

The District Agricultural Contingency Plans (DACP) are technical documents aimed to be ready reckoner for line departments and farming community on prevailing farming systems and technological interventions to manage various weather aberrations such as droughts, floods, cyclones, hailstorms, heat and cold waves addressing different sectors of agriculture including horticulture, livestock, poultry, fisheries. The contingency plans are useful for preparedness and real time implementation towards sustainability agriculture production system in the events of weather aberrations and extreme climatic events.

1.0 Climate Change and Extreme Weather Events

The rise in temperature of the earth surface and in atmosphere, fluctuations in rainfall, flooding due to high intense rainfall events, frequent droughts, high velocity winds, sea level rise due to melting of glacier, etc., are all the clear evidences of climate change phenomenon.

These extreme weather events are climatic anomalies which have major impact on food and nutritional security of human and animal populations. In recent times the frequency of these events is increasing causing enormous damage not only to agriculture but also to other sectors like horticulture, livestock, poultry and fisheries (Fig 1).

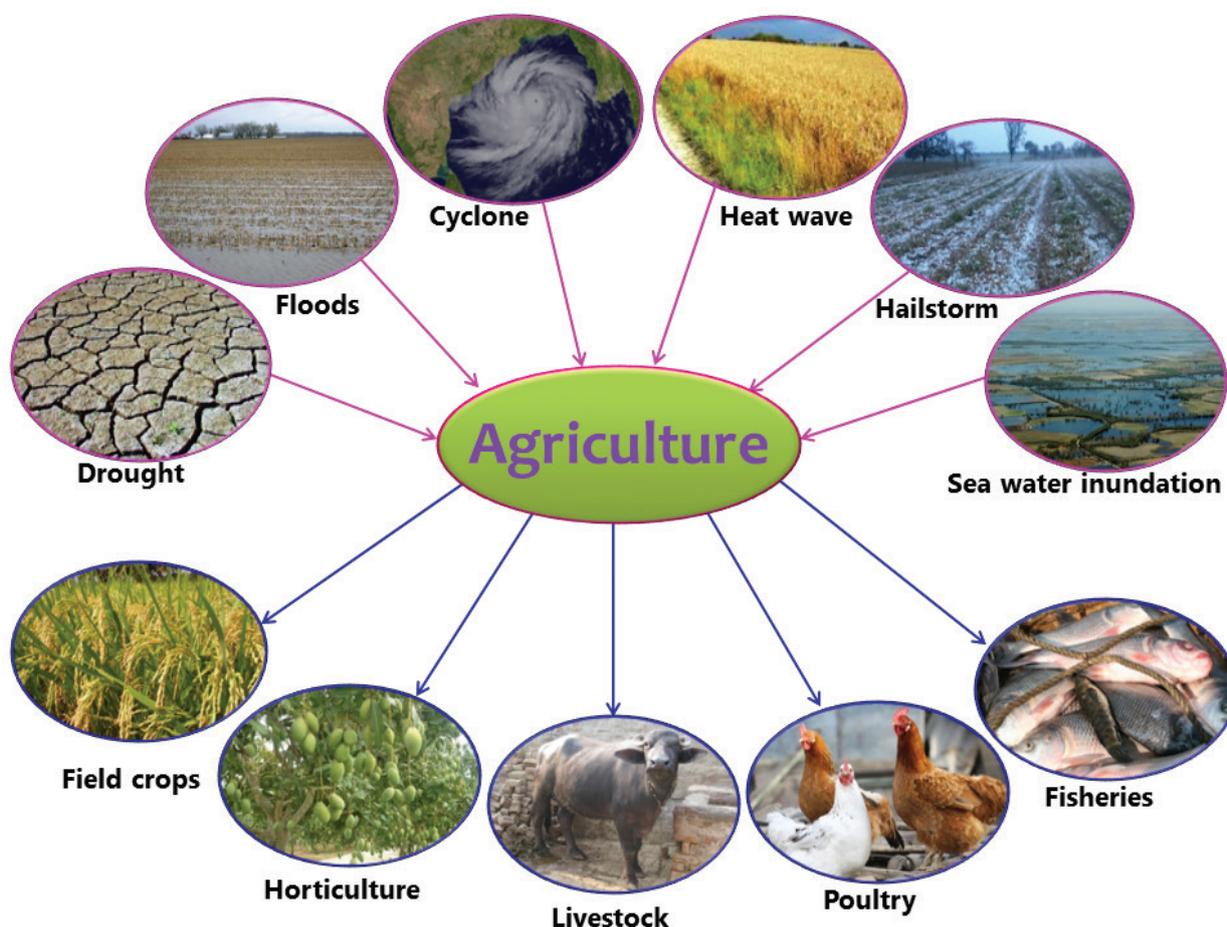


Fig 1. Weather aberrations and affected agriculture sectors in India

WEATHER ABERRATIONS



Drought



Cyclone



Hailstorm



Flood



Heat wave



Sea water inundation

2.0 District Agriculture Contingency Plan

District level contingency plans are technical documents containing integrated information on agriculture and allied sectors *i.e.*, horticulture, livestock, poultry, fisheries and technological solutions for all the major weather related aberrations including extreme events *viz.*, droughts, floods, heat wave, cold wave, untimely and high intensity rainfall, frost, hailstorms, pest and disease outbreaks and are aimed to be utilised by district authorities. A standard template was developed in consultation with all stakeholders to cover prevailing agro-ecological situations in the district towards preparedness, possible in-season contingencies and suggested adaptive strategies. The template consisting of two parts deal with

(a) district agricultural profile of a district with information on resource endowments such as rainfall, soil types, land use, irrigation sources, more dominant crops and cropping systems along with their sowing windows; livestock, poultry and fisheries information; production and productivity statistics; major contingencies faced by the district and digital soil and rainfall maps and

(b) the detailed strategies for weather related contingencies anticipated in crops/cropping systems such as delay in onset of monsoon

of different duration; mid-season monsoon breaks resulting in drought both in rainfed and irrigated situations and adaptation strategies for weather related extreme events. These contingency plans contain information on alternate crop varieties/ crops to be chosen in case of delay in onset of monsoon or early season drought and also on agronomic measures for mid and terminal season droughts. Further, strategies for contingency situations in livestock, poultry and fisheries have also been included.

3.0 Process of Preparation

The district contingency plans were prepared by ICAR-CRIDA (nodal institute) along with other institutes of Natural Resource management Division of Indian Council of Agricultural Research (ICAR) and State Agricultural Universities and KVKs under the overall guidance and supervision of ICAR and Department of Agriculture and Cooperation (DAC) (Fig 2).

Five Regional orientation workshops were conducted to nodal officers of state agricultural universities to sensitise them about the standard template developed for the purpose during April to June 2010. Vetting workshops were organised since October 2010 in different states to scrutinize and finalise the plans in the presence of ICAR institutes and respective university authorities (Table 1).

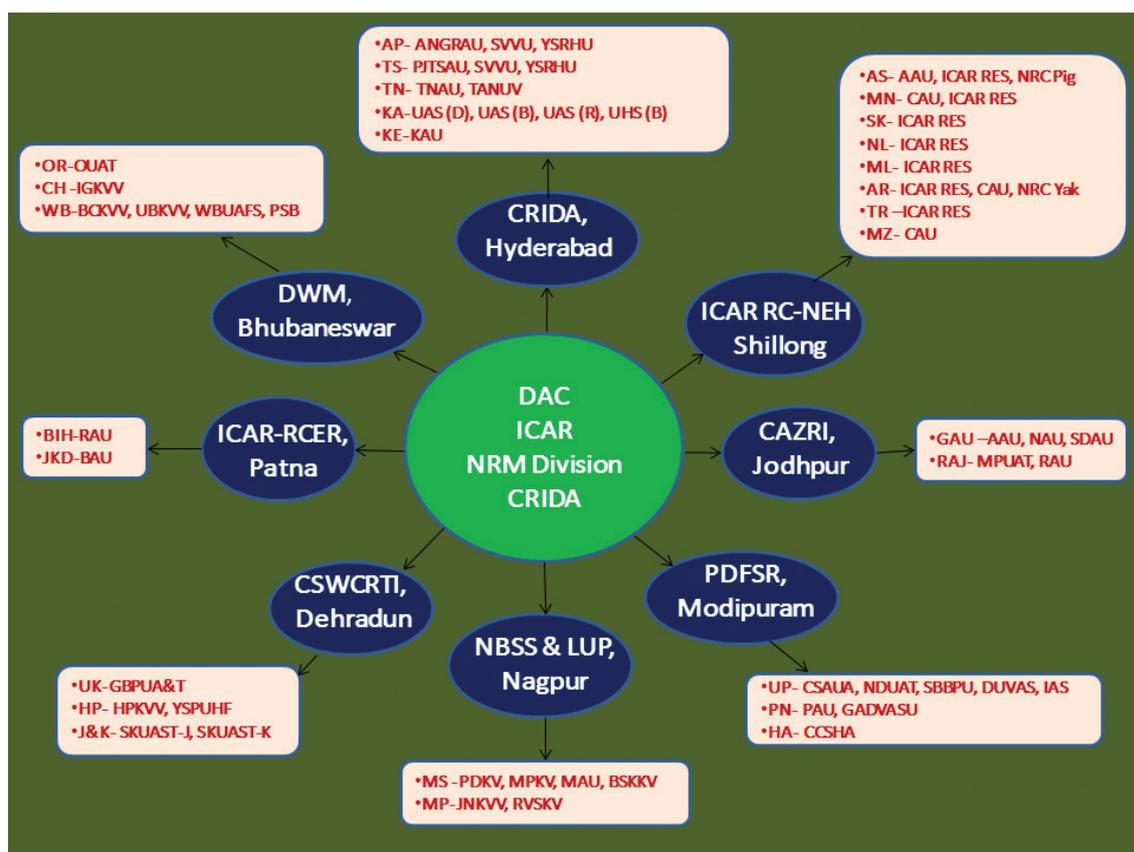


Fig 2. Process of preparation followed for DACPs

Table 1. Vetting Workshops organized for scrutiny and finalization of draft plans with SAUs and ICAR Institutes

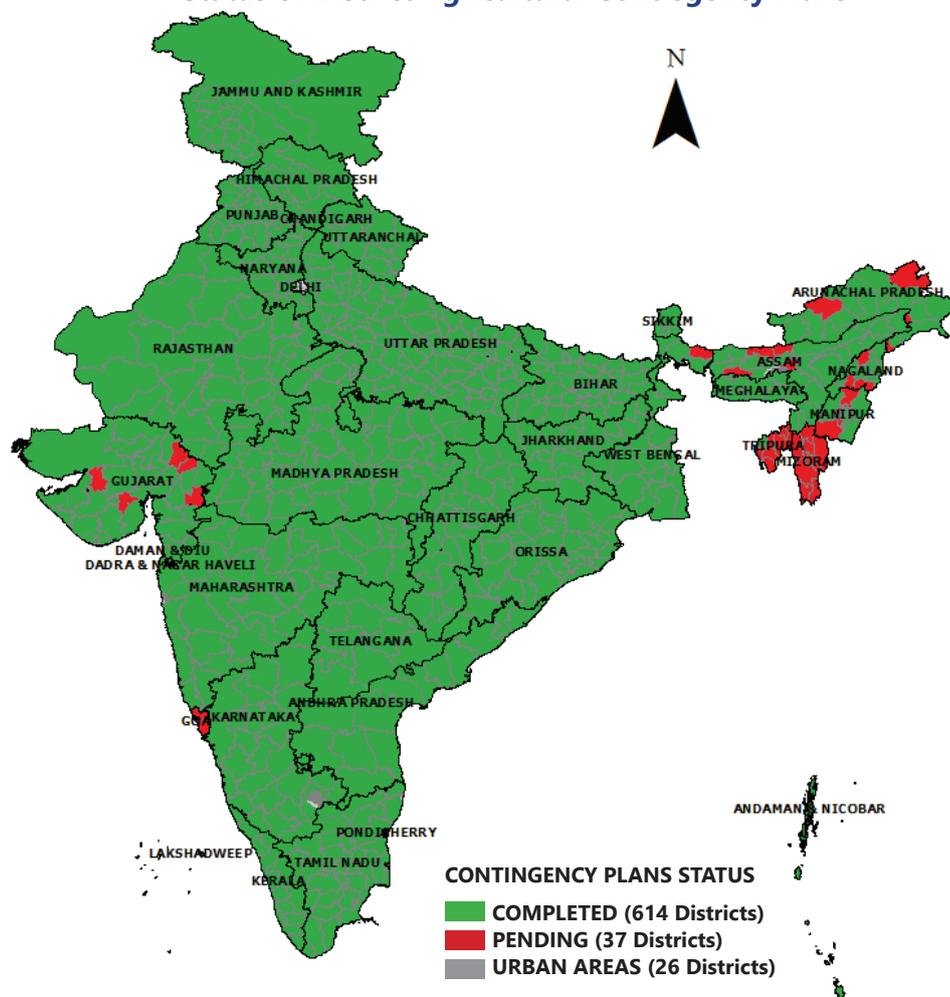
Date of Workshop	Venue of the Workshop	States/Region covered
4 th Oct, 2010	NBSS & LUP, Nagpur	Maharashtra & Madhya Pradesh
8 th Oct, 2010	CAZRI, Jodhpur	Gujarat & Rajasthan
20 th - 21 st Oct, 2010	UAS, Bengaluru	Karnataka
5 th - 6 th Jan, 2011	ANGRAU, Hyderabad	Andhra Pradesh
19 th Feb, 2011	OUAT, Bhubaneswar	Odisha
14 th - 15 th Mar, 2011	PAU, Ludhiana	Punjab
15 th Mar, 2011	MPKV, Solapur	Madhya Maharashtra
12 th - 13 th Apr, 2011	BCKV, Kalyani	West Bengal
24 th - 25 th May, 2011	PDKV, Akola	Vidarbha
21 st Sep, 2011	MAU, Aurangabad	Marathwada
22 nd - 23 rd Mar, 2012	CSWR&TI, Dehradun	Uttarakhand, HP, J&K
27 th - 28 th Mar, 2012	RVSKVV, Gwalior	Madhya Pradesh
18 th - 19 th Apr, 2012	ICAR RC NEH, Umiam	Assam
16 th May, 2012	HPKV, Palampur	Himachal Pradesh
21 st - 22 nd Jan, 2013	ICAR RC NEH Regional Station, Jharnapani	Nagaland, Mizoram, Manipur, Meghalaya, Sikkim, Arunachal Pradesh
16 th Dec, 2013	RAU, Pusa, Samastipur	Bihar
22 nd - 23 rd July, 2014	Directorate of Agriculture, Lucknow	Uttar Pradesh
10 th April, 2015	VNMKU, Parbhani	Maharashtra
18 th May, 2015	ANGRAU, AP	Andhra Pradesh
7 th Oct, 2015	ICAR-RC-NEH	Tripura
20 th Jan, 2015	CARI, Port Blair	Andaman & Nicobar Islands

4.0 Availability of Plans

The district based contingency plans are prepared for 614 districts in the country and hosted on ICAR / DAC websites <http://farmer.gov.in/>, <http://agricoop.nic.in/acp.html>, and circulated to all state agriculture departments. Distribution of completed districts and state-wise number of districts for which the plans made are given in following figures (Fig 4).

<http://crida.in/> and circulated to all state agriculture departments. Distribution of completed districts and state-wise number of districts for which the plans made are given in following figures (Fig 4).

Status of District Agricultural Contingency Plans



AGRICULTURE SECTORS



Field Crops



Horticulture



Dairy



Goat Farming



Poultry



Fisheries

WEATHER ABERRATIONS



Drought



Cyclone



Hailstorm



Flood



Heat wave



Sea water inundation



Fig 4. Region wise district agricultural contingency plans developed till date (state-wise)

5.0 Linking Plans with Action

The contingency plans operationalization requires extensive planning both at district and state level which need to be coordinated and facilitated by several departments of Government of India.

Sensitization of district authorities to respond to various weather aberrations affecting the agriculture sector is an important activity. As part of systematic sensitisation exercise, the ICAR and DAC organised interface meetings with concerned line departments of the State Government before the commencement of

kharif, 2014 in Patna (Bihar), Ahmedabad (Gujarat), Jaipur (Rajasthan) and Bengaluru (Karnataka).

During the year 2015, following the forecast of India Meteorological Department in April, 2015 about the possible deficit rainfall during south-west monsoon, immediately a high level national consultation meeting was held at ICAR-CRIDA, Hyderabad on 24th April, 2015 followed by state-wise interface meetings (a total of 11 states) with department of agriculture, KVKs, SAUs, seed agencies and other stakeholders during May-June 2015 (Table 2) (Fig. 5, 6, 7 and 8).



Fig 5. National level consultation meeting on preparedness for agriculture contingencies held at ICAR-CRIDA, Hyderabad on 24th April 2015



Fig 6. ICAR, DAC Interface meeting with Department of Agriculture, Govt. of Karnataka on 19th May 2015 at GKVK, Bengaluru



Fig 7. ICAR, DAC Interface meeting with Department of Agriculture, Govt. of Maharashtra on 13th May 2015 at Pune



Fig 8. ICAR, DAC Interface meeting with Department of Agriculture, Govt. of Rajasthan on 5th June 2015 at Jaipur

Table 2. ICAR, DAC Interface Meetings details on Enhancing the Preparedness of Agricultural Contingencies in *kharif* 2015

State	Meeting Date	Venue
National Consultation	24 th April 2015	Hyderabad
Telangana	11 th May 2015	Hyderabad
Maharashtra	13 th May 2015	Pune
Andhra Pradesh	18 th May 2015	Tirupati
Karnataka	19 th May 2015	Bengaluru
Haryana	26 th May 2015	Karnal
Gujarat	29 th May 2015	Anand
Uttar Pradesh	29 th May 2015	Lucknow
Rajasthan	05 th June 2015	Jaipur
Chhattisgarh	19 th June 2015	Raipur
Jharkhand	22 nd June 2015	Ranchi
Madhya Pradesh	26 th June 2015	Bhopal

As part of imparting awareness among district authorities, seven interaction meetings were organised (for Western states-Pune, Eastern states-Bhubaneswar, Southern states-Hyderabad, Northern states-Dehradun, Central India and Northern zone-Delhi and North Eastern states-Umiam, Shillong) in regional workshops of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) to the IAS/IFS officials and state officials about contingency crop plans and their operationalization during droughts, floods etc.

6.0 Key Resources

The entire process was documented systematically for dissemination of information on contingency plans, books and bulletins were published and circulated amongst the stakeholders. Compensatory Production Plans in *rabi* seasons were prepared and circulated to all KVKs and department of agriculture in various states and are also hosted on ICAR-CRIDA's websites (www.crida.in).

7.0 Village Level Models for Real Time Implementation

Pilot models were developed and implemented during 2011-14 in 34 villages covering 15 states in the country for various weather aberrations like delayed onset of monsoon, midseason drought, terminal drought and extreme events like untimely high intensity rainfall events, with real time implementation of contingency plans in All India Coordinated Research Project for Dryland Agriculture (AICRPDA) domain regions. Similar real time contingency measures were initiated under NICRA-TDC

programs. Various real time contingency interventions included crops & varieties, soil conservation, rainwater conservation and utilization and crop management practices. The first priority in all interventions was to have a reasonable crop stand in the field and then manage it for getting better yield and income. The pilot models were also meant to demonstrate that, if not responded to the situation appropriately, could have resulted in total crop loss to the farmer.

In Harigaon village, Aurangabad, Bihar rainwater storage capacity of 12700 cubic meters was created through 9 ponds in 9 farmers' fields during 2014-15. The harvested water was used to irrigate 9.3 ha area for improving yield in lentil (11.2 q/ha), chickpea (9.0 q/ha) and wheat (40.0 q/ha). Irrigated area increased by 69% due to increase in water use efficiency.

In Jalgaon KP village of Baramati, Maharashtra, rainwater harvesting and recharging of wells facilitated supplemental irrigation to *rabi* sorghum in 18 ha area. A cement bandhara was constructed during 2014-15 which impounded sufficient water to recharge 6 adjoining wells providing for two supplemental irrigations to *rabi* sorghum resulting in 38% increase in productivity (23.7 q/ha). Similarly, 2-4 protective irrigations were given to pearl millet, wheat and onion which increased productivity by 20-30%.

In Kochariya village of Bhilwara district, Rajasthan, about 38% higher rainfall (397 mm) was received in July resulting in filling up of *kachha* farm ponds. However, rainfall was deficit by 26 and 47% in September and October, respectively. The harvested rainwater in farm ponds was used for pre-sowing irrigation to *rabi* crops (mustard, barley and chickpea) resulting an increase of *rabi* crops yield up to 55% (3255 kg/ha).

In Chomakot village of Kota district, Rajasthan, furrow irrigated raised bed (FIRB) planting in soybean to overcome long dryspells through *in-situ* storage resulted in a yield increase of 6% compared to conventional sowing (9.6 q/ha). FIRB technique in wheat led to increase in productivity by 4% over conventional practice (41 q/ha) along with water saving of 22-25%, saving in seed requirement with BC ratio of 2.7. The wheat crop planted in FIRBs suffered less damage due to unseasonal rains and hail storm during March, 2015.

AGRICULTURE SECTORS



Field Crops



Horticulture



Dairy



Goat Farming



Poultry



Fisheries

WEATHER ABERRATIONS



Drought

In Narotewadi village (Solapur district), Maharashtra, the rainfall during *kharif* season was deficit by 11.9% (531 mm) followed by deficit rainfall of 82% in September and 83% in October. *In-situ* moisture conservation practice with ridge and furrow system followed by sowing of *rabi* sorghum was demonstrated in 10 ha on 10 farmers' fields resulted in better performance of sorghum with yield increased by 29% (1085 kg/ha) and net returns of Rs.6800/ha.

8.0 Impacts of Contingency Crop Plans

The experiences of some of the states in implementing the contingency crop plans in consultation with SAUs and ICAR and their impacts are summarized below.

Despite the deficit rainfall (-20 to -59% of normal) in 30 districts out of 51 districts in Madhya Pradesh, productivity of soybean, total oilseeds and total pulses increased from 0.733 to 0.937 t/ha, 0.52 to 0.6 t/ha and 0.75 to 0.94 t/ha, respectively (Madhya Pradesh).

Though regions East Gujarat, Central Gujarat, Kutch & South Gujarat received 77 to 88% of normal rainfall during 2014-15, the impact of deficit rain on area and production during the year was negligible except for groundnut, sorghum and pearl millet (Gujarat).

The deficit monsoon scenario during the year 2014-15 was managed in Karnataka (a) by encouraging the sowing of maize, cotton, pearl millet in unsown areas of sorghum, pigeonpea, groundnut and sunflower (b) encouraging farming community to take up land configuration, soil management practices (c) utilizing the common property resources for fodder production and drought safety net programmes i.e. crop insurance (Karnataka).

Promotion of community nurseries for rice seedlings to overcome the delayed sowing of paddy on a village basis was the major intervention initiated to meet the demand of the entire village. Similarly, lined ponds and bund strengthening were promoted for effective water storage (Jharkhand).

Allocation of additional power supply for irrigation, promotion of *in-situ* conservation measures, promotion of short duration rice varieties in case of delay in monsoon, change in sowing practices in rice, crop diversification

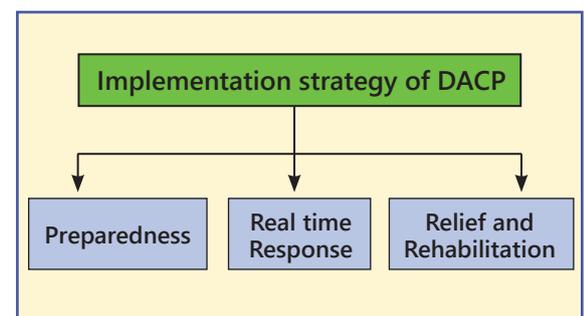
from cotton to soybean, greengram, groundnut, and growing cotton with micro irrigation were some of the major interventions taken up during 2014-15 to overcome delayed monsoon (Telangana).

In-situ conservation measures on large scale, micro irrigation technologies, cotton under high density planting, soybean with broad bed furrow technology, mulching in horticultural crops, sprinkler irrigation for soybean, hybrid pigeonpea promotion and greengram as substitute for soybean were the major interventions promoted during 2014-15 to overcome delayed monsoon (Maharashtra).

In Andhra Pradesh, during 2014-15, measures such as (a) campaign for not sowing the crops till soil soaking rains were received (b) widespread publicity about contingency crop plan through scrolls in all local channels (numbering 14) (c) direct seeded/ drum seeded rice cultivation promotion on a mission mode approach (d) sowing of horsegram seed in unsown areas of groundnut in Anantapur district (e) growing fodder crops as intercrops in horticultural plantations, (f) flood waters diversions to Rayalaseema region to irrigate horticultural crops were taken up to overcome weather aberrations such as delayed monsoon onset and delay in release of canal water.

9.0 Way Forward

The overall implementation strategy of contingency plans involve (a) initial preparedness (b) real time response to weather aberrations and (c) relief and rehabilitation.



The district agricultural contingency plans (DACP) are technical documents detailing the interventions to be taken up by individuals/line departments 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



Cyclone



Hailstorm



Flood



Heat wave



Sea water inundation

- new technologies developed
- improved seed varieties
- linkage with new developmental programmes
- experiences on handling the recent weather aberrations across states etc.

The way forward is addressed under Research & Development and Policy front.

Research & Development Front

- Research need to be initiated at State Agricultural Universities (SAUs) through establishment of multi-disciplinary teams by simulating the contingencies and developing adaptation strategies to demonstrate the benefits to the farmers and respond to the needs of line departments.
- Technological advances in other scientific fields should be dove-tailed with Research & Development efforts to develop efficient and cost-effective technologies.
- Research on dissemination tools need to be focused with extra weightage on spread of contingency adaptation measures with a totally different extension approach which are often time-bound.
- Enhanced research efforts for hailstorms, frost, unseasonal rains etc. be made across different states.
- Research on use of satellite-data for understanding the nature and extent of contingency situation should be promoted to plan and implementation plan for the adaptation strategies.
- Development of protocols for initiation of interventions for droughts which may occur at different times during the crop growing season.
- Need to identify drought prone districts/ taluqs utilizing the recent weather data and special emphasis need to be made for preparation of agricultural plans for prioritization purpose.
- Seasonal weather forecast at district level is the need of the hour for appropriate agricultural planning. Efforts need to be strengthened to provide these forecasts by IMD well in advance.

- Establishment of an interfacing mechanism at the district level with regional IMD centres is needed in order to better utilize the weekly forecast at district level made by IMD and to provide advisories to farming communities at SAUs & districts.
- Dissemination of information to farming communities on prevailing weather conditions, support being provided by state and central governments through the available media such as TVs (local language), radio, internet, leaflets/ brochures need to be strengthened with proper feedback to the system.
- Wide spread awareness on agricultural insurance to be created among farming community.
- The information technology should be extensively tapped for two-way communication i.e. for ground-truth information collection at a short-time as well as transmitting back the adaptation strategies.

Policy Front

- There is a need to bring a change in planning process of annual district agricultural plans at district level with explicit use of seasonal weather forecasts.
- A long term strategy need to be evolved for seed development/ multiplication for contingency groups/ self-help groups/ rytu sangams etc.
- Agricultural contingency cells be established at district levels in the department with staff from other sectors such as Dairy, Horticulture, Ground water etc.
- The developmental projects/schemes be identified before the crop season so that necessary funds could be leveraged for various interventions during the implementation.
- Empower the line departments with a flexible fund to immediately start the response measures in the affected areas for calamities such as floods, cyclones etc.

AGRICULTURE SECTORS



Field Crops



Horticulture



Dairy



Goat Farming



Poultry



Fisheries



For more information on District Agriculture Contingency Plans, please write to

Dr Ch Srinivasa Rao

Director
ICAR-CRIDA

or

Dr KV Rao

Agriculture Contingency Cell
ICAR-CRIDA



भाकृअनुप - केंद्रीय बारानी कृषि अनुसंधान संस्थान
ICAR- Central Research Institute for Dryland Agriculture, Hyderabad

संतोषनगर, सैदाबाद, हैदराबाद -500 059
Santoshnagar, Saidabad PO, Hyderabad - 500059
Ph: 040-24530157/161/163 Fax:040-24531802
E-mail: crida.contingency@gmail.com
Website: www.crida.in