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ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

ANGRAU

AGRICULTURAL CONTINGENCY PLAN FOR

WEST GODAVARI DISTRICT

Prepared by

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Regional Agricultural Research Station, MARUTERU - 534 122, West Godavari

State: ANDHRA PRADESH

Agriculture Contingency Plan for District: WEST GODAVARI

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Eastern Coastal plain, hot sub-humid to semi arid eco region (7.3)			
	Agro-Climatic Region (Planning Commission)	East Coast plain and hill region (XI)			
	Agro Climatic Zone (NARP)	Krishna Godavari Zone (AP-1)			
	List all the districts or part thereof falling under the NARP Zone	Krishna, Guntur, West Godavari, major parts of East Godavari and parts of Prakasam			
	Geographic coordinates of district	**Latitude**	**Longitude**	**Altitude**	
		$16^0$15'0"- $17^0$30'0"N	$80^0$55'0"- $81^0$55'0"E		
	Name and address of the concerned ZRS/ ZARS/ RARS/	Regional Agricultural Research Station, MARUTERU – 534 122, West Godavari District			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Opposite to FCI Godown, UNDI – 543 199, West Godavari District			
1.2	**Rainfall**	Normal RF (mm)	Normal Rainy days (No)	Normal Onset (Specify week and month)	Normal Cessation (Specify week and month)
	SW monsoon (June-Sep):	792.0	67	1st week of June	2nd week of October
	NE Monsoon(Oct-Dec):	239.4	05	3rd week of October	4th week of December
	Winter (Jan- Feb)	17.9	01	-	-
	Summer (Mar-May)	104.0	02	-	-
	Annual	1153.3	75	-	-

1.3	**Land use pattern of the district**	Geographical Area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows	Net Area Sown	Fish Ponds
	Area in '000 hectares	850.665	132.902	122.754	12.074	14.172	7.593	40.155	28.081	16.876	424.676	51.382

Source: Directorate of Economics & Statistics, Govt. of Andhra Pradesh, 2015-16

Alternative Soil Classification given by Dept of Agrl.

1. 4	**Major Soils (common names like shallow red soils etc.,)**	**Area ('000 ha)**	**Percent (%) of total**
1	Red Sandy Loams	166.86	35.05
2	Clay Loams	108.97	22.89
3	Alluvial	66.65	14.00
4	Sandy Alluvial	59.65	12.53
5	Deltaic Alluvial	47.51	9.98
6	Coastal Sandy Loams	14.95	3.14
7	Heavy Clays	9.43	1.98
8	Saline Soils	2.05	0.43
	Total	**476.06**	

1.5	**Agricultural land use**	Area ('000 ha)	**Cropping intensity %**
	Net sown area	476.06	170.3 %
	Area sown more than once	279.53	
	Gross cropped area	850.665	

1.6	**Irrigation**	**Area (ha) give in '000 ha**		
	Net irrigated area	364.5		
	Gross irrigated area	613.4		
	Rainfed area	67.8		
	Sources of Irrigation	**Number**	**Area (ha) '000 ha**	**Percentage of total irrigated area**
	Canals		188.5	50.2
	Tanks		22.7	6.1
	Open wells/ Bore wells		155.9	41.5
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources		8.3	2.2
	Total Irrigated Area		375.5	100.0
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
	Over exploited			
	Critical			
	Semi- critical			
	Safe			
	Wastewater availability and use			
	Ground water quality	Water quality data is available, very important, pl fill it		
*over-exploited: ground water utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

Area under major field crops & horticulture etc. (Average of 2016-17, 2017-18 & 2018-19)

1.7		**Major Field Crops cultivated**	**Area ('000 ha)**					
			Kharif		***Rabi***		**Summer**	**Total**
			Irrigated	***Rainfed***	***Irrigated***	***Rainfed***		
	1	Paddy	226.933	1.223	56.651	**111.696**	**0**	**396.504**
	2	Jowar	0	0.017	0.020	0.022	0	0.059
	3	Ragi	0	0.001	0	0	0	0.001
	4	Maize	1.985	0.003	15.760	37.677	0	55.425
	5	Minor millets	0	0.008	0	0	0	0.008
	6	Redgram	0.019	0.213	0.042	0.057	0	0.331
	7	Greengram	0.006	0.226	7.640	12.574	0	20.446
	8	Blackgram	0.255	2.822	11.306	16.968	0	31.351
	9	Horsegram	0	0	0.028	0.045	0	0.073
	10	Cowpea	0	0.014	0.029	0.048	0	0.091
	11	Turmeric	0.257	0	0	0	0	0.257
	12	Chillies	0.033	0.003	0.439	1.183	0	1.658
	13	Sugarcane	8.999	0	0	0	0	8.999
	14	Cotton	0.750	4.042	0	0	0	4.792
	15	Groundnut	0.901	0	0.394	1.635	0	2.930
	16	Sesamum	0.012	0.007	0.224	0.335	0	0.579
	17	Bengalgram	0	0	0.007	0.022	0	0.029
	18	Tobacco	0	0	6.656	14.494	0	21.150
	19	Sunflower	0	0	0.0043	0.070	0	0.113
		Total	**240.150**	**8.579**	**99.242**	**196.826**	**0**	**544.797**
		Horticulture crops - Fruits	**Total area**					
	1	Cashew	40.4					
	2	Mango	17.5					
	3	Banana	13.1					
	4	Lemon	2.5					
		Horticultural crops - Vegetables	**Total area**					
	1	Chilies	3.6					
	2	Brinjal	1.1					
		Spices and Plantation Crops	**Total area**					

	1	Oil palm	28.1
	2	Coconut	23.0

1.8	**Livestock**		**Male ('000)**	**Female ('000)**		**Total ('000)**
	Non descriptive Cattle (local low yielding)		61.7	94.9		156.6
	Crossbred cattle		7.3	38.7		46.0
	Non descriptive Buffaloes (local low yielding)		90.0	600.7		690.7
	Graded Buffaloes					
	Goat					178.0
	Sheep					326.9
	Others (Camel, Pig, Yak etc.)					14.1
	Commercial dairy farms (Number)					
1.9	**Poultry**		**No. of farms**	**Total No. of birds (number)**		
	Commercial			7577388		
	Backyard			1568057		
1.10	**Fisheries** (Data source: Chief Planning Officer)					
	A. Capture					
	i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**	**Storage facilites (Ice plants etc.)**
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)
		805	**0**	**30 / 109**	**0 / 22479**	**7 / 0**
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**	**No. of village tanks**	
		12786		1	42	
	B. Culture					
		Water Spread Area (ha)		**Yield (t/ha)**	**Production ('000 tons)**	
	i) **Brackish water** (Data Source:	2850		-	1.6	

	MPEDA/ Fisheries Department)			
	ii) **Fresh water** (Data Source: Fisheries Department)	31020	-	6.8
	Others		-	302.0

1.11	**Production and Productivity of major crops** (Average of last 3 years: 2016, 2017,2018)	**Kharif**		**Rabi**		**Summer**		**Total**		**Crop residue as fodder** (‘000 tons)
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	
Major Field crops										
1. Paddy		1306.50	5729	1324.76	7869			2631.27	6634	
2. Blackgram		3.90	1259	4.74	823	3.037	149	8.65	919	
3. Green gram		0.25	1112	5.65	733	2.015	154	5.903	746	
4. Maize		14.012	7234	470.62	8807			484.63	8747	
5. Sugarcane		868.01	96.89	0.00	0.00			868.01	96.893	
6. Ground nut		2.12	2353	7.63	3730			9.75	3301	
7. Chillies		0.13	2277	5.10	3711			6.130	3711	
8. Tobacco(Natu)		0.00	0.00	37.58	2756			37.58	2659	
9. Tobacco(VFC)		0.00	0.00	16.48	1.59			16.481	797	
Major Horticultural crops (Crops to be identified based on total acreage)										
Horticulture crops - Fruits										
1	Cashew									
2	Mango									
3	Banana									
4	Lemon									
Horticultural crops - Vegetables										
1	Chilies									
2	Brinjal									

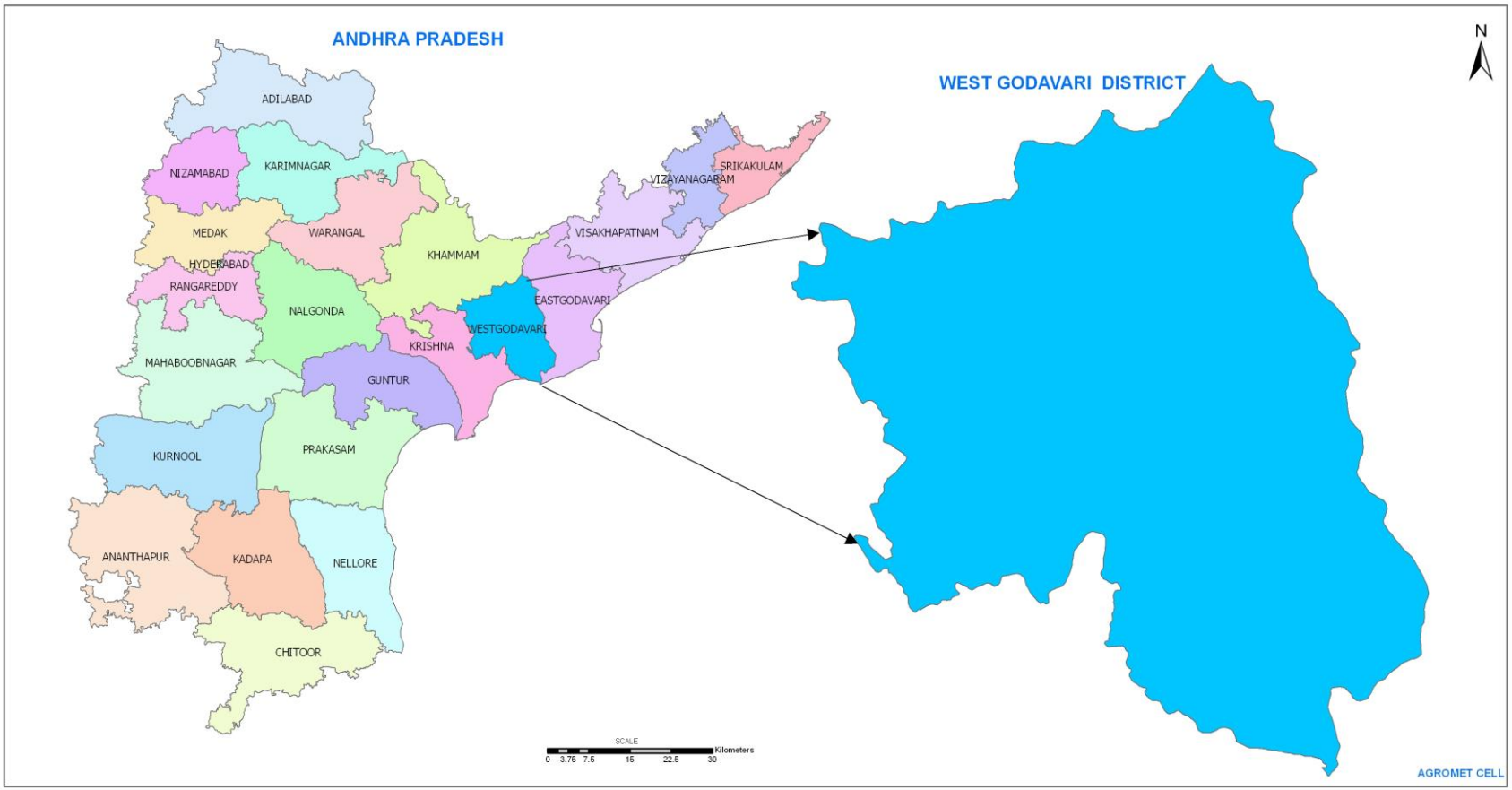
Spices and Plantation crops									
1	Oil palm								
2	Coconut								

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Paddy	Greengram	Redgram	Blackgram	Maize
	Kharif- Rainfed	-	June 1st fortnight – July 2nd fortnight	June 1st fortnight – July 2nd fortnight	June 1st fortnight – July 2nd fortnight	-
	Kharif-Irrigated	June 1st fortnight – July 2nd fortnight	-	-	-	June 1st fortnight – July 2nd fortnight
	Rabi- Rainfed	-	October 2nd fortnight – November 1st fortnight	September 1st fortnight – October 1st fortnight	October 2nd fortnight – November 1st fortnight	
	Rabi-Irrigated	December 2nd fortnight – January 1st fortnight	November 2nd fortnight – December 1st fortnight	October 2nd fortnight – November 1st fortnight	November 2nd fortnight – December 1st fortnight	November 2nd fortnight – December 1st fortnight

1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought		√	
	Flood		√	
	Cyclone		√	
	Hail storm			
	Heat wave			
	Cold wave			
	Frost			
	Sea water intrusion			
	Pests and diseases (specify)		<u>Rice:</u> Blast, BLB,BPH <u>Black gram</u> : YMV	

	Others (Fog)		√	

1.14	**Include Digital maps of the district for**	Location map of district within State as Annexure I	Enclosed: Yes / No
		Mean annual rainfall as Annexure 2	Enclosed: Yes / No
		Soil map as Annexure 3	Enclosed: Yes / No


ANDHRA PRADESH
WEST GODAVARI DISTRICT
N
ADILABAD
NIZAMABAD
KARIMNAGAR
MEDAK
WARANGAL
HYDERABAD
RANGAREDDY
NALGONDA
KHAMMAM
MAHABOOBNAGAR
KRISHNA
GUNTUR
WESTGODAVARI
EASTGODAVARI
VISAKHAPATNAM
VIZAYANAGARAM
SRIKAKULAM
KURNOOL
PRAKASAM
ANANTHAPUR
KADAPA
NELLORE
CHITOOR
SCALE
0 3.75 7.5 15 22.5 30 Kilometers
AGROMET CELL


WEST GODAVARI
District Map
N
East Godavari
Khammam
Krishna
BAY OF BENGAL
Errakalava
Polavaram
Kannapuram
Jilugumilli
Gutala
Koyyalgudem
Chintalapudi
Borrampalem
Gopalapuram
Kovvuru
Potavaram
Kamavarapukota
Chigallu
Dwarka Tirumala
Guntupalle
Nidadavole
Tadikalapudi
Dubacherla
Bhogulu
Madhavaram
Tadepallegudem
Bhimadolu
Dharmajigudem
5
Duvvu
Tanuku
Pentapadu
Gundugolanu
Denduluru
Eluru
Piphara
Velpuru
Gmapavaram
Attili
Metchili
Relangi
Tammileru
Kolleru Lake
Undi
Penugonda
Akividu
Maruteru
Kolleru
Viravasaram
Gummaturu
Bhimavaram
Palakollu
Narasapur
Mogalturru
LEGEND
District Boundary
National Highway
Major Road
Railway
District Headquarter
Major Town
Other Town
River
Map not to Scale
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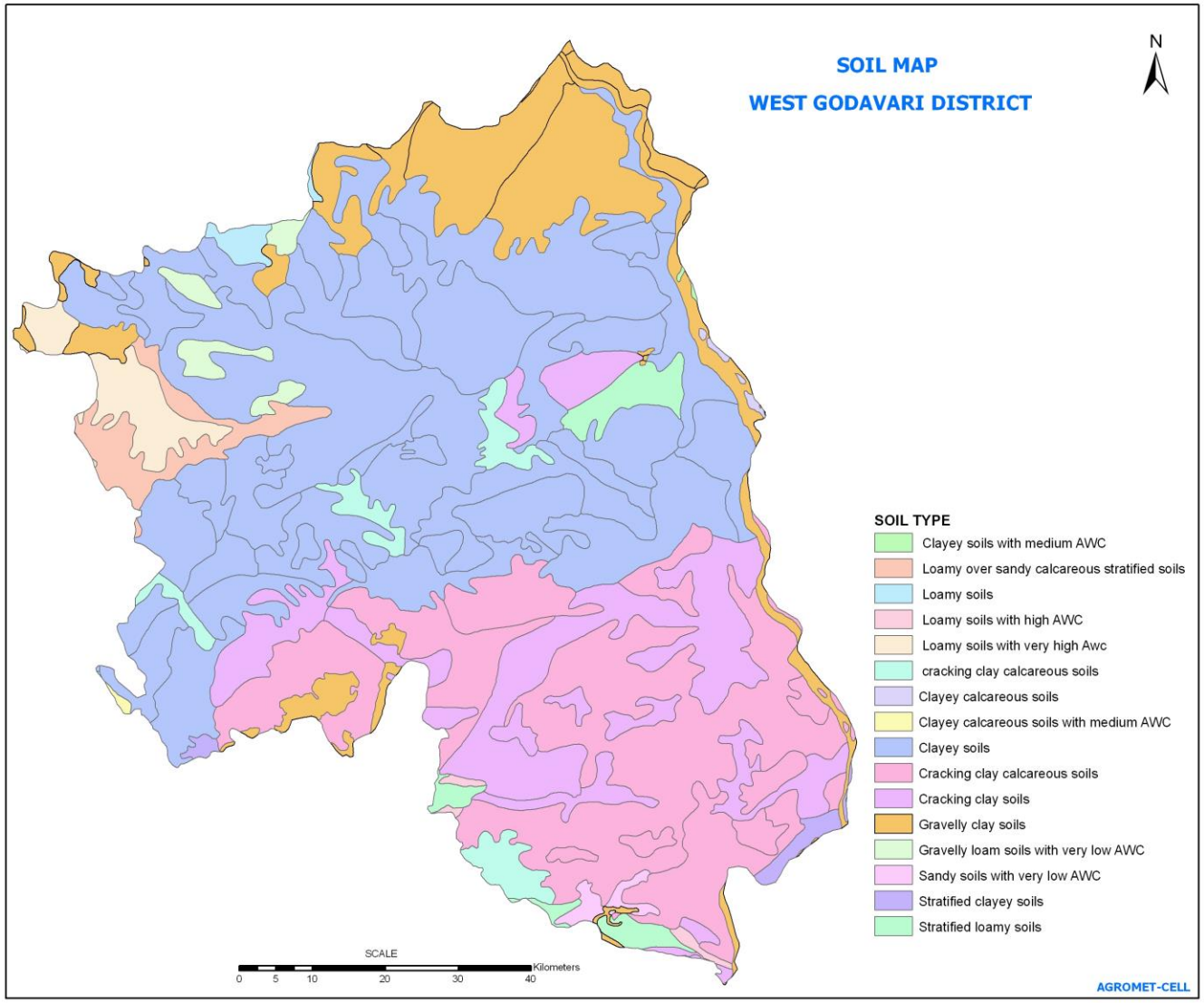
SOIL MAP
WEST GODAVARI DISTRICT
N
SOIL TYPE
Clayey soils with medium AWC
Loamy over sandy calcareous stratified soils
Loamy soils
Loamy soils with high AWC
Loamy soils with very high Awc
cracking clay calcareous soils
Clayey calcareous soils
Clayey calcareous soils with medium AWC
Clayey soils
Cracking clay calcareous soils
Cracking clay soils
Gravelly clay soils
Gravelly loam soils with very low AWC
Sandy soils with very low AWC
Stratified clayey soils
Stratified loamy soils
SCALE
0 5 10 20 30 40
Kilometers
AGROMET-CELL

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 2 weeks (June 3rd week)	Red sandy soils - Rainfed	Blackgram / Greengram / Redgram	No change	Black gram: LBG 752, PU 31, LBG 787, TBG 104, GBG 1 Green gram: LGG 460, IPM-2-14, WGG 42 Red gram: LRG 41, LRG 30, LRG 52, Lakshmi, Abhaya	-

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 4 weeks (July 1st week)	Red sandy soils - Rainfed	Blackgram / Greengram / Redgram	No change	Black gram: LBG 752, PU 31, LBG 787, TBG 104, GBG 1 Green gram: LGG 460, IPM-2-14, WGG 42 Red gram: LRG 41, LRG 30, LRG 52, Lakshmi, Abhaya	-

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 6 weeks (July 3rd week)	Red sandy soils - Rainfed	Blackgram / Greengram / Redgram	No change	Black gram: LBG 20, LBG 623, T 9, TBG 104, GBG 1 Green gram: LGG 407, IPM-2-14, WGG 42 Red gram: LRG 52, Durga, PRG 100	-

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 8 weeks (August 1st week)	Red sandy soils - Rainfed	Blackgram / Greengram / Redgram	Only Black gram / Green gram	Black gram: LBG 20, LBG 623, T 9, TBG 104, GBG 1 Green gram: LGG 407, IPM-2-14, WGG 42	-

Condition			**Suggested Contingency measures**		
Early season drought **(Normal onset)**	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[d]**	**Remarks on Implementation[e]**
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Red sandy soils - Rainfed	Blackgram/Greengram			-
		Redgram (sole crop)/ Redgram + Greengram (1:5)	Spray 2 % urea solution or 1 % water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21	Inter cultivate periodically (7-10 days interval) to conserve soil moisture	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm))	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[s]**	**Remarks on Implementation[e]**
At vegetative stage	Red sandy soils - Rainfed	Blackgram / Greengram	Spray Urea 2 % or KNO_3 1% or other water soluble fertilizers like 19-19-19,20-20-20-20,21-21-21 @ 1 % to supplement nutrition	Intercultivation to conserve moisture	-
		Redgram (sole crop)	-Do-	-	
		Redgram + Greengram / Bajra	-Do-	-	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil nutrient & moisture conservation measures[d]**	**Remarks on Implementation[e]**
At reproductive stage	Red sandy soils - Rainfed	Blackgram / Greengram	Spray Urea 2 % or KNO_3 1% or other water soluble fertilizers like 19-19-19,20-20-20-20,21-21-21 @ 1 % to supplement nutrition	Intercultivation to conserve moisture	-
		Redgram (sole crop)	-Do-	-	
		Redgram + Greengram / Bajra	-Do-	-	

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
	Red sandy soils - Rainfed	Redgram (sole crop)/ Redgram + Greengram (1:5)	Spray 2% Urea or KNO_3 1% or other water soluble fertilizers 1 % to supplement nutrition	-	-

2.1.2 Irrigated situation

Condition	Suggested contingency measures				
Delayed release of water in canals due to low rainfall	**Major farming situation [f]**	**Normal crop;/ cropping system [g]**	**Change in crop/ cropping system [h]**	**Agronomic measures [i]**	**Remarks on implementation [j]**
	Godavari Delta Tail end Areas	Paddy – Paddy - blackgram/greengram	Paddy-Paddy-greengram	• Over aged seedlings can be transplanted up to August • Adopt closer spacing by planting 4-6 plants/hill • Apply entire P and K and 2/3rd N as basal and remaining 1/3rd N as top dressing • If nurseries are dried up, direct sown paddy can be taken up till August with short duration varieties (MTU 1153, MTU 1156, IR 64)	--

				• If rabi rice harvesting is delayed, avoid blackgram in rice fallows. Instead, greengram or green manure crops can be taken up	
	Godavari Delta Tail End Areas Saline / Alkaline soils	Sugarcane - Paddy	No change	• Short or medium duration varieties of sugarcane need to be taken up • Adopt recommended plant protection practices for control of shoot borer • Adopt crop rotation with pulse crop	

Condition			**Suggested Contingency measures**		
	Major Farming situation[f]	**Normal Crop/ cropping system[g]**	**Change in crop/ cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Limited release of water in canals due to low rainfall	Alluvial Soils – Canal irrigated	Green manure –Rice - Blackgram/ Maize	Green manure – Rice – Black gram/ Greengram/ Jowar/Bajra	**Rice –**1. Adopt alternate wetting and drying upto Primordial Initiation stage to save water 2. Irrigate upto a depth of 3 - 5 cm from Primordial Initiation to maturity 3. Take up effective weed control measures either mechanically or through herbicides as the problem of weeds is more under alternate wetting and drying method of irrigation **Rice fallows** 1. Crops like Greengram, Blackgram, Jowar, Bajra etc. which require less water than Maize shall be grown 2. Short duration varieties of crops shall be selected. 3. In crops like Bajra, Jowar water conservation practices like inter cultivation, earthing up, Alternate row irrigation shall be practiced 4. Water loss during conveyance can be reduced by using PVC/Metallic pipes instead of running water in open field channels	**Rice fallows –** Availability of seed of short duration varieties shall be ensured
	Red sandy soils –	Greengram – Rice –	1. Green manure	For rice and rice fallow crops the agronomic	**Rice fallows –**

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/ cropping system[g]**	**Change in crop/ cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
	Canal irrigated	Blackgram/Greengram/Maize/Fodder	– Rice – Greengram/Blackgram/Jowar/ Bajra/Fodder	measures as suggested for the above farming situation shall be followed	Availability of seed of short duration varieties shall be ensured
			2. Redgram + Greengram/Bajra /Jowar	Proper drainage facilities should be created to take up cropping systems as suggested	

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Non release of water in canals under delayed onset of monsoon in catchment	Alluvial Soils irrigated	Green manure – Rice – Blackgram/Maize	Green manure – Blackgram – Maize/Blackgram/ Groundnut/Sunflower	Green manure crops followed by ID crops like maize, greengram, groundnut, millets and sunflower Control measures to be adopted for Fall army worm in maize and leaf spot diseases in ID crops	Varieties of ID crops like maize, blackgram, ground nut and millets under NSFM may be made available.
	Black soils/Red soils – Canal irrigation	Greengram / Green manure – Rice – Blackgram / Greengram / Jowar / Fodder	Greengram / Green manure – Blackgram / Sunflower / Bengal gram – Blackgram / Greengram / Maize / Fodder crop Green manure / Greengram – Cotton Green manure / Greengram –	Sowing of ID crops can be taken from September second fortnight onwards Maize, Blackgram, Sunflower and Millets can be grown from December to February/March with two to three irrigations after the harvest of early Rabi crops Control measures to be adopted for Fall army worm in maize and leaf spot diseases in ID crops	-do-

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
			Redgram		

Condition	**Major Farming situation[f]**	**Normal Crop/cropping system[g]**	**Suggested Contingency measures**		
			Change in crop/cropping system[h]	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Alluvial Soils irrigated	Green manure – Rice – Blackgram/Maize	Green manure – Blackgram – Maize/Blackgram/Ground nut/Sunflower	Green manure crops followed by ID crops like maize, greengram, groundnut, millets and sunflower Control measures to be adopted for Fall army worm in maize and leaf spot diseases in ID crops	Varieties of ID crops like maize, blackgram, groundnut and millets under NSFM may be made available.
Insufficient groundwater recharge due to low rainfall	Black soils/Red soils – Canal irrigation	Greengram / Green manure – Rice – Blackgram / Greengram / Jowar / Fodder	1.Greengram / Green manure –Blackgram / Sunflower / Bengal gram – Blackgram / Greengram / Maize / Fodder 2. Green manure / Greengram – Cotton 3. Green manure / Greengram – Redgram	Sowing of ID crops can be taken from September second fortnight onwards Maize, Blackgram, Sunflower and Millets can be grown from December to February/March with two to three irrigations after the harvest of early Rabi crops Control measures to be adopted for Fall army worm in maize and leaf spot diseases in ID crops	-do-

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations)

Condition - Continuous high rainfall in a short span leading to water logging				
Crop	**Suggested contingency measure**			
	Vegetative stage[k]	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
1.Rice	1. Drain the excess water as early as possible 2. Apply 20 kg N + 10 kg K /acre after draining excess water 3. Take up gap filling either with available nursery or by splitting the tillers from the surviving hills 4. Take up proper weed control Measures 5. Take up suitable plant protection Measures in anticipation of pest & disease out breaks	1. Drain the excess water as early as possible 2. Apply 20 kg N + 10 kg K /acre after draining excess water 3. Take up suitable plant protection Measures in anticipation of pest & disease out breaks	1. Drain the excess water as early as possible 2. Take up suitable plant protection measures in anticipation of pest & disease out breaks	1. Drain out water and spread sheaves loosely in field or field bunds where there is no water stagnation 2. Spray common salt at 3% on panicles to prevent germination and spoilage of straw from moulds 3. Thresh after drying the sheaves properly 4. Ensure proper grain moisture before storing
2. Blackgram	1. Drain the excess water as early as possible 2. Apply 4-5 kg N /acre after draining excess water 3. To spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 4. Spray fungicides like Copper oxy chloride 0.3 % or Carbendazim 0.1 % or Mancozeb 0.25% two to three	Same as previous column	1. Drain the excess water as early as possible 2. Allow the crop to dry completely before harvesting	1. Spread the bundles drenched in rain on field bunds or drying floors to quicken the drying 2. Thresh the bundles after they are dried properly 3. Dry the grain to proper moisture per cent before bagging and storing to prevent deterioration in quality during storage

	times by rotating the chemicals 5. Take up timely control measures against the out break of pests like *Spodoptera* etc.			
3. Maize	1. Drain the excess water as early as possible 2. Apply 20 kg N + 10 kg K /acre after draining excess water 3. Take up inter cultivation and at optimum soil moisture condition to loosen and aerate the soil and to control weeds 4. Earthen up the crop for anchorage 5. To spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 6. Take up timely control measures for Fall army worm, Pink stem borer, sheath blight and Turcicum leaf blight	Same as above	1. Drain the excess water as early as possible 2. Allow the crop to dry completely before harvesting	1. Harvest the cobs after the they are dried up properly. Dry the grain to optimum moisture condition before storing
4.Sugarcane	1. Drain the excess water as early as possible 2. Apply 50 urea+ 50 kg MOP/acre after draining excess water 3. Take up inter cultivation at optimum soil moisture condition to loosen and aerate the soil and to control weeds 4. Adopt timely plant protection measures.	**Grand Growth stage** 1. Drain the excess water as early as possible 2.Apply 50 urea+ 50 kg MOP/acre after draining excess water 3. Take up timely control measures against the out break of pests.	**Formative Phase** 1. Drain the excess water as early as possible 2. Apply 50kg MOP/ acre in early season varieties and 50kg urea +50 kg MOP in mid season and late season varieties 3. Take up timely plant protection measures	**Maturity stage** Harvest the cane at appropriate time

Condition - Heavy rainfall with high speed winds in a short span[2]				
1. Rice	1. Drain out the excess water from the field as early as possible 2. Apply 20 kg N + 10 kg K /acre after draining excess water 3. Take up gap filling either with available nursery or by splitting the tillers from the surviving hills 4. Takeup timely plant protection measures for pest and disease incidences	Same as previous column.	1. Drain out the excess water from the field as early as possible 2. Lift the lodged hills tie them together to keep them erect 3. Harvest the crop as soon as the field condition permits 4. Takeup timely plant protection measures for pest and disease incidences	1. Drain out the excess water from the field as early as possible 2. Dry the sheaves on elevated areas like field bunds and drying floors and dry the grain to optimum moisture content to store the grain
2. Maize	1. Drain out the excess water from the field as early as possible 2. Take up inter cultivation and at optimum soil moisture condition to loosen and aerate the soil and to control weeds 3. Earthenup the crop for anchorage 4. Apply 20 kg N + 10 kg K /acre after draining excess water 5. To spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 6. Take up timely plant protection measures for possible pest and disease out breaks	Same as previous column.	1. Drain out the excess water from the field as early as possible 2. Allow the crop to dry completely before harvesting	1. Harvest the cobs after the they are dried up properly. Dry the grain to optimum moisture condition before storing
3.	1. Drain out the excess water	1. Drain out the excess water	1. Drain out the excess water	1. Dry the produce under sun

Blackgram	from the field as early as possible 2. Apply 4-5 kg N /acre after draining excess water 3. Spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 4. Take up proper weed control measures 5. Takeup timely plant protection measures for possible pest and disease out breaks	from the field as early as possible 2. Apply 4-5 kg N /acre after draining excess water 3.Spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 4. Takeup timely plant protection measures for possible pest and disease out breaks	from the field as early as possible 2. Harvest the crop as soon as the field condition permits	before sending to market
4.Sugarcane	1. Drain out the excess water from the field as early as possible 2. Lift the fallen plants if any and firm up the soil around the base of the stem 3Apply booster dose of 50 kg urea + 50kg MOP per acre after draining excess water	1. Drain out the excess water from the field as early as possible 2. Lift the fallen plants if any 3.Earthing up and propping by trash twisting is to be taken up to provide anchorage to plants 4. Apply booster dose of 50 kg urea + 50kg MOP per acre after draining excess water 5. Take up timely pest control measures for internode borer & wilt	1. Drain out the excess water from the field as early as possible 2. Apply booster dose of 50 kg. urea + 50kg MOP per acre in late and mid season varieties and 50 kg MOP/acre in early varieties after draining excess water 3. Harvest the crop as soon as the field condition permits and transport to drying floor	Harvest the cane at appropriate time
Condition - Outbreak of pests and diseases due to unseasonal rains				
1. Rice	Stem rot and Sheath blight - need based plant protection measures to be initiated based on incidence levels	BPH, Blast, Sheath blight incidence may increase due to unseasonal rains - need based plant protection measures to be initiated	Climbing cutworm and neck blast	-

2. Blackgram	Spodoptera - Need based plant protection measures to be initiated	Same as previous column	Same as previous column	Dry the grain to optimum seed moisture content (8 %) to avoid damage in storage
3. Maize	-	Fall army worm, Jassids, Wilt and Stalk rot may increase due to unseasonal rains - need based plant protection measures to be initiated	Post flowering Stalk rots may aggravate if unseasonal rains occurs	Same as above
4. Sugarcane	ESB, root grub and mealy bug – Need based plant protection measures to be initiated	Internode borer, mealy bug and root grub – Need based plant protection measures to be initiated	Top shoot borer, scale and smut- need based plant protection measures to be initiated	-
Horticultural crops- fruits				
Cashew	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices
Mango	-do-	-do-	-do-	-do-
Banana	• Need based plant protection measures to be done immediately	• Need based plant protection measures to be done immediately	• Need based plant protection measures to be done immediately	• Need based plant protection measures to be done immediately
Lemon	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices
Horticultural crops - Vegetables				
Chillies	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM	• Control pest diseases in an holistic approach with proper plant protection chemicals	• Control pest diseases in an holistic approach with proper plant protection chemicals

	practices	practices	• Adoption of IPM and IDM practices	• Adoption of IPM and IDM practices
Brinjal	-do-	-do-	-do-	-do-
Spices & Plantation crops				
Oil palm & Coconut	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Control pest diseases in an holistic approach with proper plant protection chemicals • Adoption of IPM and IDM practices	• Drain the excess water as soon as possible. • Harvest the mature produce as soon as possible. • Store the produce in well-ventilated place temporarily in gunny bags treated with safe fungicides and insecticides before it can be marketed. • Market the produce as soon as possible and adopt the IPM and IDM practices to prevent further spread of pest and diseases on the standing crop

2.3 Floods

Condition	**Transient water logging/ partial inundation**[1]			
	Suggested contingency measure[o]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
1. Rice	1. Drain out the excess water at the earliest 2. Apply booster dose of 0.2 kg N/40 sq. m 3. Spray micronutrients like Zn, Fe two to three times at 4 -5 days interval 4. Takeup proper weed control measures	1. Drain out the excess water at the earliest 2. Take up gap filling either with available nursery or by splitting the tillers from the surviving hills 3.Apply a booster dose of 20 kg N/acre 4. Spray $ZnSO_4$ 0.2 % if it is less than 45 days after transplanting 5. Takeup need based plant protection measures	1. Drain out the excess water at the earliest 2. Takeup need based plant protection measures	1. Drain out water .Spread sheaves loosely in field or field bunds where there is no water stagnation 2. Spray common salt at 3% on panicles to prevent germination and spoilage of straw from moulds 3. Thresh after drying the sheaves properly 4. Ensure proper grain moisture before storing
2. Blackgram	1. Drain out the excess water at the earliest 2. Takeup the gap filling at the earliest 3. Takeup weed control either mechanically or through weedicides 4. Apply 4-5 kg N/acre after draining excess water 5. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Takeup weed control either mechanically or through weedicides 3. Apply 4-5 kg N/acre after draining excess water 4. Spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 5. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Apply 4-5 kg N/acre after draining excess water 3. Spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 4. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Harvest the crop after the fields are dried up

3. Maize	1. Drain out the excess water at the earliest 2. Takeup weed control either mechanically or through weedicides 3. Intercultivation and earthing up to be done 4. Apply 20 kg N + 10 kg K /acre after draining excess water 5. Take up plant protection measures against possible pests and disease incidence	1.Drain out the excess water at the earliest 2. Takeup weed control either mechanically or through weedicides 3. Intercultivation and earthing up to be done 4. Apply 20 kg N + 10 kg K /acre after draining excess water 5. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Take up plant protection measures against possible pests and disease incidence	1. To drain out the excess water at the earliest 2. Cob picking to be done after they are dried fully
4.Sugarcane	1. Drain out the excess water at the earliest 2. Inter cultivate at optimum field moisture condition 3. Apply 50 kg urea + 50kg MOP/acre after draining excess water	**Grand growth stage** Same as previous column +Earthing up and propping by trash twisting is to be taken up to provide anchorage to plants.	**Formative stage** 1.Same as previous column+50 kg MOP /acre in early varieties after draining excess water 2.Take up plant protection measures against possible pests and disease incidence	**Maturity stage** 1.Drain out the excess water at the earliest 2. Harvest the crop when the field condition permits
Condition - Continuous submergence for more than 2 days[2]				
	Suggested contingency measure[o]			
1. Rice	1. Top dressing with 0.2 kg N/40 sq.m immediately after recede of flood water 2. Spray of $ZnSO_4$, $FeSO_4$ to correct micronutrient deficiencies 3. Weed control through mechanical or Chemical measures	1. Drain out the excess water at the earliest 2. Take up gap filling either with available nursery or by splitting the tillers from the surviving hills if the gaps are < 30% if more go for replanting 3. Apply 20 kg N + 10 kg K /acre after draining excess water 4. Proper weed control measures to be taken up	Same as above.	1. Drain out water spread sheaves loosely in field or field bunds where there is no water stagnation 2. Spray common salt at 5% on panicles to prevent germination and spoilage of straw from moulds 3. Thresh after drying the sheaves properly 4. Ensure proper grain

		4. Timely plant protection measures for pest and disease out break		moisture before storing
2. Blackgram	1. Drain out the excess water at the earliest 2. Takeup gap filling if the gaps are < 30 % and if more take up resowing 3. Apply 4-5 kg N /acre after draining excess water	1. Drain out the excess water at the earliest 2. Apply 4-5 kg N /acre after draining excess water 3. To spray KNO_3 1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 at 1% to support nutrition 4. Proper weed control measures to be taken up 5. Need based plant protection measures to be taken up	same as in previous column	1. Drain out the excess water at the earliest 2. Dry the bundles on field bunds and drying floors 3. Dry the grain to optimum moisture content before storage
3. Maize	same as above	same as above	1. Drain out the excess water at the earliest 2. 2. Apply 20 kg N + 10 kg K /acre after draining excess water 3. To spray KNO_3 @1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 @ 1% to support nutrition 4. Need based plant protection measures to be taken up	1. Drain out the excess water at the earliest 2. Pick the cobs and dry them properly before threshing 3. Dry the grain to optimum moisture content before storage or marketing
4. Sugarcane	1.Drain out excess water at the earliest 2. Apply 50 kg urea + 50kg MOP/acre after draining excess water	1. Take up inter cultivation to smother the weeds and to aerate the soil 2.Earthing up is to be taken up to provide anchorage to plants	1. Drain out excess water form the field 2.Earthing up is to be taken up to provide anchorage to plants	1. Drain out excess water as early as possible 2. Harvest the crop at appropriate time

	3. Adopt proper plant protection measures	3. Apply 50 kg urea + 50kg MOP/acre after draining excess water	3. Apply 50 kg urea + 50kg MOP/acre in late and mid season varieties and 50 kg MOP per acre in early season varieties after draining excess water Need based plant protection measures to be taken up	
Horticultural crops-fruits				
Cashew	• Drain the excess water as soon as possible • Spray 1% KNO_3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible • Spray 1% KNO_3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible • Spray 1% KNO_3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible. • Harvest the mature produce as soon as possible. • Store the produce in well-ventilated place temporarily before it can be marketed. • Market the produce as soon as possible.
Mango	• Drain the excess water as soon as possible • Spray 1% KNO3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible • Spray 1% KNO3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible • Spray 1% KNO3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible. • Harvest the mature fruits as soon as possible. • Store the fruits in well-ventilated place temporarily before it can be marketed. • Market the fruits as soon as possible.
Banana	.	• Drain the excess water as soon as possible	• Drain the excess water as soon as	• Drain the excess water as soon as possible.

		• Spray 1% KNO3 or Urea 2% solution 2-3 times. • Topdressing of booster dose of 80 g MOP + 100 g Urea per plant in two to three splits at monthly intervals. • If the age the plant is more than three months and less than seven months allow one sword sucker for ratoon and take up fertilization at monthly intervals for four months.	possible • Spray 1% KNO3 or Urea 2% solution 2-3 times. • Stake the plants with bamboos to prevent further lodging.	• Harvest the mature bunches as soon as possible. • Use ripening chambers for quick and uniform ripening • Store the harvested bunches in well-ventilated place temporarily before it can be marketed. • Market the fruits as soon as possible.
Lemon	• Drain the excess water as soon as possible. • Spray 1% KNO3 or Urea 2% solution 2-3 times. • Plant protection measures may be taken for control of insect vectors and diseases.	• Drain the excess water as soon as possible. • Spray 1% KNO3 or Urea 2% solution 2-3 times. • Foliar spray of micronutrient mixture is also to be taken up. • Sand casting around the tree trunks should be removed up to the collar region of the tree to prevent fungal infections. • If the tree age is above eight years a booster dose of 500 g of Urea and 750 g MOP per tree should be applied.	• Drain the excess water as soon as possible • Spray 1% KNO3 or Urea 2% solution 2-3 times.	• Drain the excess water as soon as possible. • Harvest the mature produce as soon as possible. • Store the produce in well-ventilated place temporarily before it can be marketed. • Market the produce as soon as possible.
Horticultural crops - Vegetables				
Chillies	• Drain the excess water as soon as possible	• Drain the excess water as soon as possible • Spray Urea 2% solution 2-3 times. • Topdressing of booster dose of 15 kg MOP + 30 kg Urea	• Drain the excess water as soon as possible • Spray Urea 2% solution 2-3 times. • Topdressing of	• Drain the excess water as soon as possible. • Dry the pods on concrete floor/ tarpaulins. • Spray any drying oil after the pods are free from

		per acre as soon as possible. • Gap filling may be taken up if the plants are two weeks old and sowing window is still available for the crop.	booster dose of 15 kg MOP + 30 kg Urea per acre as soon as possible.	surface moisture for quick drying. • Use poly house solar driers for quick drying • Market the produce as soon as possible .
Brinjal	• Drain the excess water as soon as possible	• Drain the excess water as soon as possible • Spray Urea 2% solution 2-3 times. • Topdressing of booster dose of 10 kg MOP+ 30 kg Urea per acre as soon as possible.	• Drain the excess water as soon as possible • Spray Urea 2% solution once. •	• Drain the excess water as soon as possible. • Harvest the mature produce as soon as possible. • Store the produce in well-ventilated place temporarily before it can be marketed. • Market the produce as soon as possible.
Spices & Plantation crops				
Oil palm and Coconut	• Planting should be done on mounts or bunds • Drainage system, suited to local conditions. may be provided to remove surplus water from root zone • Relief drains [shallow] channels are opened at places where water accumulates and connected with main drain to remove water from the surface	• Drain the excess water as soon as possible • Apply booster dose of NPK fertilizers	• Drain the excess water as soon as possible • Apply booster dose of NPK fertilizers	• Harvest the mature nuts as soon as possible. • Market the produce as soon as possible.

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone

Extreme event type	Suggested contingency measure[r]			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Cyclone				
1. Rice	1. To drain out the excess water at the earliest 2. Apply booster dose of 0.2 kg N/40 m^2 3. Spray micronutrients like Zn, Fe 2-3 times at 4 -5 days interval 4. Takeup proper weed control measures	Same as in previous column	1. To drain out the excess water at the earliest 2. Takeup need based plant protection measures 3. Lodged plants to be lifted and tied together to make them stand erect	1. Drain out water spread sheaves loosely in field or field bunds where there is no water stagnation 2. Spray common salt at 3% to prevent germination of seed and spoilage of straw from moulds 3. Thresh after drying the sheaves properly 4. Ensure proper grain moisture before storing
2. Black gram	1. To drain out the excess water at the earliest 2. Takeup weed control either mechanically or through weedicides 3. Apply 4-5 kg N/acre after draining excess water	1. To drain out the excess water at the earliest 2. Takeup weed control either mechanically or through weedicides 3. Apply 4-5 kg N/acre after draining excess water 4. To spray KNO_3 @1 % or water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 @ 1% to support nutrition 5. Take up plant protection measures against possible pests and disease incidence		1. Drain out the excess water at the earliest 2. Harvest the crop after the fields are dried up
3. Maize	1. To drain out the excess water at the earliest 2. Intercultivation and earthing up to	1. To drain out the excess water at the earliest 2. Takeup weed control either	1. To drain out the excess water at the earliest	1. To drain out the excess water at the earliest 2. Cob picking to be done after

	be done 3. Apply 20 kg N + 10 kg K /acre after draining excess water 4. Take up plant protection measures against possible pests and disease incidence	mechanically or through weedicides 3. Intercultivation and earthing up to be done 4. Apply 20 kg N + 10 kg K /acre after draining excess water 5. Take up plant protection measures against possible pests and disease incidence	2. Take up plant protection measures against possible pests and disease incidence	they are dried fully
4. Sugarcane	1Drain out the excess water at the earliest 2. Inter cultivate at optimum field moisture condition 3. Apply 50 kg urea + 50kg MOP/acre after draining excess water	1.Drain out the excess water at the earliest 2. Inter cultivate at optimum field moisture condition 3. Earthing up and propping by trash twisting is to be taken up to provide anchorage to plants 4. Apply 50 kg urea + 50kg MOP/acre after draining excess water 5. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Earthing up and propping by trash twisting is to be taken up to provide anchorage to plants 3.Apply 50 kg urea + 50kg MOP/acre in late and mid season varieties and 50kg MOP /acre in early varieties after draining excess water 4. Take up plant protection measures against possible pests and disease incidence	1. Drain out the excess water at the earliest 2. Harvest the crop when the field condition permits
Horticultural crops- fruits				
Cashew	• Drain the excess water as soon as possible	• Drain the excess water as soon as possible	• Drain the excess water as soon as	• Drain the excess water as soon as possible.

	• Spray 1% KNO3 or Urea 2% solution 2-3 times.	• Tress fallen on ground may be lifted and earthed up • Broken and damaged branches may be pruned and applied with Bordeaux paste •	possible • Tress fallen on ground may be lifted and earthed up • Broken and damaged branches may be pruned and applied with Bordeaux paste	• Harvest the mature produce as soon as possible. • Store the produce in well ventilated place temporarily before it can be marketed. • Market the produce as soon as possible.
Mango	• If the damage is severe, go for resowing	• Trees fallen on ground may be lifted and earthed up • Manuring and plant protection measures have to be taken up. • Broken and damaged branches may be pruned and applied with Bordeaux paste	• Tress fallen on ground may be lifted and earthed up • Manuring and plant protection measures have to be taken up. • Broken and damaged branches may be pruned and applied with Bordeaux paste	• Drain the excess water as soon as possible. • Harvest the mature fruits as soon as possible. • Collect the fallen fruits and sell immediately or go for preparation of processed products. • If to store, store the produce in well-ventilated place temporarily before it can be marketed. • Broken and damaged branches may be pruned and applied with Bordeaux paste
Banana		• Wind damaged plants should be pruned using disinfected secateurs and cut ends must be smeared with Bordeaux paste • Drain the excess water as soon as possible • The fallen tress may be cut leaving two suckers • Inter-cultivate the soil	• Wind damaged plants should be pruned using disinfected secateurs and cut ends must be smeared with Bordeaux paste • Drain the excess water as soon as possible	• Wind damaged plants should be pruned using disinfected secateurs and cut ends must be smeared with Bordeaux paste • Drain the excess water as soon as possible. • Harvest the mature bunches as soon as possible. • Use ripening chambers for quick and uniform ripening • Store the harvested bunches in well-

		with gorru for aeration. • Spray 0.5 % KNO3 or Urea 2% solution 2-3 times. • Topdressing of booster dose of 80 g MOP + 100 g Urea per plant at two to three times intervals. • Gap filling may be taken up if the plants are two weeks old and sowing window is still available for the crop. • If the age of the plant is less than three months and submergence up to three feet better to replant the garden.	• The fallen tress may be cut leaving two suckers • Topdressing of booster dose of 80 g MOP + 100 g Urea per plant at two to three times intervals • Mature bunches on the completely damaged plants be covered with Leaves and harvested with in 15-20days	ventilated place temporarily before it can be marketed. • Market the produce as soon as possible. • 3-4 foliar application of KNO3on immature/developing bunches and leaves at weekly intervals. • Staking with bamboo for support .
Lemon	• If the damage is severe, go for resowing.	• Tress fallen on ground may be lifted and earthed up • Manuring and plant protection measures have to be taken up. • Broken and damaged branches may be pruned and applied with Bordeaux paste	• Tress fallen on ground may be lifted and earthed up • Manuring and plant protection measures have to be taken up. • Broken and damaged branches may be pruned and applied with Bordeaux paste	• Drain the excess water as soon as possible. • Harvest the mature fruits as soon as possible. • Collect the fallen fruits and sell immediately or go for preparation of processed products. • If to store, store the produce in well-ventilated place temporarily before it can be marketed. • Broken and damaged branches may be pruned and applied with Bordeaux paste
Horticultural crops - Vegetables				

Chillies	• Grow nursery on raised beds.	• Uprooted plants may be lifted and earthed up • Drain the excess water as soon as possible • Gap filling must be done immediately • If damage is more go for replanting Spray Urea 2% solution 2-3 times. • Topdressing of booster dose of 15 kg MOP + 30 kg Urea per acre as soon as possible.	• Uprooted plants may be lifted and earthed up • Drain the excess water as soon as possible • Spray Urea 2% solution 2-3 times. • Topdressing of booster dose of 15 kg MOP + 30 kg Urea per acre as soon as possible.	• Drain the excess water as soon as possible. • Dry the pods on concrete floor/ tarpaulins immediately • use poly house solar driers for quick drying • Remove the pest and disease infected pods. .
Brinjal	• Grow nursery on raised beds. • If damage is more go for replanting	• Uprooted plants may be lifted and earthed up • Drain the excess water as soon as possible • Gap filling must be done immediately • Topdressing of booster dose of 12 kg MOP + 30 kg Urea per acre as soon as possible. • If damage is more go for replanting	• Uprooted plants may be lifted and earthed up • Drain the excess water as soon as possible • Gap filling must be done immediately • Spray Urea 2% solution 2-3 times. • Topdressing of booster dose of 12 kg MOP + 30 kg Urea per acre as soon as possible. • Spray COC 30 g in 10 liters of water, 2-3 times	• Drain the excess water as soon as possible. • Harvest the mature produce as soon as possible. • Store the produce in well ventilated place temporarily before it can be marketed. • Market the produce as soon as possible. • Collect the fruits and sell immediately or go for preparation of processed products.

			against leaf spots.	
Spices & Plantation crops				
Oil palm and Coconut	• Planting should be done on mounts or bunds • Drainage system suited to local conditions. may be provided to remove surplus water from root zone • Relief drains [shallow] channels are opened at places where water accumulates and connected with main drain to remove water from the surface	• Drain the excess water as soon as possible • Twisted leaves may be cut and removed • Apply booster dose of NPK fertilizers • The palms have fallen with root system still having contact with the soil, they need to be brought to position and provided with soil mound and support	• Drain the excess water as soon as possible • Hanging bunches may be provided with supports wherever possible. Apply booster dose of NPK fertilizers • The palms have fallen with root system still having contact with soil they need to be brought to position and provided with soil mound and support	• Twisted leaves may be cut and removed • Hanging bunches may be provided with supports wherever possible • Harvest the mature nuts as soon as possible. • Market the produce as soon as possible.

Extreme event type	**Suggested contingency measure[r]**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Cold wave				
1. Rice	1. Irrigate field during night and drain out during day in alternate days to avoid cold injury 2. Mulching with paddy straw/ polythene sheets 3. Apply excess dose of 0.5 kg P2O5/40 sq. m 4. Spray micronutrients like Zn, Fe 2-3 times at 4 -5 days interval 5. Take up proper weed control	1. Irrigate field during night and drain out during day in alternate days to avoid cold 2. Take up gap filling either with available nursery/by splitting the tillers from the surviving hills if the gaps are < 30% if more go for replanting 3. Apply 20 kg N + 10 kg K	1. Irrigate field during night and drain out during day in alternate days to avoid cold injury 2. Apply 20 kg N + 10 kg K /acre after draining of water 3. Take up plant protection measures against possible pests and disease incidence	N/A

	measures 6. Take up plant protection measures against possible pests and disease incidence	/acre after draining of water 4. Take up proper weed control measures 5. Take up plant protection measures against possible pests and disease incidence		

2.5.Detailed Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

General contingency plans

Before the event[s]	During the event	After the event
Feed and fodder availability		
1.Conserving fodder/crop residues/ forest grass by silage / hay making either by individual or on community basis 2. Preparing complete diets and storing in strategic locations 3. Organize procurement of dry fodders / feed ingredients from surplus areas 4. Establish fodder banks and feed banks 5. Livestock relief camps during floods/cyclones must be planned in the vicinity of relief camps for people 6. Capacity building and preparedness	1.Organise relief camps 2.Supply silage / hay to farmers with productive stock on subsidized rates 3.Segregate old, weak and unproductive stock and send for slaughter 4. Supply mineral mixture to avoid deficiencies 5. Dry fodder must be offered to the livestock in little quantities for number of times 6.Concentrate feed or complete feed must be offered to only productive and young stock only	1. Capacity building to stake holders on drought /cyclone/flood mitigation in livestock sector 2. Promote fodder cultivation. 3. Flushing the stock to recoup 4. Avoid soaked and mould infected feeds / fodders to livestock 5. Replenish the feed and fodder banks 6.Promote fodder preservation techniques like silage / hay making
Drinking water		

1.Construct drinking water tanks in herding places, village junctions and in relief camp locations 2.Plan for sufficient number of tanks for water transportation 3.Identify bore wells, which can sustain demand. 4.Procure sufficient quantities of water Sanitizers	1.Regular supply of clean drinking water to all tanks 2.Cleaning the tanks in regular intervals 3.Keep the livestock away from contaminated flood/cyclone/stagnated waters 3.Add water sanitizers	1.Hand over the maintenance of the structures to panchayats 2.Sensitize the farming community about importance of clean drinking water
Health and disease Management		
1.Procure and stock emergency medicines and vaccines for important endemic diseases of the area 2. All the stock must be immunized for endemic diseases of the area 3. Carry out deworming to all young stock 4. Keep stock of bleaching powder and lime 5.Carry out Butax spray for control of external parasites 6.Identify the Clinical staff and trained paravets and indent for their services as per schedules 7.Identify the volunteers who can serve in need of emergency	1.Keep close watch on the health of the stock 2.Sick animals must be isolated and treated Separately. 3. Carry out deworming and spraying to all animals entering into relief camps 4. Clean the animal houses regularly and apply disinfectants. 5.Safe and hygienic disposal of dead animal carcasses 6. Organize with community daily lifting of dung from relief camps	1.Keep close surveillance on disease outbreak. 2.Undertake the vaccination depending on need 3.Keep the animal houses clean and spray disinfectants

Detail Contingent strategies for Livestock, Poultry & Fisheries

Drought	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Feed and Fodder availability	Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and ***Cenchrus ciliaris*** as grass with ***Leucaena leucocephala*** as tree component (or suggest suitable similar system to your district) Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in common property resources (CPRs) like temple lands, panchyat lands or private property resources (PPRs) like waste and degraded lands with the monsoon pattern for higher biomass production Promote cultivation of short duration fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 and also sunhemp Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality chaff cutters. Establishment of backed yard cultivation of para grass with drain water from bath room/washing area Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon Proper drying, bailing and densification of harvested grass from previous season Creation of permanent fodder, feed and fodder seed banks in all drought prone	Harvest and use biomass of dried up crops (Rice, Maize, Bajra, Horse gram, Groundnut, black gram, sun hemp) material as fodder. Harvest the tree fodder (Neem, Subabul, Acasia, Pipal etc) and unconventional feeds resources available and use as fodder for livestock (LS). Available feed and fodder should be cut from CPRs and stall fed in order to reduce the energy requirements of the animals UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the needy areas from the reserves at the district level initially and latter stages from the near by districts. Hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS Herd should be split and supplementation should be given only to the highly productive and breeding animals Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock) Motivate the farmers to mix the dry fodder with available kitchen waste while feeding Arrangements should be made for mobilization of small ruminants across the villages where no drought exits with subsidized road/rail transportation and temporary shelter provision for the shepherds Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals Supply silage and or hay on subsidized rates to the	Concentrates supplementation should be provided to all the animals. The farmers may be advised to practice "flushing the stock" to recoup Short duration fodder crops of should be sown in unsown and crop failed areas where no further routine crop sowing is not possible Supply of quality seeds of fodder varieties and motivating the farmers to cultivate at least 10% of their land holding for fodder production

	villages	farmers having high productive stock Subsidized loans should be provided to the livestock keepers	
Cyclone	Harvest all the possible wetted grain (rice/maize/bajra etc) and sugar cane tops and use as animal feed. Motivate the farmers to store a minimum quantity of hay (25-50 kg) and concentrates (10-25 kg) per animal in farmer's / LS keepers' house/ shed for feeding the animals during cyclone. Stock of anti-diarrheal drugs and electrolytes should be made available for emergency transport Don't allow the animals for grazing in case of early forewarning (EFW) of cyclone Incase of EFW of severe cyclone, shift the animals to safer places.	Treatment of the sick injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Diarrhea out break may happen. Health camps should be organized In severe cases un-tether **or** let loose the animals Arrange transportation of highly productive animals to safer place Spraying of fly repellants in animal sheds	Repair of animal shed Deworm the animals through mass camps Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR Proper dispose of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of short duration fodder crops in unsown and water logged areas when crops are damaged and no chance to replant Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.
Floods	In case of early forewarning (EFW), harvest all the crops (Maize, Rice, Bajra, Groundnut) that can be useful as fodder in future (store properly) and also sugar cane tops	Transportation of animals to elevated areas Stall feeding of animals with stored hay and concentrates Proper hygiene and sanitation of the animal shed In severe floods, un-tether or let loose the animals	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources

	Don't allow the animals for grazing if severe floods are forewarned Motivate the farmers to store a minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods Arrangement for transportation of animals from low lying area to safer places and also for rescue animal health workers to get involve in rescue operations	Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds	Deworming with broad spectrum dewormers Vaccination against possible disease out breaks like HS, BQ, FMD and PPR Proper disposable of the dead animals / carcasses by burning / deep burying (4-8 feet) with lime powder (1kg for small ruminants and 5kg for large ruminants) in pit Drying the harvested crop material and proper storage for use as fodder.

Vaccination programme for cattle and buffalo:

Disease	**Age and season at vaccination**
Anthrax	In endemic areas only, Feb to May
Hemorrhagic septicemia (HS)	May to June
Black quarter (BQ)	May to June
Foot and mouth disease (FMD)	July/August and November/December

Vaccination schedule in small ruminants (Sheep & Goat)

Disease	**Season**
Foot and mouth disease (FMD)	Preferably in winter / autumn
Peste des Petits Ruminants (PPR)	Preferably in January
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	November

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygienic and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
Floods			
Shortage of feed ingredients	In case of early forewarning of floods, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc,	Use stored feed as supplement Don't allow for scavenging Culling of weak birds	Routine practices are followed Deworming and vaccination against RD
Drinking water		Use water sanitizers or offer cool drinking water	
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/ Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	Prevent water logging surrounding the sheds through proper drainage facility Assure supply of electricity by generator or solar energy or biogas Sprinkle lime powder to prevent ammonia accumulation due to dampness	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning / burying with line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			

Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water		Use water sanitizers or offer cool drinking water	
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / deep burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against Ranikhet Disease (0.5ml S/c)
Heat wave and cold wave	**NA**		

2.5.3 Fisheries/ Aquaculture:

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	No intervention	No intervention	No intervention
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Stocking of advanced fingerlings in half or even less than the normal stocking density or stocking of common carp seed	Immediate harvesting or decreasing the density commensurate with the water quantity.	De weeding and deepening of tank to ensure retention of water for a longer period and provision of employment under MGNREGP
(ii) Changes in water quality	Regular monitoring of water quality parameters and application of geolites, soil probiotics, etc to maintain water quality	Immediate harvesting or changing the water quality by application of sanitizers.	Removal of top layer, deep ploughing of tank and application of lime
(iii) Any other			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Crop holiday or going for stocking of yearlings by reducing the	Harvesting of fish and leaving the pond fallow till next season	Removal of top layer, deep ploughing of tank and application of lime

	density according to availability of water		
(ii) Impact of salt load build up in ponds / change in water quality	Stocking of salinity tolerant fish / shrimp, application of geolites and other buffers	Frequent change of water with fresh water	Frequent draining of the pond with fresh water, removal of top layers
(iii) Any other			
2) Floods			
A. Capture			
Marine	No intervention	No intervention	No intervention
Inland			
(i) Average compensation paid due to loss of human life	Shifting the people from low lying areas to relief camps	Deployment of specially trained persons for rescue operations by providing life bouys, jackets, ropes, boats, etc	Payment sufficient ex-gratia to the families
(ii) No. of boats / nets/damaged	Shifting and relocating boats and nets to safer places when warnings are issued, to avoid fishing, etc	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) No.of houses damaged	Avoidance of construction of houses in flood prone ares, construction of pucca houses at elevated places,	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
(iv) Loss of stock	Avoidance of surface species like catla, silver carp since they are vulnerable in tanks prone to floods, erection of nets across the spill way or just beyond it	Erection of nets at spill ways	Taking up compensatory stocking
(v) Changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(vi) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Hemorrhagic septicemia. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light

B. Aquaculture			
(i) Inundation with flood water	Raising and riveting the bunds, construction of spill way to release excess water, erection of nets to avoid escape of fish	Continuous pumping of excess water, erection of nets low lying areas	Strengthening of bunds, excavating channels along the sides of the ponds for free escape of water
(ii) Water continuation and changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(iii) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Hemorrhagic septicemia. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
(iv) Loss of stock and inputs (feed, chemicals etc)	Advance erection of nets, strengthening of bunds where they are prone to breaches, harvesting or reducing the density	Suspension of feeding, application of organic manures	Compensatory stocking, assessment of values and payment of subsidy on inputs
(v) Infrastructure damage (pumps, aerators, huts etc.)	Insuring pond, accessoires, etc., Shifting of aerators, pumps soon after warnings are issued	Relocating pumps, aerators to elevated places	Assessment of damages and provision of them on subsidy
(vi) Any other			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Avoidance of fishing, preventing fishermen from venturing into sea, carrying of safety equipment and VHF sets, shifting fishermen from vulnerable areas to relief camps, etc	To ensure the return of fishing boats on long voyages, provision of information on such boats to coast Guard	Payment sufficient ex-gratia to the families
(ii) Avg. no. of boats / nets/damaged	Avoidance of fishing when warnings are issued, shifting of boats and nets to safe places	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) Avg. no. of houses damaged	Avoidance of houses in Coastal	Shifting of people by relief	Assessment of damages to houses and

	Regulation Zone, designing of houses to withstand impact of turbulent wind and water	boats to the relief camps	provision of compensation in case of partial damage and sanction house under existing schemes
Inland	Erection of protective nets across the surplus weir to prevent fish loss due to overflows	Continuous monitoring to prevent or minimize escape of fish along with surplus water	Compensatory stocking of seed
B. Aquaculture			
(i) Overflow / flooding of ponds	The design of the pond must be in such a manner as to bail out surplus water and to prevent loss of standing crop	Continuous monitoring to prevent or minimize escape of fish along with surplus water	Compensatory stocking of seed
(ii) Changes in water quality (fresh water / brackish water ratio)	Recirculation water to replenish and ensure sufficient dissolved oxygen levels in the pond. Maintenance of salinity levels by pumping in water from creeks.	Continuation of the same process.	Restoration of physical and chemical parameters
(iii) Health and diseases	Removal of stress causing factors to maintain the health of the animal	Removal of stress causing factors to maintain the health of the animal	Restoration of physical and chemical parameters
(iv) Loss of stock and inputs (feed, chemicals etc)	Preventive nets must be erected to minimize loss of stock	Continuation of the same process.	Compensatory stocking of seed
(v) Infrastructure damage (pumps, aerators, shelters/huts etc.)	Pumps, aerators, etc. must be protected by moving them to safe locations	To avoid use of aerators, pumps and other appliances	Overhauling of the eqipment to prevent from being damaged
(vi) Any other			
4. Heat wave and cold wave			
A. Capture			
Marine	Avoidance of fishing	Avoidance of fishing	No intervention
Inland	Monitoring dissolved oxygen levels	Monitoring dissolved oxygen levels	No intervention
B. Aquaculture			
(i) Changes in pond environment (water quality)	Reduction of biomass by partial harvest in the event of heat as the DO levels will be very low.	Avoidance of fishing	Compensatory stocking of seed and restoration of all physical and chemical parameters
(ii) Health and Disease management	Removal of stress causing factors to maintain the health of the animal	Removal of stress causing factors to maintain the health of the animal	Compensatory stocking of seed and restoration of all physical and chemical parameters

(iii) Any other			