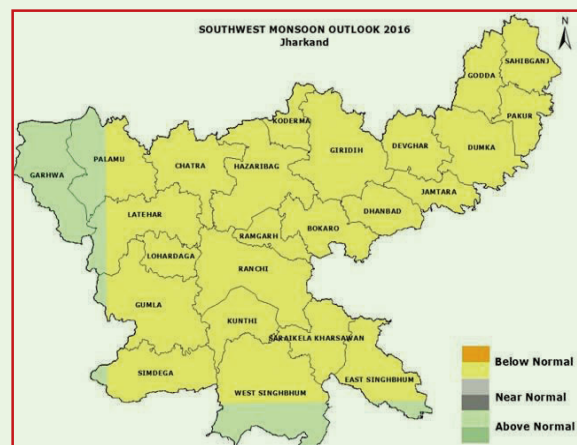


Fig. 10: Forecast of South-west monsoon for Jharkhand during 2016



Palamu, water conservation aspects were also tackled. Promotion of oilseeds and pulses in rainfed uplands was one of the major strategies being promoted by state government to reduce the risk of rainfed rice crop. In medium rainfall districts like Palamu, Garwah, mid lands are also being promoted for oilseeds and pulses. Wherever rainfed rice is being grown, the lands are treated with bunds for effective water conservation.



### Recommendations

1. Process to be hastened for procurement of seeds for pulses and oilseeds.
2. Uplands are to be promoted for growing pulses and oilseeds.
3. Harvested water in farm ponds constructed through Department of Agriculture/ MGNREGA to be used for protective irrigation during prolonged dry spells.
4. Use of farm seed could be promoted for oilseeds and pulses in case of non-availability of certified seed.
5. Awareness among farmers to be carried out on the seasons' forecast and contingency measures during krishimahostav. In spite of deficit rainfall, which is expected, crop production and productivity would be good if distribution of rainfall is proper.
6. Advisories at frequent intervals to be made through krishi portal.
7. Farmers be advised not to grow long duration rice varieties in Santhal Pargana region.
8. Popularize insurance among farmers and increase awareness on Pradhan Mantri Fasal Bhima Yojana (PMFBY).
9. Community nurseries are to be taken up in large scale for staggered planting of rice.
10. Suitable intercropping systems be promoted in uplands (groundnut + pigeonpea, maize+ bhendi).
11. Acreage enhancement be made with drought tolerant varieties in different crops.
12. Short duration crops are to be promoted through front line demonstrations by KVKs.
13. Sahabhazi variety of rice could be promoted in mid-lands instead of Naveen variety.
14. Available contingency seed with KVKs and Departments could be advertised in news papers along with cost and source of availability.
15. Direct Seeded Rice (DSR) to be promoted and machinery needed for DSR to be procured with available funds.
16. About 50% area in uplands could be brought under vegetable cowpea in Latehar district to reduce risk. Dual purpose soybean (Swarna Vasundhara) also could be promoted.



17. Efforts are to be made to enhance the area under sorghum, maize, finger millet on large scale in upland region as a part of NFSM.
18. Sand bag check dam to be promoted across stream for harvesting of water.
19. 5% model for water harvesting in individual farm holdings be taken up across rainfall regions.
20. Caution to be taken for promoting hybrids of rice in mid lands particularly in Dhanbad district.
21. Duration of varieties of rice be considered for raising staggered nurseries.
22. Perennial fruit trees and lac could be promoted in uplands as these systems are more resilient to droughts in the region.

### 3.5 Karnataka

Except South-western districts of Karnataka, all districts were likely to receive normal, above normal and excessively above normal rainfall during the season. In seven districts of South-western Karnataka deficit rainfall conditions (below normal rainfall) predicted, whereas Haveri, Dawangere, Bellary parts of Koppal, Raichur, Yadgir, Parts of Gulbarga and parts of Bidar were likely to get normal rainfall. Districts viz. Uttar Kannada, parts of Shimoga, Udipi, parts of Dakshina Kannada and Kodagu were likely to receive above normal rainfall with 80% probability. Remaining all districts were expected to receive near normal rainfall in the state (Fig.11).

ICAR-CRIDA in collaboration with Department of Agriculture and Cooperation, GoI, University of Agricultural Sciences, Bengaluru & Department of Agriculture, GoK organized an interface meeting for enhancing the preparedness of agricultural contingences in *kharif* 2016 for Karnataka at UAS Bengaluru on 26<sup>th</sup> May 2016.

Smt. G. Latha Krishna Rau, IAS, Additional Chief Secretary, Government of Karnataka, Dr. H. Shivanna, Vice Chancellor, UAS Bengaluru, Shri Pandurang B Naik, Commissioner (Agri.), GoK, Shri B. Y. Srinivas, Director (Agri.), GoK, Heads of various local ICAR institutes, key officials of Agriculture Department GoK, Heads of KVKs, representatives of NABARD, input agencies and scientists of various ICAR institutes participated.

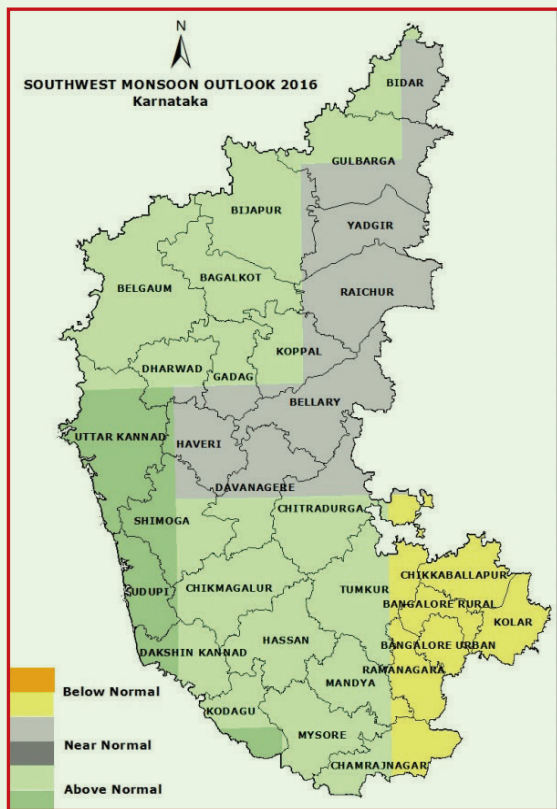


Fig. 11: Forecast of South-west monsoon for Karnataka during 2016





More emphasis was made to manage the early, mid and late season droughts through technological interventions for improving the productivity and livelihoods of the farmers. A special attention was given on the need for suggesting means and ways for providing/ meeting credit requirements of the farmers and also the need of utilizing the runoff water collected in the farm ponds efficiently. The discussion also focused on contingency plans for the coming *kharif* season and also their experiences in managing the drought conditions prevailed during the *kharif* season 2015-16.



### Recommendations

1. Promotion of pulses for meeting the nutritional requirement of the state.
2. Planting of pigeonpea on rice field bunds.
3. Increase in the area of minor millets across the state as a contingency measure for enhancing the rainwater use efficiency and nutritional security .
4. Promotion of efficient soil and nutrient management strategies for minimizing impacts of prolong dry spells.
5. *In-situ* moisture conservation measures to be implemented as 'must-do' practices.
6. Conservation furrows in Southern region and broad bed furrows (BBF) in Northern block soil regions of Karnataka to be promoted with suitable farm machinery.
7. Long duration cotton varieties/hybrids to dissuaded in late onset conditions.
8. Focus to be given on large scale use of micro irrigation systems in rainfed horticulture and vegetables.

### 3.6 Bihar

Above normal rainfall was predicted in the district Rohatas, whereas Sithamarhi, Madhubani, Saharsa, Madhepura, Muzaffarpur, Vaishali, Samasthipur and Darbhanga districts were likely receive near normal rainfall. All the remaining districts of Bihar were expected to receive below normal rainfall (Fig. 12).

An interface meeting was organized jointly by ICAR-CRIDA and ICAR-Research Complex for Eastern Region, Patna on 30<sup>th</sup> May, 2016. More than 60 officials from ICAR institutes, KVKs, SAUs and CGIAR institutes in Bihar participated in the meeting. More emphasis was laid on the implementation of the various interventions in contingency plan that should be made location and situation specific and there is a need to create awareness among the farmers and line departments about preparedness to overcome flood or drought situations. The discussion also focused on the concept of seed management as an important strategy and stress tolerant short and medium duration varieties of rice and pigeonpea need to be promoted in the state. Farm

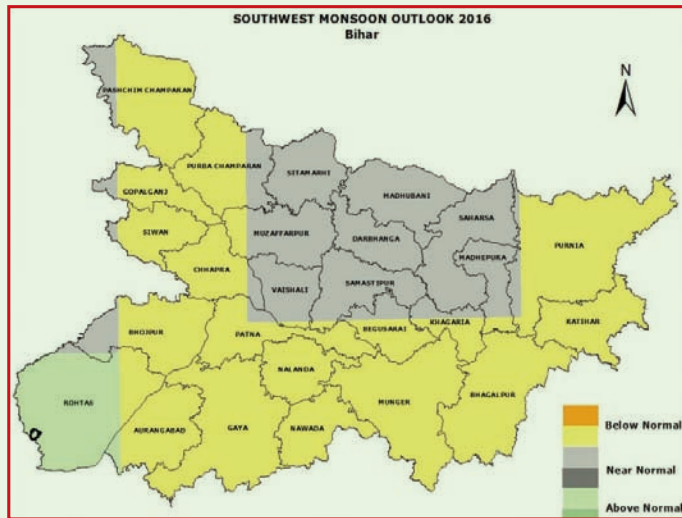


Fig. 12: Forecast of South-west monsoon for Bihar during 2016

mechanization is very necessary in the region and promotion of drought proofing measures like *in-situ* moisture conservation and rain water harvesting is needed in southern Bihar and flood water diversion management in upper Bihar.

### Recommendations

1. Climate resilient practices like community-based staggered nursery, mechanical transplanting, etc. need to be promoted.
2. As the short duration varieties of rice are more preferred for contingency, seeds of short and medium duration varieties of rice need to be produced by line departments in collaboration with KVKs and Universities.
3. Since the area of pigeonpea and other pulses is decreasing in the region, it needs to be promoted and short duration varieties need to be developed.
4. *In-situ* soil moisture conservation should be focused for contingency planning. Moisture conservation techniques like raised bed planting should be adopted. Small water harvesting structures need to be developed in large numbers.
5. Considerable area in the state exists under saline soils hence, salt tolerant rice varieties already developed by CSSRI, Karnal need to be promoted in the state.
6. Diversification with contingent crops like pigeonpea, blackgram, pearl millet, sesame, toria and small and minor millets is required.



7. Quality seed availability of contingent crops including fodder is a major problem therefore seed bank should be created in every zone. For fodder, at least 6% of the total cropped area is needed and field bunds may be utilized for this. Maize can also be promoted as fodder crop for livestock. Further, seed production of fodder should be included in seed chain.
8. Seed production of berseem needs to be taken in identified areas of Bihar.
9. Both the SAUs of the state have been requested to intensify the improved and stress tolerant varieties of pulses and oilseeds for the state.
10. Hailstorm is also becoming a regular phenomenon in the state; hence, it should also be kept in mind while making the contingency planning.
11. Demand aggregation of seed requirement of the district for different crops should be carried out in advance by all the KVKs. All the Heads of KVKs need to prepare a detailed report on seed requirement for each district, including varieties grown so as to submit it to Govt. of Bihar for contingency seed plan.
12. The KVKs need to validate contingency plans available so as to fine tune the cropping patterns.

### 3.7 West Bengal

Below to normal rainfall was expected in many districts of West Bengal during the South-west monsoon. Parts of West Midnapur and Alipurduar districts could receive above normal rainfall (Fig. 13).

ICAR-CRIDA in collaboration with Gol, ATARI, Zone-2 & Department of Agriculture, GoWB organized an interface meeting for enhancing the preparedness of agricultural contingencies in *kharif* 2016 for West Bengal at Kolkata on 31<sup>st</sup> May, 2016. Mr. Sanjeev Chopra, IAS, Additional Chief Secretary and Principal Secretary, Agriculture chaired the meeting. Dr. P. Bhattacharya, Director, Agriculture; Dr. GC Debnath, DDG, IMD; Additional and Joint Directors of Agriculture, Directors of Research of BCKV and UBKV; representatives of the Directors/Heads of regional stations of ICAR institutes in the state namely CRIJAF, NIRJAFT, NBSS&LUP, IVRI, CIFE, CIFA, CIBA, CIFPRI, CSSRI, NDRI; senior officials from agricultural universities and other staff participated in the meeting.

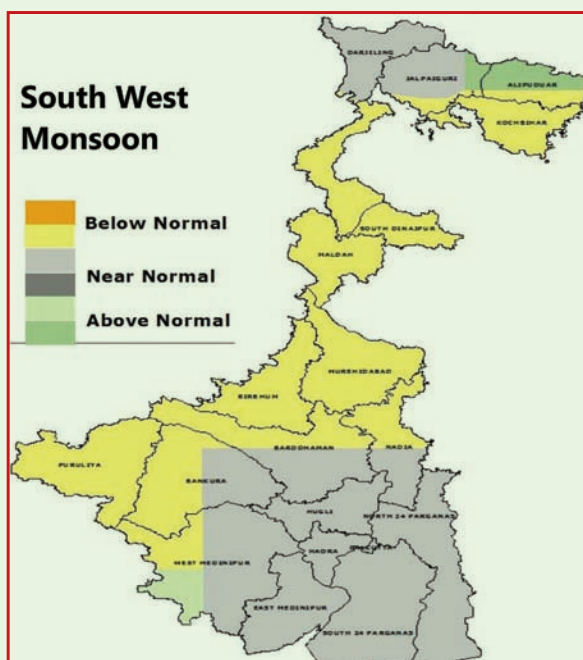


Fig. 13: Forecast of South-west monsoon for West Bengal during 2016



Dr. Debnath gave an overview of weather prediction for the *kharif* season. During interaction session, issues about seed and fodder banks were deliberated. The Chairman suggested for a meeting of all heads of departments of agriculture, horticulture and allied sectors must be held to give a holistic approach to the contingency planning. It has been suggested to prepare the seed requirement and other inputs requirement based on realistic assessment of each district and suggested to consider about 5-10% of the cropped area for contingency. All ICAR institutes also provided their inputs. Two farmers from NICRA-KVK villages shared their experience on management of weather aberrations through technological interventions.



### Recommendations

1. Considering rainfall pattern and agro-ecological conditions, interface meeting of all departments dealing with agriculture and allied sectors is required as they have equal contributions to sustainable livelihoods.
2. A mechanism should be in place for periodic as well as need based monitoring of agricultural situation during the crop season.
3. The state government as well as SAUs should have contingency cells with core subjects and prepare suitable advisories by obtaining the inputs from subject matter specialists as and when needed. The whole process should be harmonized for smooth operationalization of DACPs.
4. Machinery for multiplication of contingency crop seeds and other inputs in advance, mechanism for its distribution and disposal must be worked out for better implementation of the plans.
5. A district level monitoring and evaluation mechanism should be in place to document the impacts of contingency planning and also plug the gaps, if any.
6. Tehsil or Mandal or Block level as well as district level awareness programs should be conducted regularly to educate the farmers about the contingency plans, their implementation, and facilitation role played by different players including the availability of various options placed at the disposal of the facilitating bodies.

### 3.8 Madhya Pradesh

Major parts of Madhya Pradesh expected were to receive above normal with more probability during the SWM during 2016. Compared to eastern Madhya Pradesh, western Madhya Pradesh was expected to receive high rainfall with higher probability (Fig. 14).



An interface meeting on enhancing the preparedness for agriculture contingencies during *kharif* 2016 for Madhya Pradesh was jointly organized by ICAR-CRIDA, ICAR-Indian Institute of Soil Science (IISS), Department of Agriculture, Government of Madhya Pradesh and DAC on 21<sup>st</sup> June, 2016 at ICAR-IISS, Bhopal. Sri P.C. Meena, Agriculture Production Commissioner, Govt of MP, Sri Rajesh Rajora, Principal Secretary (Agriculture), Govt of MP,

Shri R.B. Sinha, Joint Secretary, DAC, MoA & FW, Sri M.L. Meena, Director (Agriculture), Dr A.K. Patra, Director, ICAR-IISS, state agriculture university officials, State Agriculture Department officials, Heads of KVKs, representatives of local ICAR Institutes and AICRPDA, AICRPAM centres, attended the workshop.

More attention was paid to address high intensity rainfall events which may occur during above normal rainfall years through land management efforts. Contingency plans for each district as the variability in rainfall is high with less number of rainy days coupled with high intense storms in recent years which is causing loss to farmers. The discussion also focussed on promotion of management practices such as broad bed furrow and ridge systems, farm ponds for runoff harvesting, organic mulching, zero tillage to improve soil health etc. as essential practices among farming community to meet long dryspells. It has been suggested that crop diversification, intercropping and agroforestry measures be promoted as climate resilient measures for climate

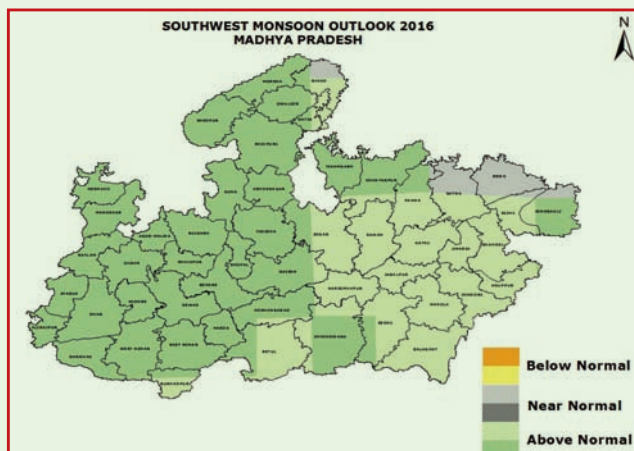


Fig. 14. Forecast of South-west monsoon for Madhya Pradesh during 2016

change. Sri ML Meena, explained that there needs to be a realistic action plan to be prepared based on the available contingency plans. He requested all district officials to prepare action plans based on the natural resources and cropping systems prevailing in the district. He also pointed out whenever necessary groundwater use to be promoted for supplemental irrigation as contingency measure. The Chief Scientists of AICRPDA centre and NICRA-AICRPDA presented the efforts made



during last year to overcome dry spells especially resource augmentation measures which are used for supplemental irrigation.

### Recommendations

1. Equal emphasis need to be given for both seed supply and management practices under contingency plans.
2. Better natural resource management practices to be promoted among farmers to overcome water stagnation problems due to high intense storms particularly in black soils.
3. A seed rolling plan to be developed for contingency crops in discussion with state agriculture universities so that sufficient quantity of seed for contingency crops would be available for distribution.
4. Farmers are to be dissuaded in cultivation of rice with groundwater and promoting rice through SRI cultivation method.
5. Realistic action plans are to be prepared by each district based on resources available and commodity specific.
6. Monthly meetings to be organized at district level with all stakeholders during the *kharif* season to address contingency scenarios.

### 3.9 Gujarat

Above normal rainfall was expected in western Gujarat state consisting Kutch, Dwaraka, Jamnagar, Junagadh, Porbandar, Rajkot, Somnath, Morvi and parts of Surendranagar, Botad, Bhavnagar, Patan and Banaskanta districts. Above normal rainfall with 80% probability was forecasted in the remaining districts situated in eastern and southern districts of Gujarat (Fig.15).

ICAR-CRIDA in collaboration with Department of Agriculture and Cooperation (DAC) and Department of Agriculture, Government of Gujarat organised an interface meeting on

23<sup>rd</sup> June, 2016 for enhancing the preparedness for agricultural contingencies during *Kharif* 2016 in the state of Gujarat. The meeting was chaired by Dr. SR Chaudhari, Director of Agriculture, Government of Gujarat and attended by Dr. RA Sherasiya, Director of Horticulture, Dr. KS Detroja, Additional Director Agriculture, Directors of Research and Extension of SAUs, Joint Directors of



Fig. 15: Forecast of South-west monsoon for Gujarat during 2016

Agriculture of different zones, district agricultural officers of all districts. Scientists of AICRPDA and AICRPAM centres, Heads of KVKs and input agencies participated.

Dr SR Chaudhari shared the department experiences in managing the weather aberrations during *kharif* 2015 and also department's preparedness for tackling any weather aberrations during *kharif* 2016. He also informed that during *kharif* 2015, Banaskantha district experienced 66 cm of rainfall in 48 hours leading to severe erosion of top soil and loss of standing crop of cotton. He explained that the groundnut and castor as contingent crops were raised successfully in place of cotton during the last two drought years.



It has been suggested to all District Agricultural Officers to ensure use of soil health cards by the farmers in decision making of fertilizer use as per the recommendations. The department is also promoting intercropping systems involving pigeonpea as an intercrop along with groundnut, maize, pearl millet and discouraging cotton due to high infestation of pink boll worm and its sensitivity to water stress. The Joint Directors of Agriculture, Horticultural Officers, KVK officials of the eight agro-climatic zones shared their experiences of 2015 and their plans for the current cropping season.

### Recommendations

1. *In-situ* conservation measures in long duration crops such as cotton and castor to be promoted to manage rainfall variability.
2. Residue recycling need to be promoted for improving soil organic carbon towards coping mid season droughts.
3. Broad bed furrows to be promoted to address high intense rainfall events in heavy textured soils
4. Individual farm holding wise water structures need to linked with PMKSY.
5. Groundnut and castor as contingent crops in place of cotton.
6. Promoting intercropping systems involving pigeonpea as an intercrop along with groundnut, maize, pearl millet, etc.
7. Discouraging cotton due to high infestation of pink boll worm.
8. Silage making needs to be emphasized to meet the off season fodder requirement.



### 3.10 Assam

Above normal rainfall with 80% probability was forecasted in the parts of Kokrajhar, Chirang and Dhemaji districts of Assam, whereas, near normal rainfall was likely in parts of Tinsukhia, parts of Dibrugarh, parts of Golaghat, parts of Lakhimpur, Sonitpur, Udalguri, Darrang, Marigoan and Korbi Anglong districts of Assam. Remaining districts of Assam state were likely to face deficit condition due to below normal forecast (Fig.16).

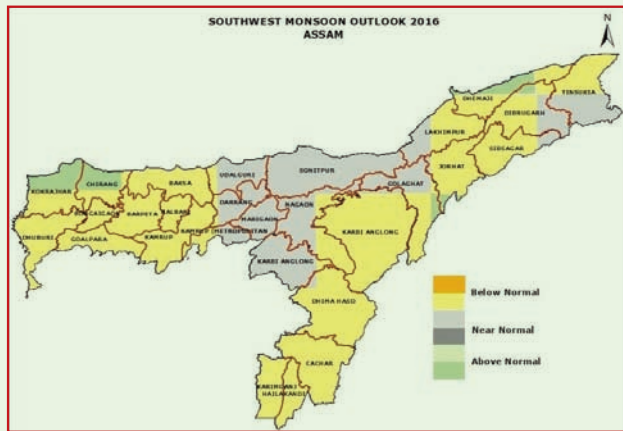


Fig. 16: Forecast of South-west monsoon for Assam during 2016

Interface meetings on enhancing the preparedness for agriculture contingencies such as floods and mid season droughts during *kharif* 2016 for North East Region were jointly organized by ICAR-CRIDA, ICAR Research Complex for North East Region, Umiam and DAC along with state departments of agriculture at Assam was conducted at Guwahati on 27<sup>th</sup> June, 2016.

Sri Amlan Barua, Secretary (Agriculture), Dr Kabindra Borkakati, Director (Agriculture), Dr Ch Srinivasa Rao, Director ICAR-CRIDA, Dr GN Hazarika, Director (Research), Assam Agricultural University, Dr BC Deka, Director, ATARI, Zone III, State Agriculture University officials, State Agriculture Department officials, Heads of KVKs, Representatives of local ICAR Institutes and AICRPDA, AICRPAM centres, attended the workshop at Guwahati.

Sri Amlan Barua presented the role and desired that village level worker, a link between the department and farmer should be made aware of the contingency plans and implementation



need to be made through them. He requested that interface meetings for North East region could be conducted in April/ May every year with the help of ICAR. It has been suggested to enhance the *rabi* cultivation in Assam specially with pulses and oilseeds and use the available technologies from AAU. ICAR-CRIDA scientists informed the status of monsoon and stressed upon the need for contingency preparation in view of below normal rainfall which may





impact the crops during mid or end of season and also for flash flood situations which are common in this region. The discussions also focussed on technologies developed at AAU both submergence tolerant rice varieties, natural resource management technologies for efficient use of available resources. It has been suggested for promotion of short duration rice varieties, staggered nursery planting in the event of post flood scenarios.

### Recommendations

1. Priority to be given for interventions to overcome flash flood and mid season/ terminal drought situations.
2. Village level extension workers to be appraised of contingency plans and to be involved actively in implementation.
3. Efforts to be made to promote farm ponds in every farm holding to face the mid season droughts.
4. Bund height needs to be increased for additional water storage in rice fields.
5. In flood prone regions, emphasis to be given for *rabi* action plans and link them up for enhancing production of pulses and oilseeds.
6. Flood tolerant varieties to be promoted as a long term measure in chronically flood affected districts
7. Diesel pumpsets on subsidy to be given to make use of shallow groundwater particularly mid season droughts.
8. Summer rice (*boro* rice) sowings to be completed before end of November to overcome terminal drought in March/April.
9. Short duration rice varieties are to be promoted in post flood situations.
10. Mid lands and uplands can be diversified with high value horticulture systems in place of rice.
11. Ensuring fodder availability and proper housing for livestock be given priority for livelihood stability.
12. Capacity building for district level officials to be taken up at AAU, Jorhat to convert contingency plans into action plans for implementation.
13. Agro-advisories and weather bulletins to be disseminated through local channels and SMSs.

### 3.11 Meghalaya

In Meghalaya, near normal rainfall was likely in parts of Ri Bhoi and West Jaintia hills. Remaining districts of Meghalaya state were likely to face deficit condition with the below normal forecast (Fig.17)

Interface meetings on enhancing the preparedness for agriculture contingencies such as floods and mid season droughts during *kharif* 2016 for Meghalaya was jointly organized by ICAR-CRIDA, ICAR Research Complex for North East Region, Umiam and DAC along with state departments of agriculture at Umiam on 28<sup>th</sup> June, 2016.

Dr Premjit Singh, Vice Chancellor, CAU, Dr Ch Srinivasa Rao, Director ICAR-CRIDA, Dr SV Ngachan, Director ICAR Complex for North East Region, Smt D. Syiemiong, Director (Agriculture), Meghalaya,



State Agriculture Department officials, Heads of KVKs, representatives of AICRPDA, AICRPAM centres, attended the workshop.

Below normal rainfall is expected during the *kharif* season as per IMD and SASCOF forecast and discussions focused on plan for mid season and terminal season droughts as well as flash flood scenarios. Crop diversification was discussed in detail and promote pulses and oilseeds in mid and uplands and short duration submergence tolerant varieties in low lands. Water scarcity is a constant problem in this state and the department should plan for long term measures with focus on rain water harvesting systems and enhancing the *rabi* area and production with micro irrigation systems. The discussion also focused on the availability of quality seed suited to the region. special emphasis was given to address drought and flood in districts of Meghalaya and the steps to be taken to conserve rainwater on streams through construction of check dams in large scale.

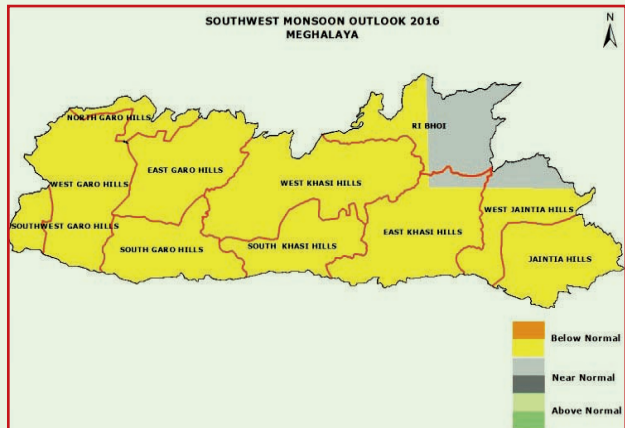


Fig. 17: Forecast of South-west monsoon for Meghalaya during 2016



## Recommendations

1. Priority for construction of check dams across streams for water storage with more funds from central schemes.
2. Efforts to be made to conserve the forests which otherwise enhances the risk of landslides, soil erosion with increased high intensity of rains.
3. Promotion of soybean and pigeonpea up on priority during *rabi* season.
4. Application of fertilizers in split doses to be promoted.
5. Low cost *jalkunds*, *treadle* pumps are to be promoted in the region.
6. Need to develop machines suiting to local conditions for enhancing their use by women farmers.
7. Crop rotation should be the norm for pest endemic areas.

8. Efforts be made to advance the planting rice to June month so as to get sufficient growing period for *rabi* crops.
9. Policy decision to be taken on relaxation of farmers contribution towards water harvesting structures.
10. Collection facilities to be created for storage of vegetables which are booming in the state
11. Awareness campaign to be made for village leaders on group farming, avoiding the stray cattle problem and other related issues.

### 3.12 Rajasthan

Above normal rainfall was likely in Bikaner, Ganganagar, Hanumangarh, Jhunjunu, Sikar, Alwar, Jaipur, Dausa, Bharatpur, parts of Barmer, Jalore and Sirohi districts of Rajasthan. Remaining all districts were Likely to get above normal rainfall with 80% probability (Fig.18).



Fig.18: Forecast of South-west monsoon for Rajasthan during 2016

Interface meetings on enhancing the preparedness for agriculture contingencies such as mid-season droughts, high rainfall events, during *kharif* 2016 for Rajasthan was jointly organized by ICAR-CRIDA, Hyderabad, ICAR-Central Sheep and Wool Research Institute, Avikanagar along with DAC, MoA&FW, Rajasthan state Agriculture Department on 4<sup>th</sup> July at Jaipur.

Sri Shard Godha, Additional Director (Horticulture), Shri SK Hudda, Joint Director (Agri), Dr Ch Srinivasa Rao, Director ICAR-CRIDA, Dr SMK Naqvi, Director ICAR-CSWRI, Dr OP Yadav, Director ICAR-CAZRI, Dr GL Keshwa, Vice Chancellor, Kota Agriculture University, Dr PS Rathore, Vice Chancellor, KN Agriculture University, Jobner, Dr Subhash Chandra, Director, DMD, Dr Rohilla, ATARI, Zone III, different state agriculture university officials, State Agriculture Department officials, Heads of KVKs, Representatives of local ICAR Institutes and AICRPDA, AICRPAM centres, located in the state attended the interface meeting.



The monsoon scenario during 2105-16 and the interventions taken to overcome the drought scenario during late season were discussed. More emphasis was laid on advisories to the farmers



to adopt mixed and intercropping systems during 2016. Contingency plans for all districts of Rajasthan were completed and are available in public domain and requested to make use and revise based on the local conditions. Presentations were made by district level officials on the preparedness in terms of alternate seed varieties, crops, management practices being advised, etc.

### Recommendations

1. Priority to be given for interventions to overcome mid-season/ late season drought situations.
2. Utilizing the harvested water in farm ponds for life saving irrigation during dry spells in view of the available water in farm ponds.
3. Promoting farm ponds for harvesting water from green houses which could be utilized for irrigating vegetables in green houses.
4. Encouraging farming community to make use of pipes for water distribution and sharing.
5. Deep ploughing to be encouraged for moth been cultivation.
6. Strip intercropping with farm mechanization to be promoted.
7. Universities may work for redesign of greenhouses considering the high speed winds in the regions. Tree based systems as wind barriers could be tried to reduce the speed of winds.
8. New varieties/ hybrids for pearl millet, guar are to be promoted extensively. State Dept. officials were advised to take up the seed available with state seed corporation for promotion.
9. Efforts are to be made to increase the cropping intensity under diggies.
10. With diggies being promoted in the state on a large scale, area under irrigation could be enhanced under irrigation with saved water and by changing the cropping pattern.
11. A pre *rabi* meeting to be conducted at ICAR-CAZRI for better planning in the rainy season also.
12. Custom hiring centers experiences in NICRA under TDC and AICRPDA are to be shared with department officials.
13. The centers of NICRA by AICRPDA and KVK are to be used as learning centers for both district officials and farming communities. Department officials are advised to take farmers on visit to these centers under ATMA programme.
14. The location specific advantages such as Banswara for mango to be developed.
15. Focus to be given to bring in better management practices for higher income and better livelihoods by diversification.





## 4. Summary

The ICAR-CRIDA along with DAC, Ministry of Agriculture and Farmers' Welfare organised interface meetings with officials of agricultural departments in 12 states during May-July 2016 to apprise them about the south-west monsoon outlook as made out by national and international agencies and the steps to be taken for managing weather aberrations. Though the prediction for the entire country is expected to be above normal (106% of long term average), the prediction indicated that traditionally high rainfall areas in eastern and North-eastern regions receive normal to less than normal rainfall and western regions were likely to receive high rainfall. Based on this information, the focus was laid on mid- and end-of-season drought management for eastern and North-eastern regions whereas management of excess rainfall in western and central region. In 12 state-level interface meetings organised before the commencement of the season, some salient recommendations were emerged such as organizing mass training and awareness programs for staff at sub-district level, land management practices for drought management, suitable fund allocation for implementation of contingency plans, advance planning and procurement of contingency seed, establishment of contingency cells at university and district agriculture departments, etc.

## 5. Way forward

To make the district based agriculture contingency plans relevant to real-farm scenarios, there is a need for a developing a cohesive action plan defining role of each of the stakeholder supported by research, development and policy backstopping. The overall implementation strategy of contingency plans involve (a) preparedness (b) in-season response on real-time basis and (c) relief and rehabilitation. The district agricultural contingency plans (DACP) are technical documents detailing the interventions to be taken up by stakeholders for various weather aberrations. With climate change looming large over as witnessed during last few years across states in India, it is necessary to make these plans dynamic by updating the information on a) new technologies developed; b) improved seed varieties, c) linkage with new developmental programmes and d) sharing of experiences on handling the recent weather aberrations across states etc. A strategy framework for effective implementation of DACPs is shown in Fig. 19, where in need for creation of teams and their interlinking at various levels is presented. To make these plans implementable at field level, the issues need to be addressed under R&D and policy fronts and the anticipated roles to be played by various organizations are as below.

### **Department of Agriculture, Cooperation and Farmers' Welfare (DAC &FW)**

- A nodal cell may be created at national level at DAC under MoA & FW with Agriculture and allied departments under Ministry to monitor the implementation of contingency plans in different state governments through state level nodal institution.
- Policy backstopping to leverage funds through convergence crosscutting implementing agencies for various interventions.



## Contingency Plan Implementation Strategy

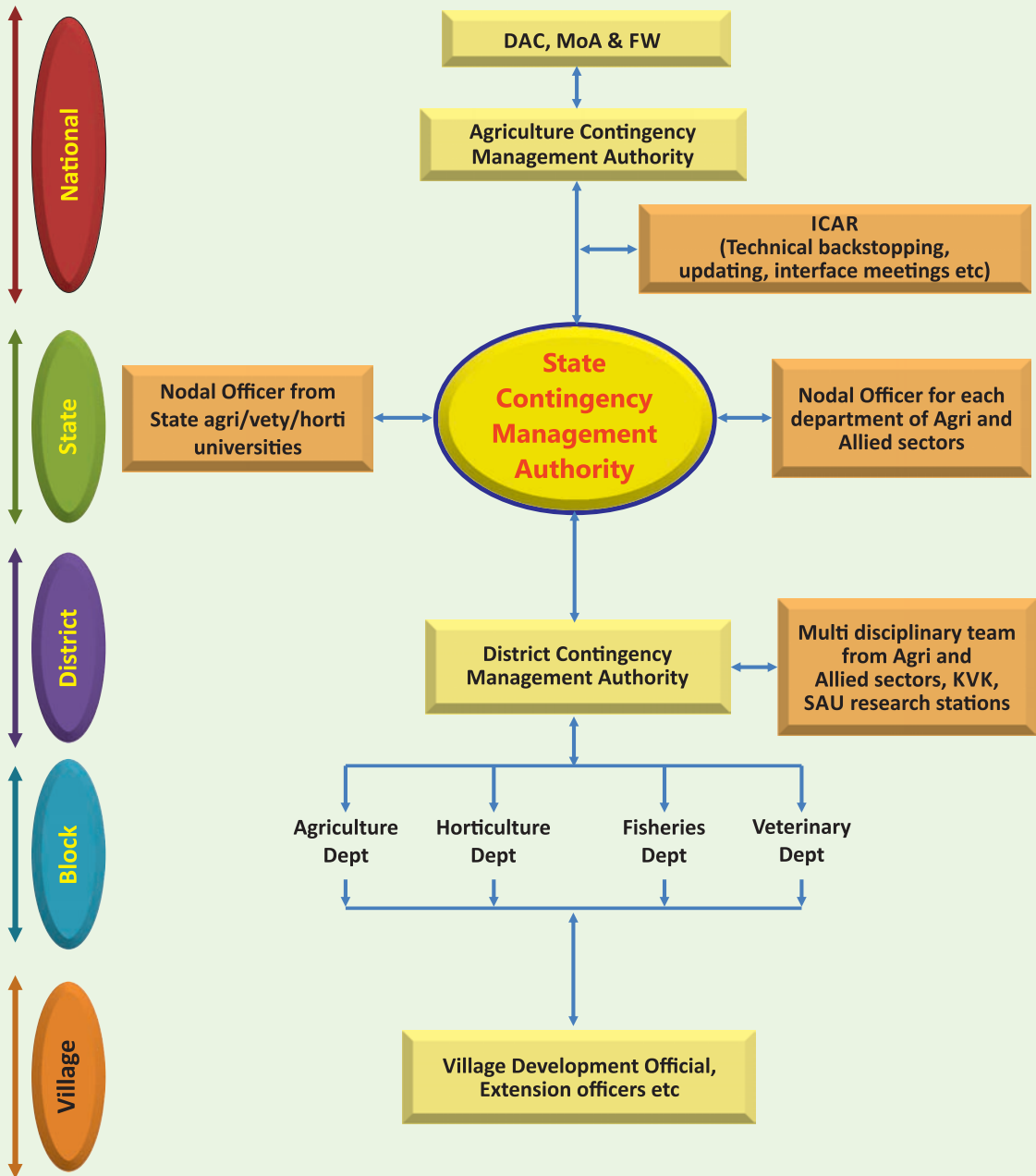


Fig. 19: Implentation strategy for District Agriculture Contingency Plans



## Indian Council of Agricultural Research (ICAR)

- Validation, refinement of the plans in a regular manner and updating of DACPs with new technologies evolved.
- Organizing interface meetings for each season with line departments and to provide them with meteorological forecast and enhance the preparedness of line departments.
- Develop monitoring mechanisms for proper implementation as well as mid-course corrections, if needed.
- Provide technical backstopping and policy briefs to the planners on convergence of various schemes for successful implementation of the DACPs.

## State Agriculture Departments

- Establishment of Agricultural Contingency Cell at State Government level involving officials from agriculture and allied sectors, other relevant line departments, and SAUs.
- Development of block level contingency plans through close consultation with multi-tier stakeholders including farmers.
- Development of customized training modules for capacity building of the stakeholders including farmers which promotes implementation process.

## State Agriculture Universities (SAUs)

- Establishing of a Agricultural Contingency Cell at SAUs with multi-disciplinary team of scientists to provide technical inputs on regular basis in updating and in supporting implementation process.
- Backstopping the district level contingency cells with weather analysis on a real-time basis and the interventions to be taken up.
- Human resource capacity building esp. at sub district level of line departments.



## **Acknowledgements**

We sincerely thank and acknowledge the contribution of all State Governments, Department of Agriculture & Cooperation, ICAR Institutes, State Agricultural Universities, Krishi Vigyan Kendras Seed Corporations and participating farmers. Authors are grateful to National Innovations in Climate Resilient Agriculture (NICRA) project for providing funds and facilities in conducting the interface meeting and to bring out the publication. We are also thankful to ICAR institutes (Partners in NICRA Project) and other organizations for providing the necessary logistic and technical support in conducting the interface meetings.



## List of Abbreviations

AAU	Assam Agricultural University
ADA	Assistant Director of Agriculture
AICRPAM	All India Coordinated Research Project on Agrometeorology
AICRPDA	All India Coordinated Research Project for Dryland Agriculture
ATARI	Agricultural Technology Application Research Institute
ATMA	Agricultural Technology Management Agency
BAU	Birsa Agricultural University
BCKV	Bidhan Chandra Krishi Viswavidyalaya
CAU	Central Agricultural University
CIBA	Central Institute of Brackish Water Aquaculture
CIFA	Central Institute of Freshwater Aquaculture
CIFE	Central Institute of Fisheries Education
CIFRI	Central Inland Fisheries Research Institute
CRIDA	Central Research Institute for Dryland Agriculture
CRIJAF	Central Research Institute for Jute and Allied Fibres
CSSRI	Central Soil Salinity Research Institute
CSWRI	Central Sheep and Wool Research Institute
DAC	Department of Agriculture and Cooperation
DACP	District Agricultural Contingency Plan
DATT centres	District Agricultural Advisory and Transfer of Technology Centres
DDG	Deputy Director General
DSR	Direct Seeded Rice
GoI	Government of India
GoK	Government of Karnataka
GoWB	Government of West Bengal
ICAR	Indian Council of Agricultural Research
ICAR-RCEA	ICAR-Research Complex for Eastern Region
IINGR	Indian Institute of Natural Resins and Gums
IISS	Indian Institute of Soil Science
IMD	India Meteorological Department
IVRI	Indian Veterinary Research Institute
JDA	Joint Director of Agriculture
KKV	Konkan Krishi Vidyapeeth
KVK	Krishi Vigyan Kendra
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoA & FW	Ministry of Agriculture and Farmers' Welfare
MPKV	Mahatma Phule Krishi Vidyapeeth
NABARD	National Bank for Agriculture and Rural Development
NBSS&LUP	Nation Bureau of Soil Survey and Land Use Planning
NDRI	National Dairy Research Institute
NFSM	National Food Security Mission
NICRA	National Innovations in Climate Resilient Agriculture
NIRJAFT	National Institute on Research on Jute and Allied Fibre Technology
PDKV	Dr. Panjabrao Deshmukh Krishi Vidyapeeth
PJTSAU	Professor Jayashankar Telangana State Agricultural University
PMFBY	Pradhan Mantri Fasal Bima Yojana
SASCOF	South Asian Climate Outlook Forum
SAU	State Agricultural University
SRI	System of Rice Intensification
SWM	South West Monsoon
TDC	Technology Demonstration Cell
UAS	University of Agricultural Sciences
UBKV	Uttar Banga Krishi Vishwavidyalaya
VNMKV	Vasantrao Naik Marathwada Agricultural University









हर कदम, हर डगर  
किसानों का हमसाफर  
आधुनिक कृषि अनुसंधान परिवार

*Agr#search with a human touch*



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