State: MAHARASHTRA
Agriculture Contingency Plan: District HINGOLI

1.0 District Agriculture profile				
1.1	**Agro-Climatic/ Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau, Hot Semi-Arid Eco-Region (6.2)		
	Agro-Climatic Region (Planning Commission)	Western Plateau and Hills Region (IX)		
	Agro Climatic Zone (NARP)	Central Maharashtra plateau Zone (MH-7) & Central Viderbha Zone(MH-8)		
	List all the districts or part thereof falling under the NARP Zone	Jalna, Parbhani, Hingoli, Osmanabad, Latur, Nanded, Amravathi, Akola		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		19.43”12.00” N	77.11” 00.00” E	547 m above sea level
	Name and address of the concerned ZRS / ZARS / RARA / RRA / RRTTS	Marathwada Agriculture University Parbhani National Agricultural Research Project, Paithan Road ,Aurangabad 500431 (Maharashtra)		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Tondapur Warangaphata,Taluka Kalamnuri,District- Hingoli- 431513 Website: www.kvkhingoli.com , e-mail: kvkhingoli @ gmail.com		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	AMFU- Parbhani-431 401.		

1.2	**Rainfall**	Normal RF (mm)	Normal Rainy days (number)	Normal Onset (Specify week and month)	Normal Cessation (Specify week and month)
	SW monsoon (June - Sep) :	829.5	39	June 2nd week (MW 23)	October 1st week (MW 40)
	NE monsoon (Oct - Dec) :	75.4	5	-	-
	Winter (Jan - Feb) :	10.2	1	-	-
	Summer (Mar - May) :	31.5	-	-	-
	Annual	946.6	45	-	-

(Source: Meteorology Department, MAU, Parbhani)

1.3	**Land use pattern of the district (latest statistics)**	Geographical area (000 ha)	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
		466.1	441.7	28.4	10.5	17.8	11.3	0.3	8.7	43.7	15.9

(Source: Agriculture Statistical Information Maharashtra Sate 2006 (Part – II))

1.4	**Major Soils**	**Area ('000 ha)**	**Percent (%) of total**
	Deep black cotton soils	186.40	36.34
	Medium Deep black soils	40.77	7.95
	Shallow black soils	285.81	55.7

(Source: NBSS and LUP, Nagpur)

1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	382.1	131.5
	Area sown more than once	120.4	
	Gross cropped area	502.5	

1.6	**Irrigation**	Area ('000 ha)	Percent (%)	
	Net Irrigated area	88.9	17.7	
	Gross irrigated area	204.3	-	
	Rainfed area	293.2	-	
	Sources of Irrigation (Give the data)	**Number**	**Area ('000 ha)**	**(%)**
	Canals		45.4	51.1
	Tanks	-	3.9	4.4
	Open wells	-	23.8	26.8
	Bore wells	-	13.6	15.3
	Lift irrigation	-	0.2	0.2
	Other sources (Farm ponds)	-	1.8	2.0
	Total	-	88.9	100.0
	No. of tractors	-		
	Pump sets	-		
	Micro-irrigation (2009-10) Drip 0.23 and sprinkler 0.41ha	-	0.64	
	Groundwater availability and use	No. of blocks	% area	**Quality of water**
	Over exploited	-	-	-
	Critical	-	-	-
	Semi-critical	-	-	-
	Safe	-	-	-
	Waste water availability and use	-	-	-
	Ground water quality	-	-	Suitable for drinking and irrigation

* Over-exploited: groundwater utilization > 100%; critical: 90-100% semi-critical: 70-90%; safe: < 70%

1.7 Area under major field crops & horticulture etc.

1.7	Major Field Crops cultivated	Area ('000 ha)								
		Kharif			Rabi			Summer		
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
	Soybean	-	126.3	126.3	-	-	-	-	-	126.3
	Cotton	-	67.0	67.0	-	-	-	-	-	67.0
	Sorghum	-	60.3	60.3	-	21.7	21.7	-	-	82.0
	Pigeon pea	-	25.2	25.2	-	-	-	-	-	25.2
	Green Gram	-	20.4	20.4	-	-	-	-	-	20.4
	Black gram	-	17.4	17.4	-	-	-	-	-	17.4
	Wheat	-	-	-	35.4	-	35.4	-	-	35.4
	Gram	-	-	-	-	33.0	33.0	-	-	33.0
	Safflower	-	-	-	-	26.4	26.4	-	-	26.4
	Sunflower	-	-	-	6.8	-	6.8	-	-	6.8
	Groundnut	-	-	-	-	-	-	4.8	-	4.8
	Sugarcane	-	-	-	12.3	-	-	-	-	12.3

(Source: JDA's ZREAC report, Kharif & rabi , 2010)

	Horticulture crops – Fruits	Total area (000 ha)
	Banana	2.00
	Orange (Santra)	3.50
	Sweet Orange (Mosambi)	3.00
	Mango	0.50
	Papaya	0.40
	Anola	0.40
	Total	10.10
	Horticulture crops – Vegetables	**Total area**
	Tomato	-
	Brinjal	-
	Okra (Bhendi)	-

	Chilli	-
	Total	0.50
	Medicinal and Aromatic crops	**Total area**
	Turmeric	3.50
	Flower crop	0.05
	Plantation Crops	**Total area**
		Not available
	Fodder crops	**Total area**
	Sorghum	NA
	Maize	NA
	Total fodder crop area	NA
	Grazing land	NA
	Sericulture etc	0.09
	Others (Specify)	

(Source: ZREAC report)

1.8	Livestock	Number ('000)			
	Cattle	280795			
	Buffaloes total	-			
	Commercial dairy farms	-			
	Goat	163.8			
	Sheep	5.7			
	Others (Camel, pig, Yak etc.)	NA			
	Livestock (2003 Census)		**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)		159.878	108.114	267.982
	Crossbred cattle		5.368	7.445	12.813
	Non descriptive Buffaloes (local low yielding)		159.868	108.114	267.982
	Graded Buffaloes		5.368	7.445	12.813
	Goat		38.444	125.375	163.819
	Sheep		0.975	4.806	5.781
	Sheep Crossbred		0	0	0
	Commercial dairy farms (Number)		-	-	-

1.9	**Poultry(2003 Census)**	**Total No. of birds (‘000)**		
	Commercial	32.06		
	Backyard	147.03		
1.10	**Fisheries (2008-09)**	Area (000 ha)	Yield (t/ha)	Production (tones)
	Brackish water	NA		
	Fresh water	4.27	0.24	1052
	Others	NA	-	-

(Source: Maharashtra Animal and Fishery Sciences University, Nagpur)

1.11	**Production and Productivity of major crops(Average of last 5 years: 2003 to 2008)**	Kharif		Rabi		Summer		Total	
		Production (‘000 t)	Productivity (kg/ha)	Production (‘000 t)	Productivity (kg/ha)	Production (‘000 t)	Productivity (kg/ha)	Production (‘000 t)	Productivity (kg/ha)
	Soybean	134.9	1068	-	-	-	-	134.9	1068
	Cotton	129.3	328	-	-	-	-	129.3	328
	Sorghum	67.3	1116	-	-	-	-	67.3	1116
	Pigeon pea	24.5	972	-	-	-	-	24.5	972
	Green Gram	8.8	431	-	-	-	-	8.8	431
	Rabi Sorghum	-	-	1537.5	750	-	-	1537.5	750
	Wheat	-	-	6460.0	1700	-	-	6460.0	1700
	Gram	-	-	3755.0	1073	-	-	3755.0	1073
	Safflower	-	-	1890.0	700	-	-	1890.0	700
	Sunflower	-	-	18.90	700	-	-	18.90	700
	Major Horticultural crops								
	Orange (Santra)	35.0	1000	-	-	-	-	35.0	1000
	Sweet orange (Mosambi)	30.0	1000	-	-	-	-	30.0	1000
	Mango	2.5	500	-	-	-	-	2.5	500
	Banana	40.0	2000	-	-	-	-	40.0	2000
	Anola	1.60	400	-	-	-	-	1.60	400
	Total	11.42	-	-	-	-	-	11.42	-
	Medicianal and Aromatic plants								
	Turmeric	35.0	10	-	-	-	-	35.0	10
	Flower crops	0.200	4	-	-	-	-	0.200	4

(Source: Regional Review Meeting Report, 2010-2011 Agril. Department Govt of Maharashtra)

1.12	**Sowing window for 5 major crops**	**Cotton**	**Soybean**	**Sorghum**	**Pigeon pea**	**Green Gram**
	Kharif - Rainfed	June 15 to July 15	June 15 to July 15	June 15 to July 15	June 15 to July 30	June 15 to July 7
	Kharif - Irrigated	May 15 to June 15	-	-	-	-
		Wheat	Rabi sorghum	Gram	Safflower	Sunflower
	Rabi – Rainfed	-	1-15 Oct	1- 15 Oct	15 Sept to 15 Oct	1- 15 Oct
	Rabi - Irrigated	Nov1 to Nov 20	15 Oct to 15 Nov	15 Oct to 15 Nov	15 Oct to 15 Nov	15 Oct to 15 Nov

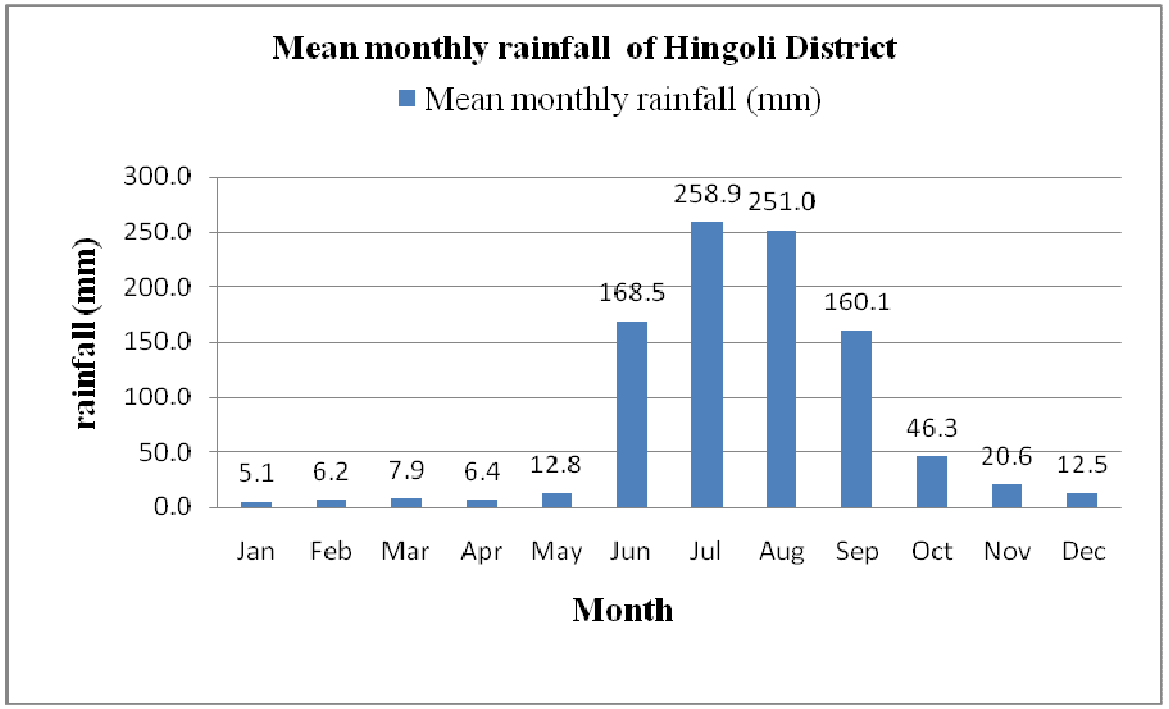
1.13	**What is the major contingency the district is prone to?** (Tick mark)	Regular	Occasional	None
	Drought	-	√	-
	Flood	-	-	√
	Cyclone	-	-	√
	Hail storm	-	-	√
	Heat wave	-	√	-
	Cold wave	-	√	-
	Frost	-	-	-
	Sea water intrusion*	-	-	√
	Pests and disease outbreak	√ .1.Heliothis (pigeonpea , gram) 2.Spodoptera (Soybean) 3.Sphingid (Moong and Urd) 4.Jassids&whitefly (cotton) 5 Sigataka disease -Banana		-

(Source: Maharashtra Animal and Fishery Sciences University, Nagpur)

1.14	**Include Digital maps of the district for**	Location map of district within States as Annexure 1	Enclosed : Yes
		Mean annual rainfall as Annexure 2	Enclosed : Yes
		Soil map as Annexure 3	Enclosed : Yes

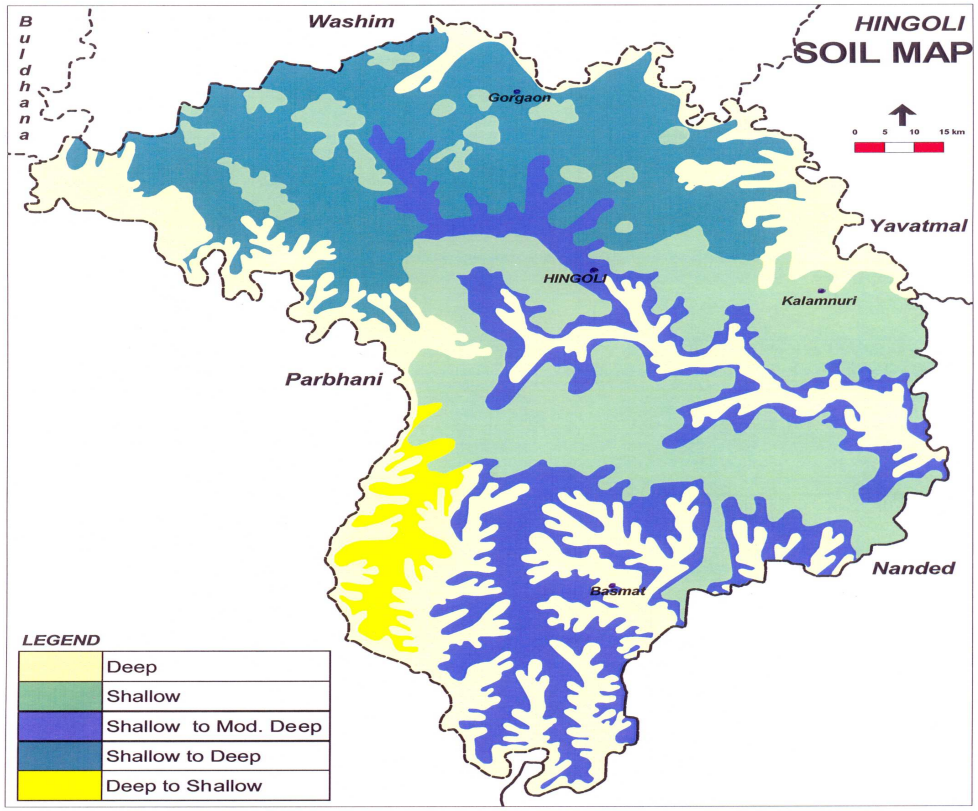
Annexure 1
Location map of Hingoli district

Annexure 2
Mean monthly rainfall of Hingoli district



(Source: IMD) (1941-1990)

Annexure 3
Soil map of Hingoli district



(Source: NBSS & LUP, Nagpur)

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**	**Normal Crop /Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 week **June 4th week**	Medium deep to deep black soils with assured and high rainfall	Soybean	No change	No change	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Cotton	No change	No change	
		Sorghum	No change	No change	
		Pigeon pea	No change	No change	
		Green Gram/ Black Gram-Sorghum/Safflower / Gram	No change	No change	
	Shallow black soils with assured and high rainfall	Cotton	No change	No change	
		Sorghum	No change	No change	
		Soybean	No change	No change	
		Pigeon pea	No change	No change	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures** ***Plz give some more measures***	**Remarks on Implementation**
Delay by 4 week **July 2nd week**	Medium deep to deep black soils with assured and high rainfall	Soybean	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	Normal package of practices recommended by MAU, Parbhani	Linkage with MAU, MSSC, NSC, NFSM and Village seed production programme for seed. Linkage with MAIDC, ZILLA PARISHAD for implements.
		Cotton	No change / Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 10-15% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Sorghum	Sorghum + Pigeonpea 4 : 2 (CSH-9, 11, 14, 16 PVK-401, 809) + (BSMR 736, 853, BDN 708, 711)	**-------do--------**	
		Pigeon pea	No change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-------do--------**	

		Green Gram/ Black Gram-Sorghum/Safflower / Gram	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-------do--------**	Linkage with MAU, KVK for agro techniques
	Shallow black soils with assured and high rainfall	Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 10-15% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Sorghum	Sorghum + Pigeonpea 4 : 2 (BSMR 736, 853, BDN 708, 711)	**-------do--------**	
		Soybean	No change / Soybean+ pigeon pea 4:2 row proportion (MAUS 71,81)	**-------do--------**	
		Pigeon pea	No change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-------do--------**	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 week **July 4th week**	Medium deep to deep black soils with assured and high rainfall	Soybean	No change / Soybean + pigeonpea 4:2 row proportion (MAUS 71,81 + BSMR 736,853,BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani	Linkage with MAU, MSSC NSC, NFSM and Village seed production programme for seed. Linkage with MAIDC, ZILLA PARISHAD for implements. Linkage with MAU, KVK for agro techniques
		Cotton	Cotton + Pigeonpea 6:2 (BSMR 736, 853, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 10-15% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Sorghum	Pearl Millet + Pigeonpea 4 : 2 , 3:3 (Sharadha, Saburi, Shanti, AIMP 92901 BSMR 736, BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani.	
		Pigeon pea	No change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81 + BSMR 736, 853,)	**-------do--------**	
		Green Gram/ Black Gram-Sorghum/Safflower	Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81 + BSMR 736, 853, BDN)	**-------do--------**	

		/ Gram			
	Shallow black soils with assured and high rainfall	Cotton	Cotton + Pigeonpea 6:2 (BDN 708, 711)	Normal package of practices recommended by MAU, Parbhani or adopt 10-15% more seed rate than recommended and reduce fertilizer dose by 25 per cent.	
		Sorghum	Pearl Millet + Pigeonpea 4 : 2 , 3:3 (Sharadha, Saburi, Shanti, AIMP 92901 BSMR 736, BDN 708, 711)	**-------do--------**	
		Soybean	No change / Soybean+ pigeonpea 4:2 row proportion (MAUS 71,81)	**-------do--------**	
		Pigeon pea	NO change / Soybean + Pigeonpea 4 : 2 (JS-335, MAUS-71,81)	**-------do--------**	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop /Cropping system**	**Change in Crop/Cropping system**	**Agronomic measures** ***Plz give some more measures***	**Remarks on Implementation**
Delay by 8 week **Aug 2nd week**	Medium deep to deep black soils with assured and high rainfall	Soybean	Pigeonpea (BDN 708, 711) or Alternatively plan for rabi season crops like sorghum, chickpea, safflower and sunflower	1. Dry sowing 8 - 10 days before rains with 10 - 15 % higher seed rate and reduce fertilizer dose by 25 per cent. 2. Seed hardening i.e. 18 hrs soaking in water followed by 24 hrs shade drying. 3. Prepare land for Rabi season 4. Open conservation furrow 5. Prefer early maturing varieties recommended by MAU, Parbhani	Linkage with MAU, MSSC NSC, NFSM and Village seed production programme for seed. Linkage with MAIDC, ZILLA PARISHAD for implements. Linkage with MAU, KVK for agro techniques
		Cotton	Sunflower (Modern, EC 68414, LS-11, LSH-35, BSH-1)	----------do---------	
		Sorghum	Fodder Maize (African Tall)	----------do---------	
		Pigeon pea	Pigeonpea (BDN 708, 711) or Alternatively plan for rabi season crops like sorghum, chickpea, safflower and sunflower	----------do---------	
		Green Gram/	Pigeonpea (BDN 708, 711) or	----------do---------	

		Black Gram-Sorghum/Safflower / Gram	Alternatively plan for rabi season crops like sorghum, chickpea, safflower and sunflower		
	Shallow black soils with assured and high rainfall	Cotton	Pigeonpea (BDN 708, 711) Alternatively plan for rabi season crops like chickpea, safflower and sunflower	----------do---------	
		Sorghum	Pigeonpea (BDN 708, 711) or Sesamum (JLT-7,26)	----------do---------	
		Soybean	Castor (VI-9, DCH-117, 32, GCH- 4,5,6) or Niger (NS-6)	----------do---------	
		Pigeon pea	Pigeonpea (BDN 708, 711)	----------do---------	

Condition	**Suggested Contingency measures**				
Early season drought (Normal onset)	**Major Farming situation**	**Normal Crop /Cropping system**	**Crop management**	**Soil nutrient & moisture Conservation measures**	**Remarks on Implementation**
Normal onset followed by 15-20 days dry spell after sowing germination / crop stand etc.	Medium deep to deep black soils with assured and high rainfall	Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population or if the plant population is less than 50% re sow the crop	Avoid applying fertilizers till sufficient soil. moisture is available	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Cotton	Gap filling 7-10 days after sowing by pot watering within the rows with same cultivar or pigeonpea to maintain at least 75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation wherever possible	Making of conservation furrows for moisture conservation When the crop is 2 weeks old take up Interculture with harrow. Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Sorghum	Gap filling with pigeonpea	When the crop is 2 weeks old take up Interculture with hoe	
		Pigeon pea	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	--do--	
		Green Gram/ Black Gram-	If the plant population is less than 75% of optimum, go for resowing of the alternate	--do--	

		Sorghum/Safflower / Gram	crops like sunflower / pigeonpea . If possible give protective irrigation with sprinkler.		
	Shallow black soils with assured and high rainfall	Cotton	Gap filling within the rows with same cultivar or pigeonpea to maintain at least 75% plant population. Raise cotton seedlings in polythene bags and transplant when sufficient soil moisture is available. Give protective irrigation wherever possible	Avoid applying fertilizers till sufficient soil. moisture is available Sowing on broad bed furrow (BBF). Making of conservation furrows for moisture conservation Interculture with harrows	
		Sorghum	Gap filling with pigeonpea	Interculture with hoe	
		Soybean	Gap filling within the rows with same or short duration cultivar to maintain at least 75% plant population	Interculture with hoe	
		Pigeon pea	--------**do**-------	Interculture with hoe	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	**Major Farming situation**	**Normal Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative stage	Medium deep to deep black soils with assured and high rainfall	Soybean	Interculture for weeding and to create soil mulch. Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough. Mulching with crop residue Spraying of 2% urea or DAP	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Cotton	Give protective irrigation wherever possible Maintain weed free conditions Avoid top dressing of fertilizers till	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrows for moisture conservation	

			sufficient soil moisture is available.	Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Sorghum	Avoid top dressing of fertilizers till sufficient soil moisture is available. Intra row thinning Inter culture for weeding Protective irrigation if possible	Opening of alternate furrows with Balaram plough. Mulching with crop residue Interculture with harrow	
		Pigeon pea	Inter culture for weeding Protective irrigation if possible	-do-	
		Green Gram/ Black Gram-Sorghum/Safflower / Gram	Inter culture for weeding Protective irrigation if possible	Spraying of 2% urea or DAP Other measures as above	
	Shallow black soils with assured and high rainfall	Cotton	Give protective irrigation wherever possible Maintain weed free conditions	Avoid applying fertilizers till sufficient soil moisture is available Making of conservation furrows for moisture conservation Interculture with harrows Two sprays of 2% MgSO4, Zn, Boron at weekly interval when the crop is encountered reddening symptoms Spray 2 % urea solution or 1% water	

				soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Sorghum	Avoid top dressing of fertilizers till sufficient soil moisture is available. Protective irrigation if possible Intra row thinning	Interculture for weeding and to create soil mulch to conserve moisture. Opening of alternate furrows	
		Soybean	Give protective irrigation wherever possible	-do-	
		Pigeon pea	Protective irrigation if possible Inter culture for weeding	Spraying of 2% urea or DAP Opening of alternate furrows	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/Cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/fruiting stage	Medium deep to deep black soils with assured and high rainfall	Soybean	Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough. Spraying of 2% urea or DAP	Linkage with MAU, MSSC and NSC for seed. Linkage with MAIDC for implements. Linkage with MAU, KVK for agro techniques
		Cotton	Give protective irrigation with drip Maintain weed free conditions	Foliar spray of 2% KNO_3, urea and DAP. Opening of alternate furrows with Balaram plough. Mulching with crop residue. IInterculture with harrows Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Sorghum	Give protective irrigation If feasible spray anti-transparant 6% kaolin	Opening of alternate furrows with Balaram plough.	
		Pigeon pea	Protective irrigation if possible	Foliar spray of 2% KNO_3, urea and DAP	
		Green Gram/	Protective irrigation if	-do-	

		Black Gram-Sorghum/Safflower / Gram	possible		
	Shallow black soils with assured and high rainfall	Cotton	Give protective irrigation with drip	Foliar spray of 2% KNO_3, urea and DAP. Opening of alternate furrows with Balaram plough. Mulching with crop residue. Interculture with harrows Spray 2 % urea solution or 1% water soluble fertilizers like 19-19-19, 20-20-20, 21-21-21 to supplement nutrition.	
		Sorghum	Give protective irrigation If feasible spray anti-transparant 6% kaolin In case of severe stress harvest as green fodder	-do-	
		Soybean	Give protective irrigation wherever possible	Opening of alternate furrows with Balaram plough	
		Pigeon pea	-do-	Foliar spray of 2% KNO_3, urea and DAP	

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawl of monsoon)	**Major Farming situation**	**Normal Crop/Cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Medium deep to deep black soils with assured and high rainfall	Soybean	Give life saving irrigation or harvest at physiological maturity	Sowing of rabi crops like sorghum, chickpea, saffalower immediately after harvest of soybean with minimum tillage	Linkage with MAIDC / DSAO for harvesting implements (thresher, harvester). Linkage with DSAO for farm ponds and micro irrigation system through RKVY
		Cotton	Give protective irrigation with drip Picking	If possible, adopt relay cropping of chickpea, safflower, rabi sorghum	
		Sorghum	Life saving irrigation or harvest at physiological	Plan for rabi crops like chickpea and safflower	

			maturity		
		Pigeon pea	Life saving irrigation Foliar spray of 2% KNO_3, urea and DAP	---	
		Green Gram/ Black Gram-Sorghum/Safflower / Gram	Harvest at physiological maturity or in case of severe drought use as fodder/ green manuring	Plan for rabi crops chickpea / safflower / rabi sorghum / sunflower	
	Shallow black soils with assured and high rainfall	Cotton	Give protective irrigation Picking	If possible, adopt relay cropping of chickpea, safflower, rabi sorghum	
		Sorghum	Give protection irrigation In case of severe stress harvest as green fodder	Plan for rabi crops chickpea / safflower	
		Soybean	Give protection irrigation	Plan for rabi crops chickpea / safflower / sorghum	
		Pigeon pea	Give protection irrigation	Foliar spray of 2% KNO_3, urea and DAP	

2.1.2 Irrigated situation

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed / limited release of water in canals due to low rainfall	Medium deep to deep black soil with assured and high rainfall	Sugarcane	No change or prefer irrigated cotton	• Raising of nurseries with single budded setts to save the time and water for pre-seasonal planting • Drip system for enhancing the water productivity • Mulching with sugarcane trash between rows and frequent interculture to conserve moisture	Supply of seed through MSSC, NFSM, MAU, Village seed production programme
		Wheat	No change. Depending upon time of release of water go for timely (HD-2496, HD-2189, Triambak) / late sown (HD-2189,	Give irrigation at critical stages of crop growth	

			Kailash) wheat varieties		
	Shallow soil with assured and high rainfall	Turmeric	Maize Cotton	Alternate furrow irrigation Drip irrigation	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	Medium deep to deep black soil with assured and high rainfall	Sugarcane	Cotton	Limited irrigation	Supply of seed through MSSC, NFSM, MAU, Village seed production programme
	Shallow soil with assured and high rainfall	Turmeric	Cotton, Maize, Soybean	Alternate furrow irrigation Drip irrigation	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Lack of inflows into tanks due to insufficient / delayed onset of monsoon	Not applicable				

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Crop/Cropping system**	**Change in crop / cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Medium deep to deep black soil with assured and high rainfall	Sugarcane	Cotton	Limited irrigation	Supply of seed through MSSC, NFSM, MAU, Village seed production programme Recharging of wells Implement Watershed development programmes
		Wheat	No change	Irrigation at critical crop growth stage	
	Shallow soil with assured and high rainfall	Turmeric	Cotton, Maize Soybean	Alternate furrow irrigation Drip irrigation	

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

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity Stage**	**Post harvest**
Cotton, Pearl millet	Drain excess water Interculture at optimum soil moisture Apply 25KgN/Ha to cotton	Drain excess water	Drain out excess water Timely harvest	Protect picked cotton from drenching and soiling Dry wet cotton and market
Maize	Drain out excess water as early as possible Intercultivation and Earthing up	Drain out excess water as early as possible Intercultivation and Earthing up	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper drying Dry the grain to optimum moisture content before storage
Soybean, Pigeonpea and short duration pulses	Drain out excess water	-do-	-do-	Shift to safer place Dry the produce
Horticulture				
Mango	Opening of field channels to drain out excess water and avoid surface ponding, Interculture at optimum soil moisture	Opening of field channels to drain out excess water and avoid surface ponding, Interculture at optimum soil moisture	Collect fallen fruits, grade and market if feasible	Grading, cleaning and marketing of fruits
Sweet orange	-do-	-do-	-do-	-do-
Pomogranate	Drain out excess water by opening the trenches	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	Treatment of 0.1 % carbendizime to the bunches to protect from diseases
Heavy rainfall with high speed winds in a short span				
Cotton, Pearl millet	Drain excess water Interculture at optimum soil moisture Apply 25KgN/Ha to cotton	Drain excess water	Drain out excess water Timely harvest	Protect picked cotton from drenching and soiling Dry wet cotton and marketing
Maize	Drain out excess water as early as possible	Drain out excess water as early as possible	Drain out excess water Harvest green cobs from dislodged plants for immediate marketing	Harvest cobs after proper drying Dry the grain to optimum moisture content before storage
Soybean, Pigeonpea and short duration pulses	Drain out excess water	-do-	-do-	Shift to safer place Dry the produce
Horticulture				
Mango	-do-	Provide support to prevent lodging	Apply multinutrient and	Shift produce to safer place

		and uprooting in young orchards	hormonal spray to promote flowering	
Sweet orange	-do-	-do-	-do-	-do-
Pomogranate	-do-	-do-	-do-	-do-
Outbreak of pests and diseases due to unseasonal rains				
Cotton	Apply soil drench of carbendazim 0.1% or COC @ 3g/litre at base of plants to prevent wilt in low lying patches	Apply foliar spray of streptocycline sulphate @ 6g/60 litre + COC @ 25g/10 litre to prevent bacterial leaf blight Apply Sulphur 25g/10 litre (300 mesh) to prevent grey mildew Apply MgSO4 25 kg/ha soil application or 1% MgSO4 foliar spray to prevent leaf reddening	Foliar spray of carbendazim 0.1% or Ditane M45 0.2% to prevent boll rot	-
Pearl millet			Apply Dithane M 45 0.2% on ear heads immediately after cessation of rains	
Maize		Foliar application of Mancozeb at 0.25-0.5% at 8-10 days interval to control Turcicum leaf blight		
Soybean	Manually remove infested plants or plant parts from below the girdles Protect against semilooper when density reaches >4 larvae per meter row with foliar spray of NSKE 5% or dimethoate 30 EC 1 ml/litre	-		
Horticulture				
Mango	Spray imidacloprid 0.3 ml or dimethoate 1 ml/liter to control hopper Drench the seedlings with COC 0.25% against root rot	Protect against hopper	Spray Dithane M 45 3g/litre or carbendazim 1g/liter against anthracnose Spray sulphur 0.5% to control powdery mildew	Maintain aeration in storage to prevent fungal infection and blackening or fruits
Sweet orange	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10 ml or quinalphos 25	Protect against Citrus Psylla with foliar spray of malathion 50 EC 10 ml or quinalphos 25 EC 10 ml or	-	-

	EC 10 ml or cypermethrin 25EC 4 ml per 10 liters	cypermethrin 25EC 4 ml per 10 liters		
Pomogrante	a) Insect pest - Shot hole borer - Use Geru paste with insecticides - Soil application of 10 g phorate @ 10g/plant in basin b) Disease - i) Bacterial blight – Spraying of bactinashak 250 ppm (2.5g/10 lit.) and captaf 0.25 % alternatively ii) Fungal fruit and leaf spot- Spraying of mancozeb 75 WP 0.25 % or carbendazim 50 WP 0.1 %	i) Shot hole borer - Use Geru paste with insecticides - Soil application of 10 g phorate @ 10g/plant in basin ii) Anar caterpillar - Spraying of Emamectin benzoate 5 SG @ 5g/10 lit. water. i) Bacterial spot – Spraying of bactinashak 250 ppm (2.5 g / 10 lit.) and captaf 0.25 % alternatively ii) Fungal fruit and leaf spot- Spraying of mancozeb 75 WP 0.25 % or carbendazium 50 WP 0.1 %	i) Fruit sucking moth - Protect the fruits either by bagging or by using repellents i) Bacterial spot – Spraying of bactinashak 250 ppm (2.5 g / 10 lit.) and captaf 0.25 % alternatively	

2.3 Floods: Not applicable

Condition	**Suggested contingency measure**			
Transient water logging / partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Continuous submergence for more than 2 days	Not applicable			
Sea water inundation				

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

Extreme event type	**Suggested contingency measure**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave				
Horticulture				
Sweet orange	Frequent irrigation Shade temporary shade net Mulching	Irrigation and pruning of affected branches / twigs	Irrigation and pruning of affected branches / twigs Apply 1% Bordeaux paste to cut ends	Immediate harvesting, grading and marketing
Cold wave				
Sweet orange	Protect with polythene sheet	Smoking, frequent and light	Smoking, frequent and light	

		irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	irrigation during evening hours, basin mulching, apply supplementary dose of fertilizers	
Frost	Not applicable			
Hailstorm	Not applicable			
Cyclone	Not applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during North-East monsoon under dry land system for fodder production Collection of soya meal waste and sunflower/safflower/ groundnut seed cake for use as feed supplement during drought Motivating the sugarcane farmers to convert green sugarcane tops in to silage by the end of February Preserving the green maize fodder as silage Development of hortipastoral systems inexisting orchards Establishment of fodder bank at village level with available dry fodder (wheat straw, Sorghum/ Bajra stover, groundnut haulms, sugarcane tops) Development of silvopastoral models with Leucaena, Glyricidia, Prosopis as fodder trees and Marvel, Madras Anjan, Stylo, Desmanthus, etc., as under storey grass Encourage fodder production with Sorghum – stylo-Sorghum on rotation basis and also to cultivate short-term fodder crops like sunhemp Promote Azola cultivation at backyard Formation of village Disaster Management Committee Capacity building and preparedness of the stakeholders	Harvest and use biomass of dried up crops (Pearlmillet, Pigeon pea, Sorghum, maize, Wheat, Green gram, Black gram, Soybean, cluster bean) material as fodder Use of unconventional and locally available cheap feed ingredients especially soya meal waste and sunflower/safflower/ groundnut seed cake for feeding of livestock during drought Harvest all the top fodder available (Subabul, Glyricidia, Pipol, Prosopis etc) and feed the LS during drought Concentrate ingredients such as Grains, brans, chunnies & oilseed cakes, low grade grains etc. unfit for human consumption should be procured from Govt. Godowns for feeding high productive animals during drought Promotion of Horse gram as contingent crop and harvesting it at vegetative stage as fodder All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed to LS. Continuous supplementation of minerals to prevent infertility. Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals Arrangements should be made for mobilization of	Encourage progressive farmers to grow multi cut 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 on their own lands with input subsidy Supply of quality seeds of COFS 29, Stylo and fodder slips of Marvel, Yaswant, Jaywant, Napier, guinea grass well before monsoon Flushing the stock to recoup Replenish the feed and fodder banks

	and official staff for the drought/floods/cyclones	small ruminants across the districts where no drought exits Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers	
Drinking water	Make available wholesome clean drinking water throughout the year for livestock Adopt various water conservation methods at village level to improve the ground water level for adequate water supply. Identification of water resources Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Construction of drinking water tanks in herding places/village junctions/relief camp locations Drinking water troughs should be provided in shandies /community grazing areas	Provide wholesome clean drinking water throughout the day Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Watershed management practices should be promoted to conserve the rainwater. Bleach (0.1%) drinking water / water sources Desilting of ponds Sensitize the farming community about importance of clean drinking water for livestock
Health and disease management	Procure and stock emergency medicines and vaccines for important endemic diseases of the area All the stock must be immunized for endemic diseases of the area before the onset of monsoon Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on disaster management to be given to animal husbandry department staff Procure and stock multivitamins & area specific mineral mixture	Conduct mass animal health camps in every village Keep close watch on health of different livestock species Identification and quarantine of sick animals Performing ring vaccination (8 km radius) in case of any outbreak Tick control measures should be implemented to prevent tick borne diseases in productive animals Keep the animal houses clean and spray disinfectants Safe and hygienic disposal of dead animal carcasses	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Restricting movement of livestock in case of any epidemic Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer

Cyclone/ Floods	Harvest all the possible immature and or wetted grain (Pearlmillet, Pigeon pea, Sorghum, Wheat, Green gram, Black gram, maize, Soybean, cluster bean etc) and store properly for use as animal feed. Protect the stored dry roughage feed (wheat straw/sorghum stover etc.,) from wetting and inundation of stagnated water Procure and stock vaccines for important endemic diseases Make available emergency medicines, anti-diarrheal drugs and electrolytes for transport to the needy areas Keep stock of bleaching powder and lime Don't allow the animals for grazing in case of early forewarning (EFW) Incase of EFW of severe cyclone/floods, shift the animals to safer places Surveillance and disease monitoring network to be established at Animal Husbandry Department in each district Arrange transportation facilities for animals to shift from low lying areas to safer places and also for animal health workers for rescue operations	Arrange relief camps to save productive and high valued animals Shift productive and high valued animals from affected areas to relief camps Carryout deworming to all the animals entering into relief camps Proper hygiene and sanitation of the relief camps, animal sheds and surroundings Avoid feeding soaked and mould infected feeds / fodders to livestock Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Spray fly repellants like neem oil, Butax etc., in animal sheds and relief camps Identification and quarantine of sick animals Perform ring vaccination (8 km radius) in case of any disease outbreak Sprinkle lime in relief camps and animal sheds Proper disposal of dung from relief camps and animal sheds	Restrict movement of animals in case of epidemic Repair of animal shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Deworm all 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.
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) Arrangement of H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **iv)** Thatched sheds should be provided as a	**Heat wave:** Allow the animals early in the morning or late in the evening for grazing Feed green fodder/silage / concentrates during day time and roughages / hay during night time Put on the foggers / sprinkerlers during day time In severe cases, vitamin 'C' and electrolytes should be added in H_2O during day time **Cold wave :**	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

	shelter to minimize heat stress **Cold wave :** Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow for grazing between 10AM to 3PM Add 25-50 ml of edible oil in concentrates and fed to the animals Put on the heaters during night time Apply / sprinkle lime powder in the animal shed to neutralize ammonia accumulation	
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	Submission for insurance claim and availing insurance benefit Purchase of new productive animals

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of grain like maize, bajra, jowar, broken wheat/ rice etc, to use as supplemental feed during drought	Feed with house hold grain to all the birds in the noon i.e., after morning scavenging Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Feed supplementation to all the survival birds
Drinking water	Store adequate good quality water	Use water sanitizers and offer cool hygienic drinking water	Provide clean and hygienic drinking water
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and IBD	Supplementation 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 grain like maize, bajra, jowar, broken wheat/ rice 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	Protect the stored water from contamination	Use water sanitizers Offer hygienic drinking water	Provide clean and hygienic drinking water
Health and disease management	In case of EFW, add antibiotic powder (Terramycin/Ampicilline/	Prevent water logging around the sheds Provide proper drainage facility to clear stagnated water	Sanitation of poultry house Treatment of affected birds Disposal of dead birds by burning /

	Ampiclox etc., 10g in one litre) in drinking water to prevent any disease outbreak	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	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 grain like maize, bajra, jowar, broken wheat/ rice 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	Protect the stored water from contamination	Use water sanitizers Offer hygienic drinking water	Provide clean and hygienic 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 around 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
Heat wave			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged in the shed Don't allow for scavenging during mid day	Routine practices are followed
Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation with house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed
Cold wave			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters in the shed Don't allow for scavenging during early morning and late evening	Routine practices are followed

Health and disease management	Deworming and vaccination against IBD	Supplementation with house hold grain Sanitation of poultry house Sprinkle lime powder (5-10g per square feet) to prevent ammonia accumulation due to dampness	Routine practices are followed

2.5.3 Fisheries: Not applicable