State: GUJARAT

Agriculture Contingency Plan for District: CHHOTA UDEPUR

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Central Highlands (Malwa), Gujarat Plain and Kathiwar Peninsular, Semi- Arid Eco- Region (5.2)			
	Agro-Climatic Zone (Planning Commission)	Gujarat Plain and Hill Region (XIII)			
	Agro Climatic Zone (NARP)	Middle Gujarat Zone (GJ-3)			
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Dahod, Panchmahal. Vadodara.			
	Geographic coordinates of district headquarters				
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**	
		22.3085^{o} N	74.0120^{o} E		
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Pulse Research Station, Vadodara Paddy Research Station, Dabhoi, Narmada Irrigation Project, Khandha Agriculyura Research Station, Jabugam			
	Mention the KVK located in the district with address	Krishi Vignan Kendra, Gola Gamdi, PO: Bahadarpur, Vadodara -391125			

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):	-	-	-	-
	NE Monsoon(Oct-Dec):	-	-	-	-
	Winter (Jan- March)	-	-	-	-
	Summer (Apr-May)	-	-	-	-
	Annual	1083	-	-	-

1.3	**Land use pattern of the district** (latest statistics)	Geographical area	Cultivable 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
	Area ('000 ha)	343.606	165.430	75.304	- -	-	15.358	-	-	-	38.867

1. 4	Major Soils (common names like red sandy loam deep soils (etc.,)*	Area ('000 ha)	Percent (%) of total
	1. Medium black soil	210.808	61
	2. Hilly light soil	60.501	18
	3. Sandy loam soil	72.297	21
	4.		
	5.		
	Others (specify):		

* mention colour, depth and texture (heavy, light, sandy, loamy, clayey etc) and give vernacular name, if any, in brackets (data source: Soil Resource Maps of NBSS & LUP)

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	169.088	
	Area sown more than once	-	
	Gross cropped area	208.866	

1.6	**Irrigation**	Area ('000 ha)		
	Net irrigated area	-		
	Gross irrigated area	58.816		
	Rainfed area	165.430		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		28.325	
	Tanks	704	2.484	
	Open wells	30	1.51	
	Bore wells			
	Lift irrigation schemes			
	Micro-irrigation			
	Other sources (please specify)			
	Total Irrigated Area			
	Pump sets			
	No. of Tractors			
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited			
	Critical			
	Semi- critical			
	Safe			
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture (as per latest figures)

1.7	S. No.	Major field crops cultivated	Area ('000 ha)							
			Kharif			*Rabi*				
			Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	1	Cotton	-	-	-	-	-	-	-	66.28
	2	Maize	-	-	-	-	-	-	-	23.53
	3	Pigeon pea	-	-	-	-	-	-	-	22.01
	4	Paddy	-	-	-	-	-	-	-	19.50
	5	Blackgram	-	-	-	-	-	-	-	11.68
	6	Soybean	-	-	-	-	-	-	-	2.15
	7	Castor	-	-	-	-	-	-	-	1.86
	8	Wheat	-	-	-	-	-	-	-	0.75
	Others (specify)		-	-	-	-	-	-	-	

	S. No.	Horticulture crops - Fruits	Area ('000 ha)		
			Total	Irrigated	Rainfed
	1	-	-	-	-
	2	-	-	-	-

	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	Others (specify)	-	-	-	-
		Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	Others (specify)	-	-	-	-
		Medicinal and Aromatic crops	**Total**	**Irrigated**	**Rainfed**
	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-

	Others (specify)	-	-	-	-
		Plantation crops	**Total**	**Irrigated**	**Rainfed**
	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	Others (Specify)	Eg., industrial pulpwood crops etc.			
		Fodder crops	**Total**	**Irrigated**	**Rainfed**
	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	Others (Specify)				
		Total fodder crop area			
		Grazing land			

		Sericulture etc			
		Others (specify)			

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	-	357.563	357.563
	Improved cattle	-	13.204	13.204
	Crossbred cattle	-	-	-
	Non descriptive Buffaloes (local low yielding)	-	217.277	217.277
	Descript Buffaloes	-	0.987	0.987
	Goat	-	220.097	220.097
	Sheep	-	0.627	0.627
	Others (Camel, Pig, Yak etc.)	-	0	0
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	-	281.269	
	Backyard	-		

1.10 **Fisheries** (Data source: Chief Planning Officer)

A. Capture

i) Marine (Data Source: Fisheries Department)	**No. of fishermen**	**Boats**		**Nets**		**Storage facilities (Ice plants etc.)**
		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	

ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of village tanks**

B. Culture

		Water Spread Area (ha)	Yield (t/ha)	Production ('000 tons)
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)			
	ii) **Fresh water** (Data Source: Fisheries Department)			
	Others			

1.11 Production and Productivity of major crops (Average of last 5 years: 2004, 05, 06, 07, 08; specify years)

1.11	Name of crop	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 (Crops to be identified based on total acreage)										
Crop 1	Maize	-	-	-	-	-	-	46.142	1961	-
Crop 2	Cotton	-	-	-	-	-	-	39.785	600	-
Crop 3	Paddy	-	-	-	-	-	-	35.600	1826	-
Crop 4	Redgram	-	-	-	-	-	-	25.510	1159	-
Crop 5	Blackgram	-	-	-	-	-	-	10.103	865	-
Crop 6	Castor	-	-	-	-	-	-	3.883	2093	-
Crop 7	Wheat	-	-	-	-	-	-	2.207	2942	-
Crop 8	Soybean	-	-	-	-	-	-	1.789	832	-
Crop 9	Sorghum	-	-	-	-	-	-	0.545	1159	-
Others	-	-	-	-	-	-	-	-	-	-
Major Horticultural crops (Crops to be identified based on total acreage)										
Crop 1	-	-	-	-	-	-	-	-	-	-
Crop 2	-	-	-	-	-	-	-	-	-	-

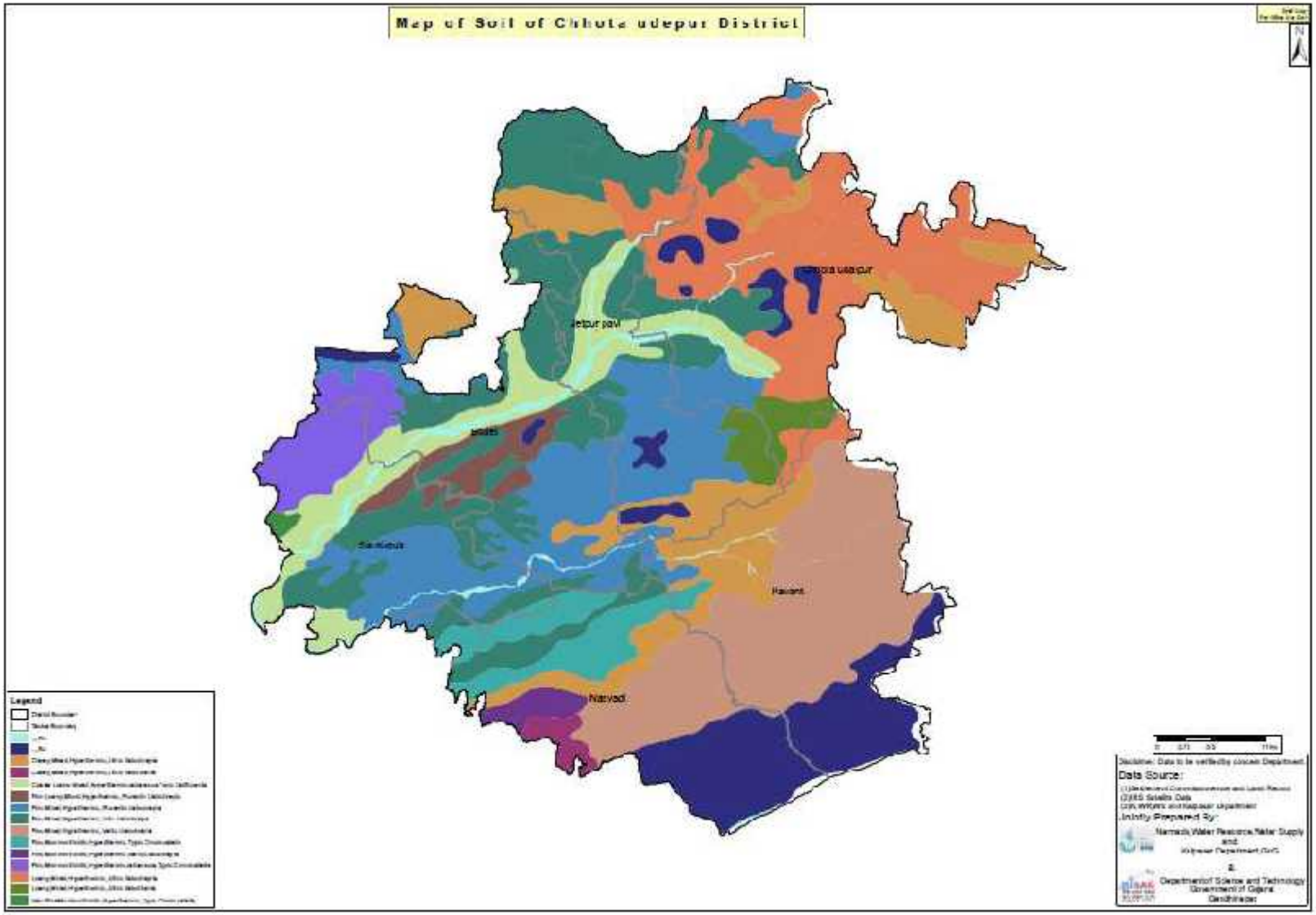
Crop 3	-	-	-	-	-	-	-	-	-	-
Crop 4	-	-	-	-	-	-	-	-	-	-
Crop 5	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-

1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	Crop 1: _____	2: _____	3: _____	4: _____	5: _____
	Kharif- Rainfed	-	-	-	-	-
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	-	-	-	-

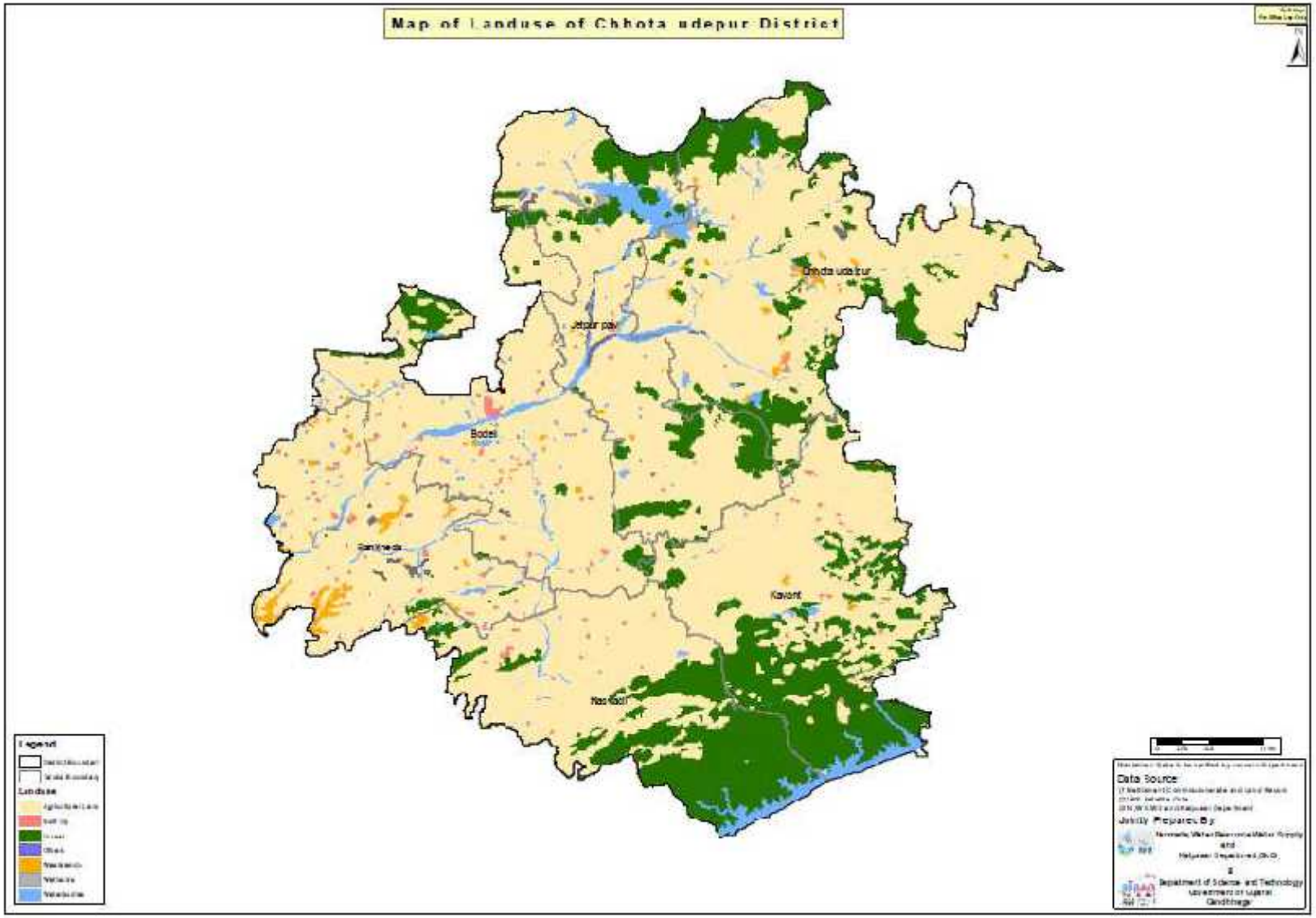
1.13	**What is the major contingency the district is prone to?** (Tick mark)	**Regular**	**Occasional**	**None**
	Drought			
	Flood			
	Cyclone			
	Hail storm			
	Heat wave			
	Cold wave			
	Frost			
	Sea water intrusion			
	Pests and disease outbreak (specify)			
	Others (specify)			

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: No
		Soil map as Annexure 3	Enclosed: Yes

ANNEXTURE I:



ANNEXTURE III:



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 weeks **1st week of July**	Medium rainfall, medium black soil	Cotton	Bt. Cotton	No need of contingency	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT – 100	-do-	Seed drill under RKVY project
		Maize	GM-4 and 6, Narmada Moti	-do-	-do-
	Medium rainfall, Sandy loam soil	Cotton	Bt. Cotton	-do-	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT - 100	-do-	-do-
		Maize	GM-4 and 6, Narmada Moti	-do-	-do-
	Medium rainfall, Black soil	Paddy TP	GR-3, GR-4, GR-5, GR-11, Gurjari, Jaya	No need of contingency	Supply of seed through NFSM and GSSC
		Cotton	Bt. Cotton var.	-do-	-do-

		Pigeon pea	BDN-2, GT-100	-do-	Seed drill under RKVY project
		Fodder Sorghum	GSF-1	-do-	-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 4 weeks 3rd week of July	Medium rainfall, medium black soil	Cotton	Bt. Cotton	Dibble the seeds followed by irrigation	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT – 100	Reduce the spacing up to 60 cm x 30 cm	Seed drill under RKVY project
		Maize	GM-4 and 6, Narmada Moti	No need of contingent planning	-do-
	Medium rainfall, Sandy loam soil	Cotton	Bt. Cotton	Dibble the seeds followed by irrigation	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT – 100	No need of contingent planning	Seed drill under RKVY project
		Maize	GM-4 and 6, Narmada Moti	No need of contingent planning	-do-
	Medium rainfall, Black soil	Paddy TP)	Paddy TP) : GR-3, GR-4, GR-5, GR-11, Gurjari,, Jaya	Staggering in nursery raising, Adopt SRI technology concept for irrigation and fertilizer management	Supply of seed through NFSM and GSSC

		Cotton	Bt. Cotton var.	Dibble the seeds followed by irrigation	-do-
		Pigeon pea	BDN-2, GT-100	No need of contingent planning	Seed drill under RKVY project
		Fodder Sorghum	Fodder Sorghum	No need of contingent planning	-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 weeks (Specify month) **1st week of August**	Medium rainfall, medium black soil	Cotton	GCH4, GCH5, GCH7 or pigeon pea	Replace the crop as per suggested	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT – 100	Dibble the seeds after receiving rain. Reduce the spacing	Seed drill under RKVY project
		Maize	GM-6, Narmada Moti	No need of contingent plan	-do-
	Medium rainfall, Sandy loam soil	Cotton	GCH4, GCH5, GCH7 or pigeon pea	Use of organic manure before sowing, Use fertilizer as per soil health card	Supply of seed through NFSM and GSSC
		Pigeon pea	BDN-2, GT – 100	Sow the crops after receiving rain. Reduce the spacing	Seed drill under RKVY project
		Maize	GM-6,Narmada Moti	Tide ridge for in situ moisture conservation	-do-

	Medium rainfall, Black soil	Paddy TP	GR-3, GR-4, GR-5, GR-11, Gurjari,, Jaya	Adopt SRI technology	Supply of seed through NFSM and GSSC
		Cotton	GCH4, GCH5, GCH7 or pigeon pea	Replace the crop as per suggested Use of organic manure before the sowing	-do-
		Pigeon pea	BDN-2, GT-100	Sow the crops after receiving rain. Reduce the spacing	Seed drill under RKVY project
		Fodder Sorghum	Fodder Sorghum	No need of contingent plan	-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 8 weeks **3rd week of August**	Medium rainfall, medium black soil	Cotton	Castor : GCH-4, GCH- 5, GCH-7 or Pigeonpea BDN-2, AGT-2	Replace the crop as suggested. Use of organic manure before the sowing.	Supply of seed through NFSM and GSSC
		Pigeon pea	Pigeonpea + Soyabean/ Moong/ Black gram	Sow the crops at narrow spacing as soon as rain received	Seed drill under RKVY project
		Maize	Maize : GM-4 and 6, Narmada Moti	Sow the crop as soon as rain received	-do-
	Medium rainfall, Sandy loam soil	Cotton	Castor : GCH-4, GCH- 5, GCH-7 or pigeon pea	Replace the crop as suggested, use of organic manure before the sowing.	Supply of seed through NFSM and GSSC
		Pigeon pea	Pigeonpea + Soyabean/ Moong/	Sow the crops as soon as	Seed drill under

			Black gram	rain received	RKVY project
		Maize	Maize : GM-4 and 6, Narmada Moti	Sow the crop as soon as rain received.	-do-
	Medium rainfall, Black soil	Paddy (TP)	Cluster bean : Guj.Guar-1	Replace the crop as suggested	Supply of seed through NFSM and GSSC
		Cotton	Castor : GCH-4, GCH- 5, GCH-7 or pigeon pea BDN-2, AGT-2	Replace the crop as suggested	-do-
		Pigeon pea	Pigeon pea BDN-2, AGT-2	Sow the crops at narrow spacing (60x30 cm) as soon as rain received	Seed drill under RKVY project
		Fodder Sorghum	Fodder Sorghum	No need of contingent planning	-do-

Condition	**Suggested Contingency measures**				
Early season drought **(Normal Onset followed by 15- 20 days dry spell after sowing leading to poor germination /crop stand etc.)**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
	Medium rainfall, medium black soil	Cotton	Bt. Cotton var.	Earthing up through harrowing. Weeding	Supply of seed through NFSM and GSSC
		Pigeon pea	Pigeonpea + Soyabean/ Moong/ Black gram	Dibble the seeds in gap Inter culturing & Weeding	-
		Maize	Maize : GM-4 and 6, Narmada Moti Thinning	Gap filling Inter culturing & Weeding	-
	Medium rainfall, Sandy loam soil	Cotton	Bt. Cotton var.	Earthing up through harrowing. Weeding	-

		Pigeon pea	Pigeonpea + Soyabean/ Moong/ Black gram	Dibble the seeds in gap. Inter culturing & Weeding	-
		Maize	GM-4 and 6, Narmada Moti Thinning	Gap filling Inter culturing & Weeding	-
	Medium rainfall, Black soil	Paddy (TP)	GR-11	Apply irrigation if available Extend top dressing of N	-
		Cotton	Bt. Cotton var.	Earthing up through harrowing. Weeding	-
		Pigeon pea	Pigeonpea + Soyabean/ Moong/ Black gram	Dibble the seeds in gap Inter culturing & Weeding	-
		Fodder Sorghum	Fodder Sorghum	No need of contingent planning	-

Condition	**Suggested Contingency measures**				
Mid season drought **(Long dry spell, consecutive 2 weeks rainless (2.5 mm) period)** **At vegetative stage**	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of organic mulch (castor shell) • Spraying of antitranspirant (kaolin) • Weeding • Extended topdressing of nitrogen • Earthing up through harrowing	Supply of seed through NFSM and GSSC and drip irrigation through GGRC
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available	

				• Inter culturing & Weeding	
		Maize	Maize : GM-4 and 6, Narmada Moti Thinning out the plants (25%)	• Irrigation if available Inter culturing & Weeding • Topdressing of nitrogen should be extended	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of organic mulch (castor shell) • Spraying of antitranspirant (kaolin) • Weeding • Extended topdressing of nitrogen • Earthing up through harrowing	
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available • Inter culturing & Weeding	
		Maize	GM-4 and 6, Narmada Moti Thin out the plants (25%)	• Irrigation if available. Inter culturing & Weeding • Topdressing of nitrogen should be extended	
	Medium rainfall, Black soil	Paddy (TP)	GR-11	• Apply SRI concept of irrigation • Topdressing of nitrogen should be extended	

		Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of organic mulch (castor shell) • Spraying of antitranspirant (kaolin) • Weeding • Extended topdressing of nitrogen • Earthing up through harrowing	
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available • Inter culturing & Weeding	
		Fodder Sorghum	Fodder Sorghum GSF-1	• Inter culturing & Weeding	

Condition			**Suggested Contingency measures**		
Mid season drought **(Long dry spell)** **At flowering stage**	**Major Farming situation**	**Normal Crop/ cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of mulch. Spray of anti-transpirant (kaolin) • Inter culturing & weeding	Supply of seed through NFSM and GSSC and drip irrigation through GGRC
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available • Inter culturing & weeding	
		Maize	GM-6	• Inter culturing & weeding • Topdressing of nitrogen should be	

				avoided at tasseling stage	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of mulch. Spray of anti-transpirant (kaolin) • Inter culturing & Weeding	
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available • Inter culturing & Weeding	
		Maize	Maize GM-6	• Inter culturing & Weeding • Topdressing of nitrogen should be avoided at tasseling stage	
		Bajra	Bajra GHB-558, GHB-538, GHB-732	• Tied ridge for in situ conservation • Interculturing & weeding	
	Medium rainfall, Black soil	Paddy TP)	Paddy: (TP) : GR-11	• Apply SRI concept of irrigation • Topdressing of nitrogen should be extended	
		Cotton	Cotton (Bt)	• Irrigation through drip irrigation system • Use of organic mulch (castor shell) • Spraying of antitraspirant (kaolin) • Weeding • Extended topdressing of nitrogen • Earthing up through harrowing	
		Pigeon pea	BDN-2, AGT-2	• Irrigation if available • Inter culturing & Weeding	
		Fodder Sorghum	Fodder Sorghum	• Inter culturing & Weeding	

Condition			Suggested Contingency measures		
Terminal drought	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi crop planning**	**Remarks on Implementation**
	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	Wheat	-
		Pigeon pea	BDN-2, AGT-2	Wheat	-
		Maize	GM-4 and 6	Maize	-
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	Wheat	-
		Pigeon pea	BDN-2, AGT-2	Wheat	-
		Maize	GM-4 and 6	Maize	-
	Medium rainfall, Black soil	Paddy TP	GR-11	Wheat	-
		Cotton	Cotton (Bt)	Wheat	-
		Pigeon pea	BDN-2, AGT-2	Wheat	-
		Fodder Sorghum	Fodder Sorghum	Fodder maize	-

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**

Delayed release of water in canals due to low rainfall	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	Interculturing and Weeding, Irrigate the crop through other sources of irrigation/ Use drip irrigation	• Seed drills under RKVY • Supply of seeds through GSSC Supply of seeds through NFSM • Procure the drip through GGRC
		Pigeon pea	BDN-2, AGT-2	Inter-culturing and weeding	
		Paddy	Paddy: (TP) : GR-11	Apply SRI technical concept for irrigation	
		Maize	Maize GM-4 and GM-6	Keep crop weed free, Conjunctive use of water	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	Interculturing and Weeding, Irrigate the crop through other sources of irrigation/ Use drip irrigation	
		Pigeon pea	BDN-2, AGT-2	Inter-culturing and weeding	
		Paddy	GR-11	Apply SRI technical concept for irrigation	
		Maize	GM-4 and GM-6	Keep crop weed free, Conjunctive use of water	
	Medium rainfall, Black soil	Cotton	Cotton (Bt)	Inter-culturing and weeding. Irrigate the crop through other sources of irrigation/ Use drip irrigation	
		Pigeon pea	BDN-2, AGT-2	Inter-culturing and weeding	
		Paddy	GR-11	Apply SRI technical concept for irrigation	
		Maize	GM-4 and GM-6	Keep crop weed free, Conjunctive use of water	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Use organic Mulch (Paddy straw)	1.Seed drills under RKVY 2.Supply of seeds through GSSC 3.Supply of seeds through NFSM 4. Procure the drip through GGRC
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding • Conjunctive use of water	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation SRI techniques	
		Maize	Maize GM-4 AND GM-6	• Consumptive use of water • Keep crop weed free	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding • Conjunctive use of water	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation SRI techniques	
		Maize	Maize GM-4 and GM-6	• Consumptive use of water • Keep crop weed free	

	Medium rainfall, Black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding • Conjunctive use of water	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation SRI techniques	
		Maize	Maize GM-4 AND GM-6	• Conjunctive use of water • Keep crop weed free	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal 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 rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	1.Seed drills under RKVY 2.Supply of seeds through GSSC 3.Supply of seeds through NFSM
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	

		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding •	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	• Interculturing and weeding	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal 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	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	Water harvesting measures such as recharge of open well/ tube well/ deepening of ponds, check dam, farm pond etc. should be implemented
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	

		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	Interculturing and weeding	

Condition			**Suggested Contingency measures**		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Insufficient groundwater recharge due to low rainfall	Medium rainfall, medium black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	Water harvesting measures such as recharge of open well/ tube well/ deepening of ponds, check dam, farm pond etc. should be implemented
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	

		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Sandy loam soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	
		Maize	Maize GM-4 AND GM-6	• Interculturing	
	Medium rainfall, Black soil	Cotton	Cotton (Bt)	• Irrigate the crop through other sources of irrigation/ Use of Drip irrigation • Interculturing and weeding • Use organic Mulch (Paddy straw)	
		Pigeon pea	BDN-2, AGT-2	• Interculturing and weeding	
		Paddy	Paddy: (TP) : GR-11	• Apply SRI technical concept for irrigation and fertilizer management	

		Maize	Maize GM-4 AND GM-6	• Interculturing	

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	• Drain out excess water	• Application of Urea (2-4%) sprays to prevent flower drop	• Drain out excess water	• Harvested product shift in safer place
Pigeon pea	• Drain out excess water	• Drain out excess water • Spaying of Endosulphan (0.07%) for control of pod borer	• Drain out excess water • Picking pods from standing crop	•
Paddy		• Drain out excess water	• Drain out excess water • Harvest at physiological maturity	• Harvested product shift in safer place
Maize	• Drain out excess water	• Drain out excess water	• Drain out excess water • Harvest the cobs from standing crop	• Cobs cover with plastic sheet • Harvested product shift in safer place
Horticulture				
Banana	Drain out the excess water As a preventive measure provide shelter belt of shevary	Drain out the excess water Spraying of copper oxychloride (0.25%) for control of sigatoka	- Drain out the excess water - Provide the support	• product shift in safer place

	in surrounding of the field at the time of planting , Spraying of copper oxychloride (0.25%) for control of sigatoka disease	disease	to plant	
Mango	• Drain out excess water	• Drain out excess water • Spraying of hormone (NAA, 20 ppm) • Plant protection measure taken	• Drain out excess water • Harvest the mature fruits	• Shift the produce at safer place
Lime	• Drain out excess water	• Drain out excess water	• Drain out excess water	• Shift the produce at safer place
Guava	• Drain out excess water	• Drain out excess water	• Drain out excess water	• Shift the produce at safer place
Papaya	Drain out excess water, drenching of fungicide (BM 0.03%)	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, propping the plant	• Shift the produce at safer place
Heavy rainfall with high speed winds in a short span				
Cotton	• Drain out excess water	• Application of Urea (2-4%) sprays to prevent flower drop	• Drain out excess water	• Harvested product shift in safer place
Pigeon pea	• Drain out excess water	• Drain out excess water • Spaying of Endosulphan (0.07%) for control of pod borer	• Drain out excess water • Picking pods from standing crop	•
Paddy		• Drain out excess water	• Drain out excess water • Harvest at physiological	• Harvested product shift in safer place

			maturity	
Maize	• Drain out excess water	• Drain out excess water	• Drain out excess water • Harvest the cobs from standing crop	• Cobs covere with plastic sheet • Harvested product shift in safer place
Horticulture				
Banana	Drain out the excess water As a preventive measure provide shelter belt of shevary in surrounding of the field at the time of planting. Spraying of copper oxichloride (0.25%) for control of sigatoka disease	Drain out the excess water Spraying of copper oxichloride (0.25%) for control of sigatoka disease	- Drain out the excess water - Provide the support to plant	• product shift in safer place
Mango	• Drain out excess water	• Drain out excess water • Sraying of hormone (NAA, 20 ppm) • Plant protection measure taken	• Drain out excess water • Harvest the mature fruits	• Shift the produce at safer place
Lime	-do-	• Drain out excess water	• Drain out excess water	-do-
Guava	-do-	-do-	-do-	-do-
Papaya	• Drain out excess water, drenching of fungicide (BM 0.03%)	• Drain out excess water, apply BM (0.03%) on stem	• Drain out excess water, propping the plant	-do-

APPENDIX

Important insect pest/disease on each crop and their control measure in details

A. Pest of major crops of the State and their control measures

Crop	Pest	Control measures
Rice	**Rice stem borer**	• Apply carbofuran 3 G 1.0 kg a.i./ha or Carptape 4 G @ 1.0 kg/100 sq. meter at 5 days after sowing and five days before transplanting in paddy nursery. • Application of carbofuran 3 G 1.0 kg a.i./ha or Carptape 4 G @ 1.0 kg/ha or carbosulfan 5 G @ 1.0 kg a.i//ha at 30 and 50 days after transplanting • Spray any one of these Phosphomedon 0.03 % or Endosulfan 0.07 % or Quinalfos 0.05 % or Phosalone 0.05 %
	Paddy leaf hopper/Jassid	• Avoid the top dressing of nitrogen application and Drain the water from the field • Later stage of the crop, spray Imidacloprid 0.05 % or Fenobucarb 0.07 %
	Rice hispa and rice blue bittle	• Collect the adults and destroy • Summer ploughing • Spray any one of these Endosulfan 0.07 % or Carbaryl 0.02 % or Methyl Parathion 0.05 % or Fenitrothion 0.05 %
	Rice grass hopper	• Deep ploughing before rain • Dust any one of these, Carbaryl 10 % or Methyl Parathion 2 % or Quinalphos 1.5 % @ 20-25 kg/ha
	Blister beetle	• Carbaryl 10 % dust @ 20 kg/ha
	Stem borer	• Spray Endosulfan 0.07 %
	Gujarat Hairy cater Pillar	• Methyl parathion 2 % dust should be dusted on the boundaries,farm bunds and west land near the field after one week of the first rain • In standing crop, Carbaryl 5 % or Methyl Parathion 2 % or Quinalphos 1.5 % @ 20 kg/ha should be dusted
Cotton	**Spotted boll worm**	• Avoid summer cotton / ratoon crop • Timely removal of cotton stocks and deep ploughing

	/pink boll worm /Spodoptera/ **Heliothes**	• Use delinted seeds • Treat the seed with Imidoclopride 70 WS or Thiamethoxam 70 WS • Grow trap crop like Okra, Marigold, Maize etc. • Installed the sticky trap or light trap or Pheromone trap in the field • Spray any one of these, Monocrotophos 0.04 % or Endosulfan 0.07 % or Phosalone 0.07 % or Prophenofos 0.05 %
	Whitefly	• Spray any one of Acephate 0.1 % or Triazophos 0.1 % or Quinalphos 0.05 %
	Mites/Aphid/ **Jassid/Thrips**	• Spray any one of Dicofol 0.05 % or Carbofenithion 0.03 % or Methyl –O-Dematone 0.025 % or Phosphomedon 0.03 % or Dimethoate 0.03 % or Monocrotophos 0.04 %

B. Diseases and Nematodes of major crops of the State and their control measures

Crop Name	**Major disease**	**Control Measures**
Bajra	Downy mildew	• Crop rotation with non host crop • Destroy diseased plants • Early sowing of bajra on onset of monsoon • Seed treatment with Apron 35SD @6g/kg seed or fosetyle @5g/kg seed • 2-3 sprays of Metalaxyl Compound @ 4 g/10 lit water • Spray of Mancozeb @1 kg /ha 30 DAS • Use resistant varieties GHB-15, PHB-10, 14, MH-169, 179, HB-1, 5 CO-7
	Ergot	• Removal of Collateral hosts • Use disease free seed • Sowing crop just after on onset of monsoon • Seed treatment with 20 % NaCl solution • Spraying of carbendazine 300 g or mancozeb 1.25 kg /ha • Long crop rotation
	Smut	• Remove smutted ear heads and destroy them • Use clean healthy disease free seeds • Follow crop rotation with one host crop

		• Growing bajra in summer season

2.3 Floods

Condition	**Suggested contingency measures**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Cotton	Drain out excess water	• Drain out excess water • Application of Urea (2-4 %) spray to prevent flower drop	Drain out excess water	Harvested product shift in safer place
Pigeon pea	-do-	-do-	• Drain out excess water • Picking pods from standing crop	
Paddy	-do-	-do-	• Drain out excess water • Harvest at physiological maturity	Harvested product shift in safer place
Maize	-do-	-do-	• Drain out excess water • Harvest cobs from standing crop	Cobs cover with plastic sheet Harvested product shift in safer place
Horticulture				
Banana	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, drenching of fungicide (copper oxychloride 0.03%)	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits

Mango	Drain out excess water	• Drain out excess water • Spraying of hormone, • Plant protection measure taken	• Drain out excess water • Harvest the fruits by intensive programme	Shift the produce at safer place
Citrus	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, drenching of fungicide	Drain out excess water, harvest the physiologically mature fruits
Guava	Drain out excess water	Drain out excess water	Drain out excess water	Shift the produce at safer place
Papaya	Drain out excess water, drenching of fungicide (BM 0.03%)	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits

Continuous submergence for more than 2 days				
Cotton	Drain out excess water	• Drain out excess water • Application of Urea (2-4 %) spray to prevent flower drop	Drain out excess water	Harvested product shift in safer place
Pigeon pea	-do-	-do-	Drain out excess water • Picking pods from standing crop	
Paddy	-do-	-do-	• Drain out excess water • Harvest at physiological maturity	Harvested product shift in safer place
Maize	-do-	-do-	• Drain out excess water • Harvest cobs from standing crop	Cobs cover with plastic sheet Harvested product shift in safer place

Horticulture				
Banana	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, drenching of fungicide (copper oxychloride 0.03%)	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits
Mango	Drain out excess water	• Drain out excess water • Spraying of hormone, • Plant protection measure taken	• Drain out excess water • Harvest the fruits by intensive programme	Shift the produce at safer place
Citrus	Drain out excess water, drenching of fungicide (copper oxychloride 0.025%)	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, drenching of fungicide	Drain out excess water, harvest the physiologically mature fruits
Guava	Drain out excess water	Drain out excess water	Drain out excess water	Shift the produce at safer place
Papaya	Drain out excess water, drenching of fungicide (BM 0.03%)	Drain out excess water, apply BM (0.03%) on stem	Drain out excess water, propping the plant	Drain out excess water, harvest the physiologically mature fruits
Sea water intrusion : Such type of situation not arise in this district				

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				

Cotton	Apply irrigation frequently	Apply irrigation frequently	Apply irrigation frequently	
Pigeon pea	-do-	-do-	-do-	
Paddy	-do-	-do-	-do-	
Maize	-do-	-do-	-do-	
Horticulture				
Banana	Provide shedding	Apply irrigation frequently	Apply irrigation frequently	
Mango	-do-	-do-	-do-	
Lime	-do-	-do-	-do-	
Cold wave[q]				
Cotton	---	Smocking in the field by burning of organic waste	Smocking in the field by burning of organic waste	
Pigeon pea	---	-do-	-do-	
Paddy	---	-do-	-do-	
Maize	---	-do-	-do-	
Horticulture				
Banana	Apply irrigation	Smocking in the field by burning of organic waste	Smocking in the field by burning of organic waste	
Mango	-do-	-do-	-do-	
Lime	-do-	-do-	-do-	
Frost	**Not applicable**			
Hailstorm				
Cyclone				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and fodder availability	As the district is occasionally prone to drought the following measures to be taken to ameliorate the fodder deficiency Avoid burning of wheat/paddy straw Establishment of fodder bank at village level with available dry fodder (paddy /wheat straw) Increase area under perennial fodder cultivation with high yielding Hybrid Napier varieties. Conservation of maize/bajra green fodder as silage Sowing of cereals (Sorghum/Bajra) and leguminous crops (Lucerne, Berseem, Horse gram, Cowpea) during early monsoon under dry land system for fodder production Encourage fodder production with Maize, Jowar, Bajra , Cowpea, Barseem, Lucerne etc., Processing & storage of feed/fodder and roughages in the form of complete feed/blocks.	Harvest and use biomass of dried up crops (paddy/wheat/bajra/maize/soybean/mungbean etc.,) material as fodder Utilizing fodder from fodder bank reserves. Utilizing stored silage/hay. Transporting complete feed/fodder and dry roughages to the affected areas. 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 as supplement for high productive animals during drought Continuous supplementation of mineral mixture to prevent infertility. Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals	Training/educating farmers for feed & fodder storage. Maintenance / repair of silo pits and feed/fodder stores. 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 etc., Supply of quality fodder seed (multi cut sorghum/bajra/maize varieties) and fodder slips of Napier, guinea grass well before monsoon Replenish the feed and fodder banks
Drinking water	Adopt various water conservation methods at village level to improve the ground water level for	Adequate supply of drinking water.	Watershed management practices shall be promoted to conserve the rainwater.

	adequate water supply. Identification of water resources Desilting of ponds 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 Community drinking water trough can be arranged in shandies /community grazing areas	Restrict wallowing of animals in water bodies/resources Add alum in stagnated water bodies	Bleach (0.1%) drinking water / water sources Provide clean drinking water
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 Vaccination for HS & FMD Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district Adequate refreshment training on draught management to be given to VAS, Jr.VAS, LI with regard to health & management measures Procure and stock multivitamins & area specific mineral mixture	Carryout deworming to all animals entering into relief camps Identification and quarantine of sick animals Constitution of Rapid Action Veterinary Force Performing ring vaccination (8 km radius) in case of any outbreak Restricting movement of livestock in case of any epidemic Drainage of water from and around animal sheds, pasture areas. Tick control measures be undertaken to prevent tick borne diseases in animals Rescue of sick and injured animals and their treatment Organize with community, daily lifting of dung from relief camps	Keep close surveillance on disease outbreak. Undertake the vaccination depending on need Keep the animal houses clean and spray disinfectants Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer
Floods			

Feed and fodder availability	In case of early forewarning (EFW), harvest all the crops (paddy/wheat/bajra/maize/soybean/mungbean etc.) that can be useful as feed/fodder in future (store properly) Keeping sufficient of dry fodder to transport to the flood affected villages Don't allow the animals for grazing if severe floods are forewarned Keep stock of bleaching powder and lime Carry out Butax spray for control of external parasites Identify the Clinical staff and trained paravets and indent for their services as per schedules Identify the volunteers who can serve in need of emergency 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	Transportation of animals to elevated areas Proper hygiene and sanitation of the animal shed In severe storms, un-tether or let loose the animals Use of unconventional and locally available cheap feed ingredients for feeding of livestock. Avoid soaked and mould infected feeds / fodders to livestock Emergency outlet establishment for required medicines or feed in each village Spraying of fly repellants in animal sheds Control of mosquitoes (1) Treatment of animals for entritis etc. (2) Special care and treatment of young animals for enteric diseases like calf scour, pneumonia	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,. Deworming with broad spectrum dewormers 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.
Cyclone	In case of early forewarning (EFW), harvest all the crops (paddy/wheat/bajra/maize/soybean/mungbean etc.) that can be useful as feed/fodder in future (store properly) Keeping sufficient of dry fodder to transport to the flood affected villages Don't allow the animals for grazing if severe floods are forewarned Keep stock of bleaching powder and lime	Transportation of animals to elevated areas Proper hygiene and sanitation of the animal shed In severe storms, un-tether or let loose the animals Use of unconventional and locally available cheap feed ingredients for feeding of livestock. Avoid soaked and mould infected feeds / fodders to livestock Emergency outlet establishment for required medicines or feed in each village	Repair of animal shed Bring back the animals to the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Encouraging farmers to cultivate short-term fodder crops like sunhemp, Lucerne, berseem, maize etc.,. Deworming with broad spectrum dewormers

	Carry out Butax spray for control of external parasites Identify the Clinical staff and trained paravets and indent for their services as per schedules Identify the volunteers who can serve in need of emergency 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	Spraying of fly repellants in animal sheds	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.
Cold wave	**Not applicable**		
Heat wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **iv)** Thatched sheds should be provided as a shelter to animal to minimize heat stress	Allow the animals early in the morning or late in the evening for grazing during heat waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Put on the foggers / sprinkerlers/fans during heat weaves in case of high yielders (Jersey/HF crosses) In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves.	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
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	**During the event**	**After the event**
Drought			

Shortage of feed ingredients	• Purchase sufficient quantity of ready feed / raw feed ingredients as per storage facilities and requirement. • Identify and test available alternative low cost feed resources in feed testing laboratories for their exact composition for formulating balanced feed. • Prepare balanced feed formulation using available feed resources. • Create alternative power generating facilities i.e. Generator set. • Take insurance of poultry sheds, equipments and feed factory well in advance may be in the starting phase of opening the farm.	• Feed formulations using low cost feed ingredients in case of non-availability of high priced conventional ingredients. • Keep check on production performance and modify ration consulting poultry specialist. • Nutrient density should be increased in proportion to feed consumption. • Avoid feed wastage.	• Shift over to good quality feed for optimum production performance.
Drinking water	• Tube well and water storage facilities should be adequately created.	• Judicious use of water by avoiding spillage/ leaking through waterers. • Use of cooling facilities like sprinklers, foggers, fans etc. for comfort zone and optimum production performance.	• Use water sanitizers (chlorination/Sokrena / Vigrox etc.) and softeners (pH. 6).
Health and disease management	• Use of anti-stress vitamins (AD_3ECB_{12}-Vimeral / Famitone / Stressvell etc.) in feed and drinking water. • Use of adaptogenetic herbal medicines (Zetress / Zist etc). • Use probiotics (Protexin / Biovet-YC) in feed. • Vaccinate birds against important diseases like R.D., IBD, I.B., Fowl pox according to age as per scheduled programme.	• Use anti-stress, vitamins and adaptogenetic herbal drugs. • Perform vaccination for Ranikhet Disease & Infectious Bronchitis . • Prophylactic medication for important diseases like E.coli & CRD. • Use of electrolytes in feed and drinking water.	• Vaccinate birds as per vaccination schedule. • Perform deworming with Levamisole / Albendazole / Piperazine etc) and use antibiotics, vitamins as per monthly health calendar programme
Floods			

Shortage of feed ingredients	• Purchase sufficient quantities of ready feed / raw feed ingredients. • Store feeding material in suitable houses which should be leak proof and without dampness. • Store feed on iron stands away from the wall to avoid increase in moisture & mould growth. • Road repairing for transporting feed and farm products. • Take insurance of poultry sheds, equipments, feed factory and mortality of birds due to drowning in flood water well in advance may be in the starting phase of opening the farm.	• Use of toxin binders (Chek–O-Tox/ UTPP etc.) in the feed. • All electric connections should be in good condition to avoid shock and accident.	• Use of Toxin binder should be continued to avoid development of mycotoxins in the feed
Drinking water	• Drinking water should be stored in over head tanks. • Underground water tanks should be repaired and closed properly to avoid contamination.	• Use of water sanitizers and softeners.	• Check water quality and accordingly use water sanitizers and water softeners for optimum pH.
Health and disease management/construction of poultry shed	• Complete vaccination as per the programme for various categories of the birds i.e. Layers & Broilers. • Poultry sheds should be constructed at high raised land/or go for raised platform poultry sheds especially in flood affected areas. (conceptional biosecurity)	• Use of probiotics / or antibiotics in feed to protect birds from bacterial infections like E.coli, CRD, Enteritis etc.	• Use of probiotics should be continued in feed for 10-15 days.

Cyclones			
Shortage of feed ingredients	• Store feed ingredients / ready feed as per need. • Use curtains to avoid splashing of water in feed stores and poultry houses.	• Avoid direct splashing of water and wind draft on the birds by using proper curtains.	• Use good quality and balanced feed for optimum production performance.
Drinking water	• Keep ready stock of water sanitizers and softeners.	• Use of water sanitizers and softeners in drinking water. • Use Toxin binders in feed. • Mixing of lime in the litter to avoid wet litter problems and ammonia production.	• Repair damages to watering systems, if any.
Health and disease management	• Keep stock of probiotics / antibiotics and anti-stress vitamins.	• Use probiotics and anti stress vitamins in feed and water.	• Use antibiotics / coccidiostate and anti-mycoplasma drugs in feed / drinking water.
Heat and cold wave			
Shelter/environment management	• Install foggers inside the house. • Install sprinklers on the roof. • Tree plantation surrounding the shed. • Purchase of electrolyte and anti-stress vitamins and antibiotics	• Try to Keep the house temperature in comfort zone i.e. 70-75° F through use of foggers, sprinklers and air velocity fans. • Reduce protein by 2% in feed. • Use of fat / Vegetable oil (2-5%) in feed as partial replacement to carbohydrates sources i.e. Maize, Wheat, Rice Kani etc.	• Use of cooling mechanisms to maintain house temperature in comfort zone for best production performance.
Health and disease management	• Birds should be free from bacterial and mycoplasma infections by using antibiotics/ antimycoplasma drugs (Tiamutin/ Tylosin etc.) as mortality in affected birds is high due to heat stress.	• Use anti stress vitamins and electrolytes in drinking water / feed.	• Check titres for respiratory disease and accordingly repeat vaccination

	• Vaccinate birds for respiratory diseases like Ranikhet disease /Infectious Bronchitis.		against Ranikhet disease / Infectious Bronchitis .

2.5.3 Fisheries / Aquaculture: (Inland fisheries)

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought	Connect the all major rivers of state and make network to connect all reservoir and village ponds to defend from drought condition of particular zone.		
A. Capture	Marine sector couldn't effected directly but estuarine biodiversity will effected (some fresh water fish migrate to marine or vice versa for breeding will effected)		
Marine			
Inland	Inland sector will affected most during the drought condition. Indian Major Carp, Exotic Carp, Cat fish and other biodiversity will either migrate or not survive.		
(i) Shallow water depth due to insufficient rains/ inflow	1. Provide water through cannel and pipeline from major reservoirs to maintain sufficient water depth 2. Taxonomic fish data collection & Preserved fish stock (gene)	1. Migration of fish stock 2. Conservation of breeders/ fish stock at unaffected area	Transplant the fish stock and breed the fish in hatchery to stock the fish seed in affected area
(ii) Changes in water quality	Migration of fish due to change of water quality	-	-

(iii) Any other			
B. Aquaculture	"Culture of aquatic organisms in confined water body", so this sector will affected most incase of either non availability of water or mismanagement.		
(i) Shallow water in ponds due to insufficient rains/ inflow	1. Lower the stocking density by harvest the big size (500 gm) fish and place in market. 2. Transfer of under culture fishes to abundance water zone	Pre- harvest all the materials (fish and prawns) & preserved by freezing	Sanitize the dead fish biomass.
(ii) Impact of salt load build up in ponds / change in water quality	Protect the water and use of lime and other probiotics	Cover the pond with plants (duckweed etc) to protect from evaporation.	Flush the pond with fresh water and manure before the next stocking of fish to maintain the food chain
(iii) Any other			
2) Floods	Flood are generally predicted and early warning will protect the lives and livelihood		
A. Capture	Change of breeding grounds, migration of fish against and with the water, and increase of fish stock etc, so positive affect on capture fisheries.		
Marine			
Inland	All the fishermen must call back from fishing	No fishing	
(i) Average compensation paid due to loss of human life	1. Recognizing the risk of flood & making the people aware of it 2. Migrate the people at safe place 3. Collect the details	Send the rescue teams to protect the lives of the most vulnerable peoples.	1. Measure social impact of losses risks of diseases, loss of employment. 2. The most vulnerable fishermen be taken care of first and fast

	information of swimmers & life savers appliances.		
(ii) No. of boats/ nets/ damaged	Transfer boats/nets at safe places	If possible protect boats during rescue operation	Identify the damages according to assessment & compensate
(iii) No. of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(v) health and diseases	Prepared the medical rescue team	-	1. Proper hygiene & sanitation 2. Send the medical rescue team with drugs.
B. Aquaculture	Flood affects the culture ponds which situated near the river. It demolished the pond dyke, overflows the pond and contaminated the culture.		
(i) Inundation with flood water	1.Transfer of aquaculture farmers to protected places 2. Harvest fish from culture ponds and preserved or sale at market 3. Protect pond dykes with sand bags.		1. Harvest the culture fish & wild fish which came with flood water. 2. Disinfect the ponds with chemicals
(ii) Water continuation and changes in water quality	Reduced water level of culture pond.	Flood water fills the pond if empty or reduced before the flood.	Exchange water with fresh water to maintain the water quality.
(iii) health and diseases	Take preventive measures		Destroyed the dead fish with disinfectant

(v) Loss of stock and inputs (feed etc)	Transfer the stock and inputs at safe places	-	Demolish the decayed feed
Infrastructure damage(pumps, aerators, huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
3. Cyclone / Tsunami	Cyclone, heavy rain and flooding are generally predicted and early warning are issued by the concern agencies, while Tsunami, Oil spill etc. cannot be forewarned		
A. Capture	Capture fishery affected due to cyclone, as current pattern change & upwelling cause the migration of some fish species, so it will either affect to stock or species variation.		
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats/nets/ damaged			
(iii) Avg. no. of houses damaged			
Inland	1. Recognizing the risk of cyclone and making the people aware of risk 2. migrate the fishermen at	Protecting the lives and livelihood of the most vulnerable fishermen	1. Measure social impact of losses risks of diseases, loss of employment. 2. The most vulnerable fishermen be taken care of first and fast

	safe place		
B. Aquaculture	Most of coastal aquaculture farms (shrimp culture) will affect most due to cyclone & tsunami, as sea water intrusion, high current & tide & high wind velocity will affect the dyke and infrastructure of aquaculture units.		
(i) Overflow/ flooding of ponds	1.Pre- harvest the materials (fish and prawns) 2. Protect the dykes by putting soil bags. 3. Place the iron screen on inlet and outlet	In case of over flooding open outlet of the pond	1. Measure impact of losses and risks of diseases 2. Provide better hygienic sanitation, disinfected the ponds.
(ii) Changes in water quality (fresh water/ brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)	Transfer the stock and inputs at safe places	-	Destroy the decomposed feed
(v) Infrastructure damage(pumps, aerators, shelters/ huts etc)	Transfer the detachable infrastructure at safe places	-	Measures impact of losses of infrastructure and provide assist for rehabilitation
4. Heat wave and cold wave	This factor will affect indirectly to the fish stock.		
A. Capture	Due to heat and cold wave some fishes migrate to offshore as well as non affected area so, it will affect the fish catch.		
Marine			
Inland	Assessment of capture fish	Study the impact of heat and cold wave on fish capture and	Established the fishery

	catch	biodiversity.	
B. Aquaculture	Due to these factor, fish growth will affect, change in feeding, breeding and rearing of fish larvae.		
(i) Changes in pond environment (water quality)	Exchange of water to maintain the water temperature and water parameter	Use equipment to protect the fish from drastic change in temperature as well as depletion of oxygen, i.e. use of thermostat heater to maintain constant pond temperature & use of aerator to maintain dissolve oxygen in pond.	Acclimatize the fish stock in natural condition and reduced the used equipments from the ponds. Maintain the feed ration accordingly.
(ii) Health and Disease management	Take some preventive measures to protect from disease	Use of probiotics as well as fresh and live feed	