

State: KARNATAKA

Agriculture Contingency Plan for District: GADAG

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau, hot semiarid Eco-Subregion ((6.1)		
	Agro-Climatic Region (Planning Commission)	Southern Plateau and Hill Region (X)		
	Agro Climatic Zone (NARP)	Northern Dry Zone (KA- 3)		
	List all the districts or part thereof falling under the NARP Zone	Entire District: Gadag, Bijapur, Bagalkot, , Bellary, Koppal Part of District: Belgaum, Dharwad, Raichur, Davanagere		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		15° 52' N	75° 16' E	655.3 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Agricultural Research Station, P. B. 18 BIJAPUR -586 101		
Mention the KVK located in the district	/ KVK, Hulakoti			
1.2	Rainfall	Average (mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	365.2	2 nd week of June	-
	NE Monsoon(Oct-Dec):	149.7	-	1 st to 2 nd week of November
	Winter (Jan- March)	6.6	-	-
	Summer (Apr-May)	108.8	-	-
	Annual	630.3	-	-

1.3	Land use pattern of the district (latest statistics)	Geographical area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (Lakh ha)	465.7	32.6	10.5	2.6	1.0	0.3	11.6	18.9	3.5

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Medium black soils	141.2	46.1
	Deep black soils	124.7	40.7
	Shallow black soils	28.3	9.2
	Red and black mixed soils	12.2	3.9
	Red sandy soils	0.2	0.1
1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	380.1	143.6
	Area sown more than once	165.8	
	Gross cropped area	545.9	

1.6	Irrigation	Area (*000 ha)	Per cent (%)	
	Net irrigated area	69.5	27.10	
	Gross irrigated area	78.8		
	Rainfed area	310.6		
	Sources of Irrigation	Number	Area (*000 ha)	% area
	Canals	01	21.3	27.9
	Tanks	30	1.1	1.4
	Open wells	3772	01.3	1.7
	Bore wells	493	27.3	35.8
	Lift irrigation	10	0.2	0.2
	Other sources		25.233	33.1
	Total		76.2	100.0
	Pumpsets	18270		
	Micro-irrigation	-		
	Groundwater availability and use	No. of blocks	% area	Quality of water
	Over exploited	-	-	
Critical	-	-		
Semi- critical	-	-		
Safe	-	-		
Wastewater availability and use	-	-		

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

1.7 Area under major field crops & horticulture etc. (2008-09)

1.7	Sl. No.	Major Field Crops cultivated	Area ('000 ha)					Summer	Total
			Kharif		Rabi				
			Irrigated	Rainfed	Irrigated	Rainfed			

	1	Greengram	-	99.2	-	-	-	99.2	
	2	Sorghum	-	11.4	-	62.8	-	74.2	
	3	Groundnut	-	48.6	-	-	5.9	54.6	
	4	Chickpea	-	-	-	43.5	-	43.5	
	5	Maize	41.1	-	1.3	-	-	42.4	
		Horticulture crops - Fruits	Total area						
	1	Mango	690.0						
	2	Bananna	349.0						
	3	Sapota	699.0						
	4	Pomegranate	242.0						
	5	Citrus spp.	120.0						
		Horticultural crops - Vegetables	Total area						
	1	Tomato	445						
	2	Brinjal	477						
	3	Onion	25159						
	4	Green chilli/dry chilli	955/900						
	5	Leafy vegetables	220						
		Medicinal and Aromatic crops	Total area						
	1	Ashwagandha	-						
	2	Coleus	-						
	3	Other medicinal plants	-						
	4	Citronella	80						
	5	Lemon grass	50						
		Plantation crops	Total area						
	1	Oil palm	420						
	2	Coconut	1110						
	3	Betel vine	67						

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)	85.0	58.1	143.1			
	Crossbred cattle	1.9	13.4	15.4			
	Non descriptive Buffaloes (local low yielding)	9.3	70.8	80.1			
	Graded Buffaloes						
	Goat			172.4			
	Sheep			313.6			
	Others (Camel, Pig, Yak etc.)			4.32			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial		158946				
	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						
					957 tons		

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

1.11	Production and Productivity of major crops (Average of last 3 years: 2006, 07, 08)	<i>Kharif</i>	<i>Rabi</i>		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)
	Sorghum	11.4	1000.0	48.9	779.0	-	-	60.2	889.5
	Greengram	69.9	704.0	-	-	-	-	69.9	704.0
	Groundnut	40.2	828.0	-	-	11.9	2000.0	52.2	1414.0
	Maize	174.6	4249.0	-	-	5.8	4500.0		
	Chickpea	-	-	308.9	710.0			308.9	710.0
	Horticulture								
	Onion	289964	10.46						
	Green chilli	14794.2	17.76						
	Sapota	6968.2	10.15						
	Mango	6515.4	9.78						
	Banana	9191.6	28.66						

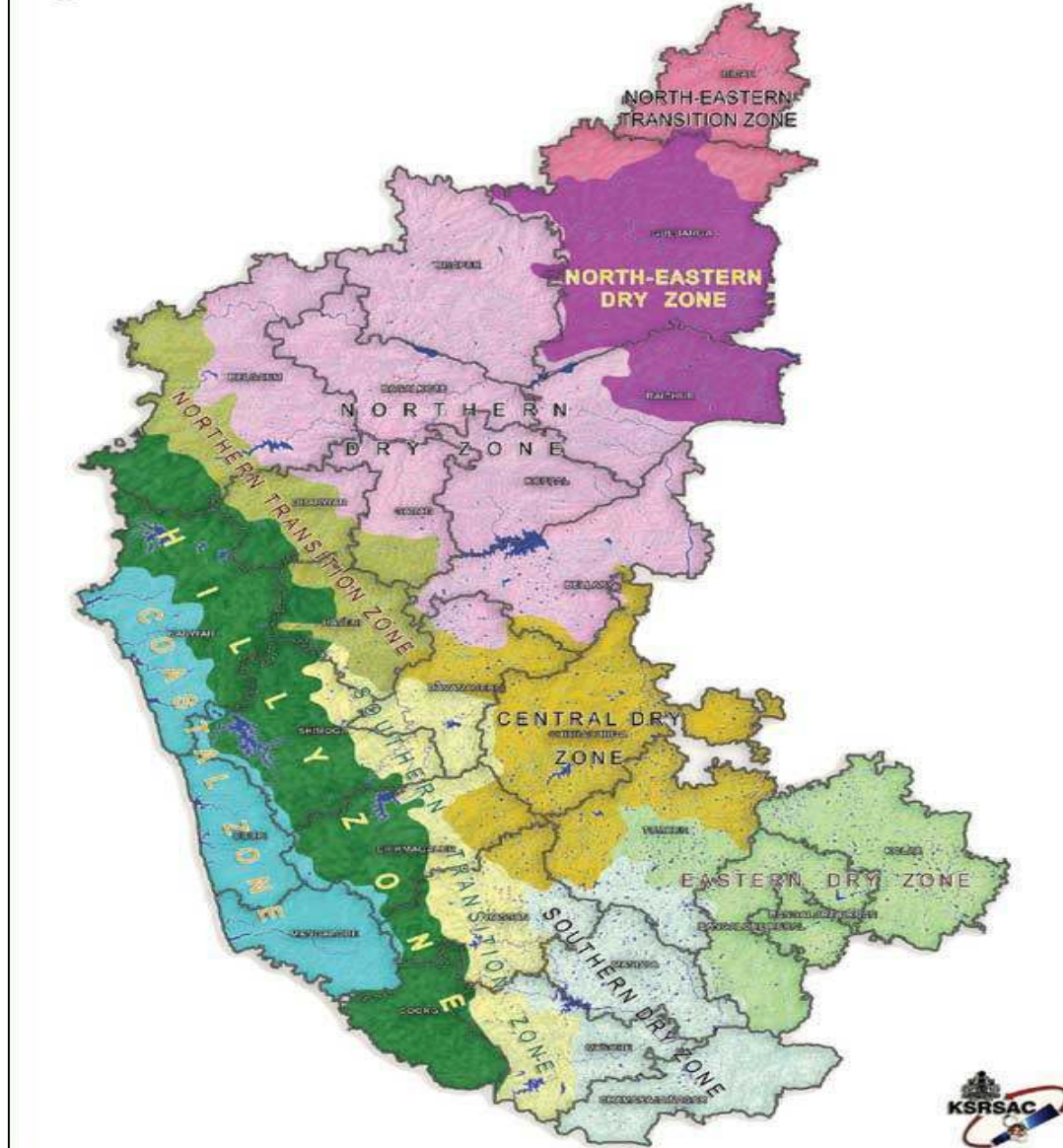
1.12	Sowing window for 5 major crops (start and end of sowing period)	Sorghum	Greengram	Groundnut	Maize	Chickpea
	Kharif- Rainfed	June	15 th May to 30 th June	1 st week of June to 4 th week of July	-	-
	Kharif-Irrigated	-	-	-	1 st week of July to 4 th week of August	-
	Rabi- Rainfed	1 st week of September to 4 th week of October	-	-	-	1 st week of October to 4 th week of November
	Rabi-Irrigated	-	-	-	1 st week of November to 4 th week of December	-

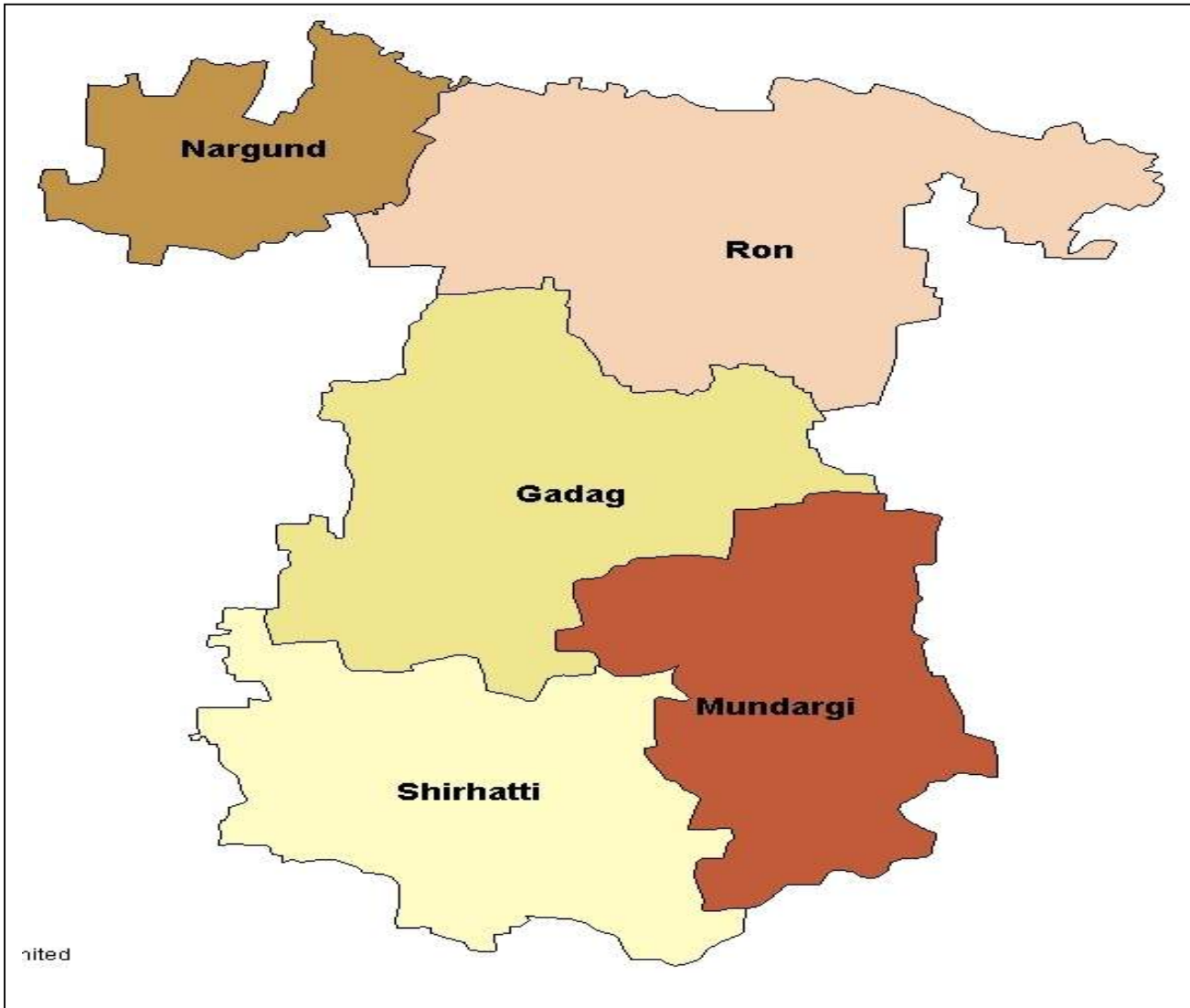
	Summer irrigated	-	-	1 st week of December to 4 th week of January	-	-
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1.13	What is the major contingency the district is prone to? (Tick mark)*	Regular	Occasional	None
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	-	√	-
	Hail storm	-	-	√
	Heat wave	-	-	√
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water inundation	-	-	√
	Pests and diseases (specify)	-	√	-

1.14	Include Digital maps of the district for	Location map of district with in State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

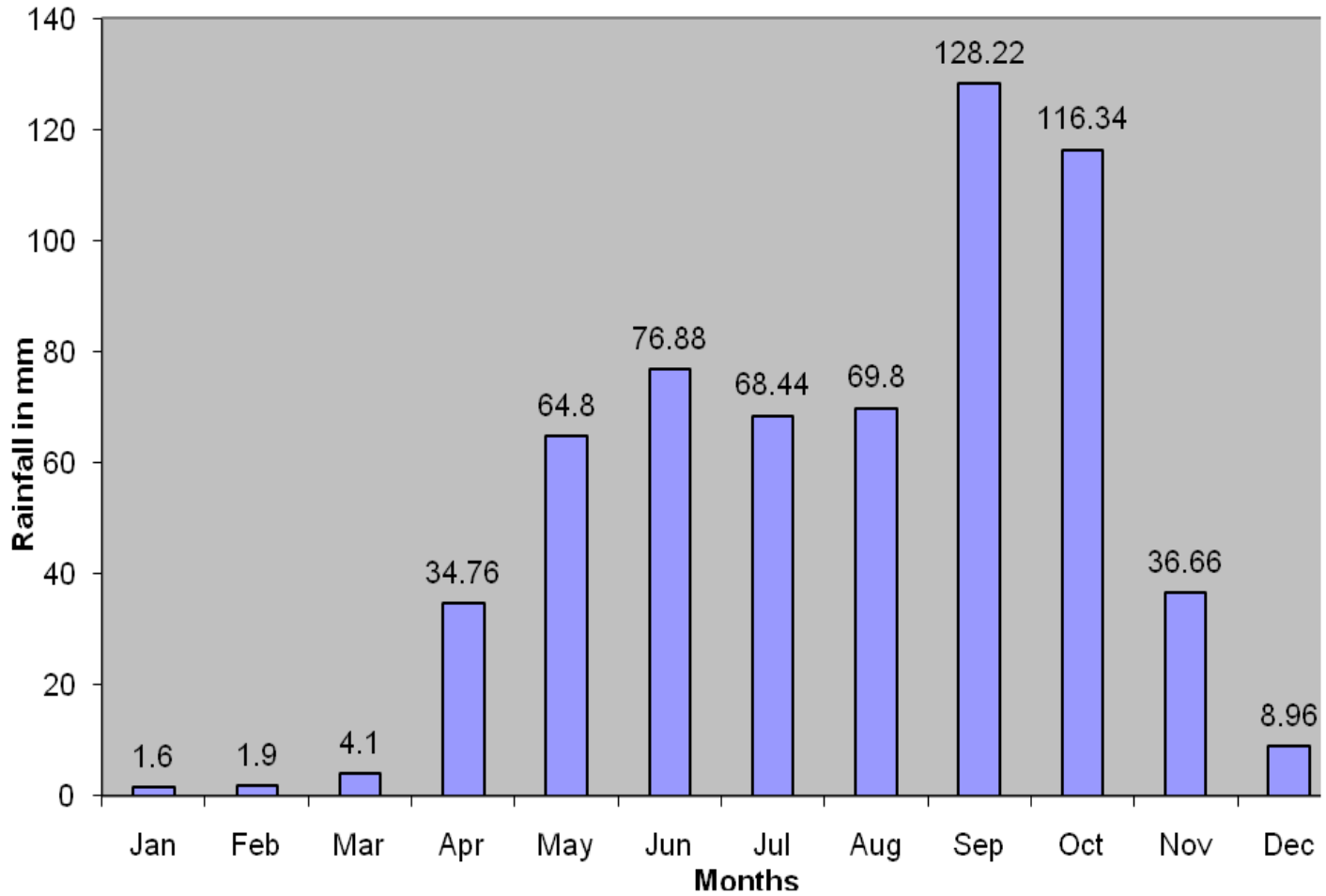
Agro Climatic Zones of Karnataka

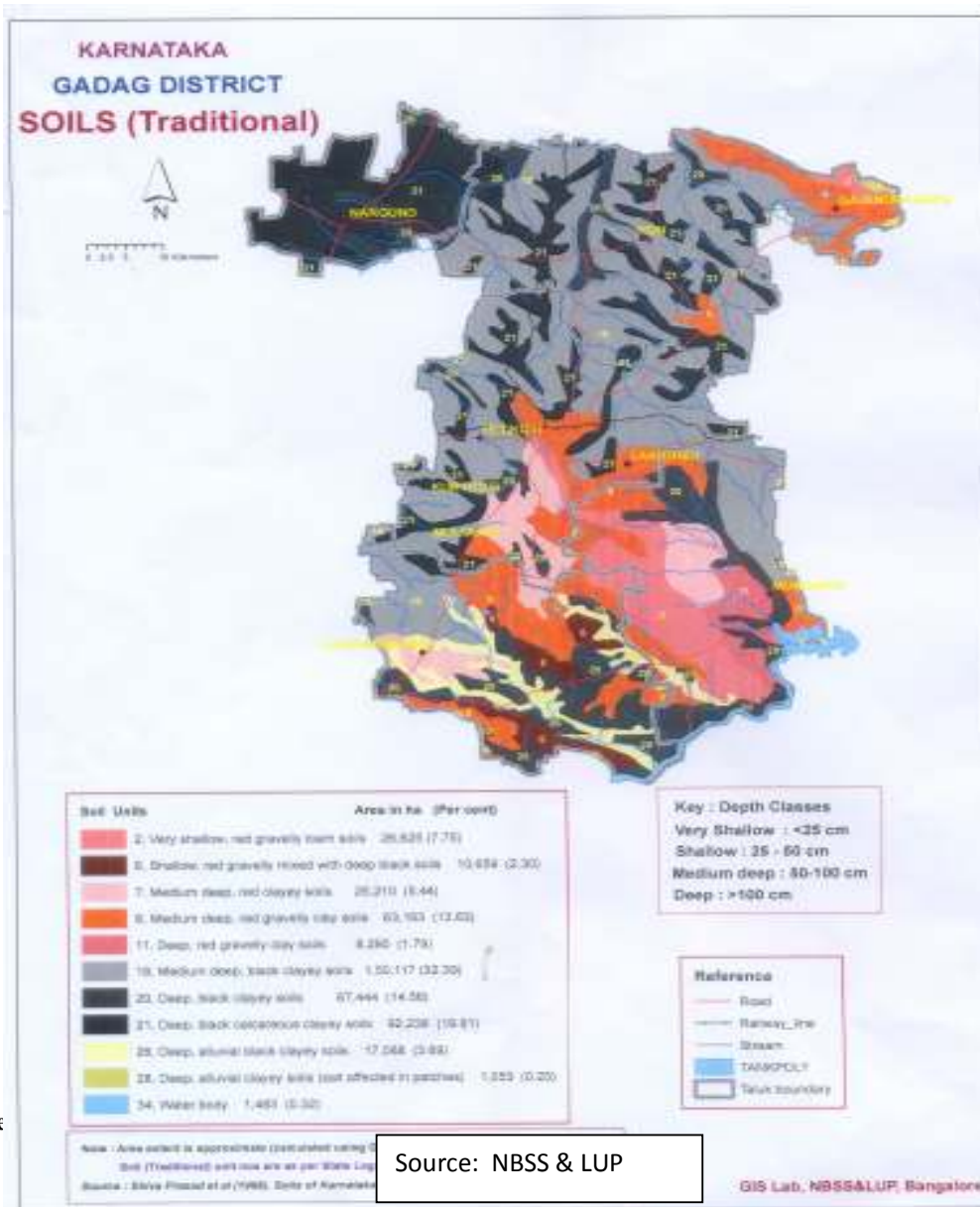




Gadg District Map

RAINFALL PATTERN OF GADAG DISTRICT





2.0 Strategies for weather related contingenc

2.1 Drought

2.1.1 Rainfed situations

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures			
			Change in crop/ cropping system	Agronomic measures	Remarks on Implementation	
1	2	3	4	5	6	
Delay by 2 weeks (June 4 th week) Kharif sowing : 1 FN of July	Rainfed <i>Kharif</i> cropping area in shallow black soils and red soils	Kharif Sorghum	No Change	-	-	
		Groundnut (bunch/spreading)	Ground nut (Spreading)	-	-	
		Greengram	Sunflower	-	-	
		Maize	No change	-	-	
		Chilli+ Onion+ Desi Cotton	Chilli + Desi cotton	-	-	
		Bt, Cotton				
	Cropping area in Rabi Season in Deep black soils and both Kharif and Rabi in medium deep black soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	-
		Follow <i>in situ</i> moisture conservation practices	Rabi sorghum Safflower, Sunflower Chickpea, Maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No change	No change	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops
		Green gram	Rabi sorghum	Chilli+Onion+ Desi Cotton	-	
			Chickpea		Chickpea	
		Ground nut	Sunflower	Fallow	Sunflower/ Wheat	
			Rabi sorghum	No change	Chickpea	
		Maize	No Change			
		Cotton	-			
		Sunflower	Chickpea		No change	
Cropping in denuded shallow soils		-	-			

Condition	Major Farming situation	Crop/cropping system	Suggested Contingency measures		
			Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
1	2	3	4	5	6
	Kharif cropping	Sorghum	Sunflower	-	-

Delay by 4 weeks (July 2 nd week) Kharif sowing : II FN of July	area in shallow black soils and red soils	Ground nut (bunch/spreading)		Ground nut (Spreading)			
		Greengram		Sunflower			
		Maize		No change			
		Chilli+ Onion+ Desi Cotton		Chilli + Desi Cotton			
		Bt. Cotton					
	Cropping area in Rabi Season in Deep black soils and both Kharif and Rabi in medium deep black soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops	
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, Miaze Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No change	No change		
		Green gram	Rabi sorghum	Chilli+Onion+ Cotton	-		
			Chickpea		Chickpea		
		Ground nut	Sunflower	Fallow	Sunflower/ Wheat		
Rabi sorghum			Rabi sorghum				
Maize		Chickpea	No change	Chickpea/W heat			
Cotton	-	-					
Sunflower	Chickpea	No change	No change				
	Cropping in denuded shallow soils	Natural pasture	TBO based silvi pasture system				

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
Delayed onset			Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
1	2	3	4	5	6
	Kharif cropping area	Sorghum	Sunflower	-	-

Delay by 6 weeks (July 4th week) Kharif sowing : I FN of Aug	in shallow black soils and red soils	Ground nut (bunch)			-	-		
		Greengram			-	-		
		Maize			-	-		
		Chilli+ Onion+ Desi Cotton		Chilli + Desi Cotton	-	-		
		Bt. Cotton		(Mention change in cropping system)				
	Cropping area in Rabi Season in Deep black soils and both Kharif and Rabi in medium deep black soils	Kharif	Rabi	Kharif	Rabi	-	-	
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, Miaze Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No change	No change	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of Rabi crops		
			Green gram	Rabi sorghum	Desi Cotton		-	
				Chickpea	Fallow		Chickpea	
			Ground nut	Sunflower			Sunflower/ Wheat	
				Rabi sorghum			Rabi sorghum	
			Maize	Chickpea	Chickpea/Wheat			
			Cotton	-	-			
		Sunflower	Chickpea	No Change	Wheat			
		Cropping in denuded shallow soils	-	-	-	-		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/ cropping system	Agronomic measures	Remarks on Implementation
Delay by 8	Kharif cropping area in shallow	Sorghum	Sunflower	-	-
		Ground nut (bunch)		-	-

weeks (Aug 2nd week) Kharif sowing : II FN of Aug	black soils and red soils	Greengram		Bt Cotton		-
		Maize				
		Chilli + Desi Onion + Desi Cotton				
		Bt. Cotton				
	Cropping area in Rabi Season in Deep black soils and both kharif and Rabi in medium deep black soils	Kharif	Rabi	Kharif	Rabi	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, Maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No Change	No Change	
		Green gram	Rabi sorghum	Cotton	-	
		Green gram	Chickpea		Chickpea	
		Ground nut	Sunflower		Sunflower/ Wheat	
		Groundnut	Rabi sorghum		Rabi sorghum/ Safflower	
		Maize	Chickpea		Chickpea/ Wheat	
		Cotton	-	No Change	-	
		Sunflower	Chickpea		Wheat	
		Cropping in denuded shallow soils	-	-	-	

Condition	Major Farming situation	Crop/cropping system		Suggested Contingency measures			Remarks on Implementation
				Crop management		Soil nutrient & moisture conservation measures	
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Kharif cropping area in shallow black soils and red soils	Sorghum		Thinning (Mention proportion of plants to be thinned)		Opening of conservation furrows at a distance of 15-20 m	
		Ground nut (bunch)		-			
		Greengram		-			
		Maize		Thinning (Mention proportion of plants to be thinned)			
		Chilli+ Onion + Cotton		-			
		Cotton		Thinning (Mention proportion of plants to be thinned)			
	Cropping area in Rabi Season in Deep black soils and both Kharif & Rabi in medium deep black soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops	-
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No Change	No Change		
		Green gram	Rabi sorghum	Intercultivation		Opening of conservation furrows at a distance of 15-20 m	
			Chickpea				
		Ground nut	Sunflower	Intercultivation and weeding			
			Rabi sorghum				
		Maize	Chickpea	Thinning, intercultivation and weeding			
		Cotton	-				
Sunflower		Chickpea	Intercultivation				
Cropping in denuded shallow soils		Natural pasture	-	Spreading of grass/legume forage seeds		Opening of staggered trenches	

Condition Delayed onset	Major Farming situation	Normal Crop/cropping system		Suggested Contingency measures				Remarks on Implementati on
				Crop management		Soil nutrient & moisture conservation measues		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period At vegetative stage	Kharif cropping area in shallow black soils and red soils	Sorghum		Intercultivation		Opening of conservation furrows at a distance of 15-20 m		
		Ground nut (bunch)						
		Greengram		-				
		Maize		Weeding and Intercultivation Weeding				
		Chilli+ Onion + Desi Cotton						
		Bt Cotton						
	Cropping area in Rabi Season in Deep black soils and both Kharif & Rabi in medium deep black soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops		
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No Change	No Change			
		Green gram	Rabi sorghum	Intercultivation		Opening of conservation furrows at a distance of 15-20 m		
			Chickpea					
		Ground nut	Sunflower	Intercultivation and weeding				
			Rabi sorghum					
		Maize	Chickpea	Intercultivation				
		Bt Cotton	-	Intercultivation and weeding				
Sunflower	Chickpea							
Cropping in denuded shallow soils	Natural pasture	TBO based silvi pasture system	Spreading of grass/legume forage seeds		Opening of staggered trenches			

Condition Delayed onset	Major Farming situation	Crop/cropping system		Suggested Contingency measures			
				Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation	
Mid season drought (Long dry spell) at flowering/ fruiting stage)	Kharif cropping area in shallow black soils and red soils	Sorghum		Spray with anti-transpirants			
		Ground nut (bunch)		Weeding and earthing up			
		Greengram		-			
		Maize		Spray with anti-transpirants			
		Chilli+ Onion+Cotton		Remove onion crop by intercultivation			
		Cotton		Weeding and Intercultivation; Spray with anti-transpirants			
	Rainfed cropping area in Rabi Season in Deep black soils and both Kharif & Rabi in medium deep black soils	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops	
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No Change	No Change		
		Green gram	Rabi sorghum		Soil incorporation of green gram crop		
			Chickpea				
		Ground nut	Sunflower		Weeding and earthing up		
			Rabi sorghum				
		Maize	Chickpea		Spray with anti-transpirants		
		Cotton	-				
Sunflower	Chickpea		Removal of lower leaves and mulching				
Cropping in denuded shallow soils	Natural pasture	TBO based silvi pasture system	Removal of perennial weeds		Opening of staggered trenches		

Condition	Major Farming situation	Crop/cropping system		Suggested Contingency measures		
				Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (Long dry spell)	Kharif cropping area in shallow black soils and red soils	Sorghum		Removal of lower leaves		
		Ground nut (bunch)				
		Greengram				

at flowering/ fruiting stage)		Maize	-			
		Chilli+ Onion+Desi Cotton	Remove onion crop by intercultivation			
		Bt Cotton	Spray with anti-transpirants			
	Cropping area in Rabi Season in Deep black soils and both Kharif & Rabi in medium deep black soils	Kharif	Rabi	Kharif	Rabi	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of Rabi crops
		Follow in situ moisture conservation practices	Rabi sorghum Safflower Sunflower Chickpea, maize Rabi sorghum + Chickpea (2:1) Chickpea + Safflower (4:2)	No Change	No Change	
		Green gram	Rabi sorghum	Harvesting and Soil incorporation of biomass		
			Chickpea			
		Ground nut	Sunflower	-		
			Rabi sorghum	-		
		Maize	Chickpea	Removal of lower leaves		
Cotton	-	Spray with anti-transpirants				
Sunflower	Chickpea	-				
Cropping in denuded shallow soils	Natural pasture	TBO based silvi pasture system	Removal of perennial weeds	-		

2.1.2 Irrigated situation

Condition	Major Farming situation	Crop/cropping system		Suggested contingency measure		
				Change in crop/ cropping system		Agronomic measures
		<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	
Delayed/ limited release of water in canals due to low rainfall	Cropping with canal irrigation both in black soils and red soils	Maize	Chickpea/ Wheat	No change	No change	Alternatively alternate furrow irrigation during kharif
		Sunflower	Maize			
		Maize	Groundnut			
		Maize	Groundnut			
		Ground nut	Wheat/ chickpea	Sunflower	Groundnut/ chickpea/wheat	Broad bed and furrow irrigation during kharif
		Bt. Cotton	-	No change	-	Transplant 25-30 days aged seedlings. Alternatively alternate furrow irrigation

Non release of water in canals under delayed onset of monsoon in catchment	Cropping with canal irrigation both in black soils and red soils	Maize	Chickpea/ Wheat	Follow insitu moisture conservation practices	No Change	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops
		Ground nut	Wheat/ chickpea		Groundnut/ chickpea/wheat	
		Sunflower	Maize		No change	
		Maize	Groundnut		Groundnut/wheat	
		Ground nut	Wheat/ chickpea	Sunflower	Groundnut/ chickpea/wheat	
		Bt Cotton	-	No change	-	Transplant 25-30 days aged seedlings. Alternatively alternate furrow irrigation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Cropping with tank bed /bore-wel irrigation both in black and red soils	Maize	Chickpea/ Wheat	-	No Change	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops
		Ground nut	Wheat/ chickpea	-	Groundnut/ chickpea/wheat	
		Sunflower	Maize	-	No change	
		Maize	Groundnut	-	Groundnut/wheat	
		Cotton	-	No change	-	Transplant 25-30 days aged seedlings. Alternatively alternate furrow irrigation
Insufficient groundwater recharge due to low rainfall	Cropping with bore-wel / Open wel irrigation both in black and red soils or any other sources	Maize	Chickpea/Whea t	Sunflower	No Change	Compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of <i>Rabi</i> crops
		Ground nut	Wheat/ chickpea		Groundnut/ chickpea/wheat	
		Sunflower	Maize	No change	No change	
		Maize	Groundnut	Sunflower	Groundnut/wheat	
		Cotton	-	No change	-	Transplant 25-30 days aged seedlings. Alternatively alternate furrow irrigation

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations) and Heavy rainfall with high speed winds in a short span

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Sorghum	Drain out excess water, Weeding and top dressing with urea	Drain out excess water	Drain out excess water, Tying up of lodged plants drying of earheads and Harvesting	Proper drying and storage of grains
Green gram (Use non-shattering cultivar Sel-4)	Drain out excess water, Weeding		Drain out excess water, Harvesting and drying of pods	
Groundnut	Drain out excess water, Drenching with fungicides; Weeding and earthing up;	Drain out excess water; Gypsum application and earthing up	Drain out excess water	Harvesting and drying of pods
Maize	Drain out excess water, Weeding and top dressing with urea	Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of cobs	Proper drying and storage of grains
Chickpea		Drain out excess water	Drain out excess water, Harvesting and drying of plants	
Horticulture				
Chilli	Draining water, spraying pesticides	Spraying NAA 10 ppm with liquid NPK	Early harvest	Separation of damaged fruits
Onion	Draining water, spraying pesticides	Spraying NAA 10 ppm with liquid NPK	2000 ppm MH 15 days before harvest to reduce bulb sprouting in storage	Separation of rotten and unmarketable bulbs
Tomato	Draining water, spraying pesticides	Spraying NAA 10 ppm with liquid NPK	Early harvest	Sorting out damaged fruits
Mango	Draining water, spraying pesticides	Control of hopper and powdery mildew	Early harvest	Dipping fruits in bavistin
Sapota	Draining water, spraying pesticides	Spraying NAA with liquid NPK	Early harvest	Sorting out damaged fruits
Banana	Draining water, spraying pesticides	Wind brakes	Early harvest	Sorting out damaged fingers/bunches
Outbreak of pests and diseases due to unseasonal rains				
Crops	The control measures may be taken up as per package of practices			
Sorghum	Control measures for sucking pests and blight	Control measures for rust	Prefer grain mold resistant variety DSV-4	-
Green gram	Control measures for spingid moth	Spray Quinalphos @ 2ml/l for control of Pod	Control measures	-

	, leaf crinckle virus	borer Powdery mildew (propiconazole @ 0.5ml/l)	for pod borer and powdery mildew	
Groundnut	For leaf miner control, spray Monocrotophos @ 1ml/l) and for Spodoptera spray Quinalphos@ 2ml/l) And Chlorothaloni 0.2 % for Leaf spot and rust (Control measures for leaf miner and Spodoptera Control leaf spot and rust	-	-
Maize	Control stem borer. For control of leaf blight spray Mancozeb @ 2.5g/l.	Control cob worm and rust	-	-
Chickpea	Control pod borer and wilt	Spray Spinosad 0.1 ml/l to control pod borer. Control rust	Control pod borer	-
Horticulture				
Onion Purple blotch	Mancozeb 2 g / lit	Mancozeb 2 g / lit	Mancozeb 2 g / lit	
Chilli Murda complex	Spraying dimethioate @ 1.7 ml/lit or Imidacloprid @ 0.05 % to control mites and thrips	Spraying dimethioate @ 1.7 ml/lit or Imidacloprid @ 0.05 % to control mites and thrips	-	
Tomato Thrips and Mites	Spraying oxydematon Methyl @ 1 ml/lit	Spraying oxydematon Methyl @ 1 ml/lit	-	
Mango Leaf hoppers	Monocrotophos @ 1.25 ml/lit	Phosphomidon @ 0.5 ml/lit	-	
Sapota Leaf spot	Copperoxychloride @ 3g/lit	Methyl thiophinate@ 1g/lit	-	
Banana Sigatoka leaf spot	COC @ 3 g/lit	2ml Melathion + 2g Zineb per lit	-	

2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation				
Sorghum	Drain out excess water, Gap filling	Drain out excess water, Weeding and top dressing with urea	Drain out excess water,	Drain out excess water, Tying up of lodged plants drying of earheads and Harvesting
Green gram (Use non-shattering cultivar Sel- 4)	Drain out excess water	Drain out excess water, Weeding	Drain out excess water	Drain out excess water, Harvesting and drying
Groundnut	Drain out excess water, Gap filling and drenching with fungicides	Drain out excess water, Weeding and earthing up	Drain out excess water; Gypsum application and earthing up	Drain out excess water
Maize	Drain out excess water, Gap filling	Drain out excess water, Weeding and top dressing with urea	Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of cobs
Chickpea	Drain out excess water, Gap filling	Drain out excess water, Weeding and top dressing with urea	Drain out excess water,	Drain out excess water, Harvesting and drying of plants
Horticulture				
Onion		Draining out excess water and providing stake Apply RDF in split form	Draining out excess water	Separation of rotten bulbs Preparation of land for next crop
Chilli		Draining out excess water and providing stake Apply RDF in split form	Draining out excess water Foliar spray of micronutrients	Separation of damaged fruits Preparation of land for next crop
Mango		Draining out excess water Apply RDF in split form	Draining out excess water Foliar spray of micronutrients	Separation of damaged fruits
Sapota		Draining out excess water Apply RDF in split form	Draining out excess water Foliar spray of micronutrients	Separation of damaged fruits
Tomato		Draining out excess water and providing stake Apply RDF in split form	Draining out excess water Foliar spray of micronutrients	Separation of damaged fruits Preparation of land for next crop
Banana				
Continuous submergence for more than 2 days				

Sorghum	Drain out excess water, Gap filling ; Resowing chickpea with seed treatment in case of more than 50% mortality	Drain out excess water, Weeding and top dressing with urea	Drain out excess water, Tying up of lodged plants	Drain out excess water, Tying up of lodged plants drying of earheads and Harvesting
Green gram	Drain out excess water; Spraying with contact insecticide against spingid moth	Drain out excess water; Spraying with systemic insecticides against sucking pests;	Drain out excess water; Spraying with NAA @ 25 ppm	Drain out excess water; Harvesting and drying
Groundnut	Drain out excess water; Spraying with systemic insecticides against leaf miner	Drain out excess water; Spraying with systemic fungicide against leaf spot and rust	Drain out excess water	
Maize	Drain out excess water, Gap filling	Drain out excess water, Weeding and top dressing with urea; Gap filling with beans	Drain out excess water, Earthing up; Tying up of lodged plants	
Chickpea	Drain out excess water, Gap filling and drenching with fungicides; Resowing wheat in case of more than 50% mortality	Drain out excess water, Weeding and top dressing with urea; Nipping of terminal bud	Drain out excess water, Spraying with NAA@ 25 ppm	
Horticulture				
Onion	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	-	Separation of rotten bulbs Preparation of land for next crop
Chilli	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	Application of NAA @ 10 ppm	Separation of damaged fruits Preparation of land for next crop
Tomato	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	Application of NAA @ 10 ppm	Separation of damaged fruits
Mango	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	-	Separation of damaged fruits
Sapota	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	-	Separation of damaged fruits Preparation of land for next crop
Banana	Providing drainage trench (1.5 cu.ft) across the slope	Providing drainage trench (1.5 cu.ft) across the slope	-	-

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	-NA-			
Cold wave				
Frost				
Hailstorm				
Cyclone	Measures to be adopted as suggested under heavy rains with high speed winds			

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	<p>As the district is frequently prone for frequent drought, it should have reserves (feeding 5000 ACU (maintenance ration) for about 1-3 weeks period) of the following at any point of the year for mobilization to the needy areas</p> <p>Silage:20-50 t Urea molasses mineral bricks (UMMB):50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production Increase area under short duration fodder crops of sorghum/bajra/maize(UP chari,</p>	<p>Harvest and use all the failed crop (Rice, Bajra, Groundnut, jowar, maize) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol etc) and unconventional feeds resources available and use as fodder for livestock (LS).</p> <p>Stall fed the LS so as to reduce the energy requirements of the animals</p> <p>Supply silage / hay to farmers with productive stock on subsidized rates</p> <p>Mild drought: hay should be transported to the drought affected villages</p> <p>Moderate drought: hay, silage and vitamin & minerals mixture should be transported to the drought affected villages</p> <p>Severe drought: UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the drought affected villages. All the hay should be enriched with 2% Urea molasses solution or 1% common salt solution and fed</p>	<p>Short duration fodder crops of Sorghum / Bajra / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Ananand / African tall, Kissan composite, Moti, Manjari, BI-7) should be sown in unsown and crop failed areas</p> <p>Capacity building to stake holders on drought/flood mitigation in livestock sector</p> <p>Flushing the stock to recoup</p> <p>Replenish the feed and fodder banks</p>

	<p>MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7</p> <p>Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters.</p> <p>Avoid burning of maize stover</p> <p>Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon</p> <p>Proper drying, bailing and densification of harvested grass</p> <p>Creation of permanent fodder, feed and fodder seed banks in all drought prone villages</p> <p>Capacity building and preparedness of the stakeholders and official staff for the unexpected events</p>	<p>to LS</p> <p>Herd should be split and supplementation should be given only to the highly productive and breeding animals</p> <p>Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock)</p> <p>Encourage mixing available kitchen waste with dry fodder while feeding to the milch animals</p> <p>Arrangements should be made for mobilization of small ruminants across the districts where no drought exits</p> <p>Unproductive livestock should to be culled during severe drought</p> <p>Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals)</p> <p>Subsidized loans (5-10 crores) should be provided to the livestock keepers</p>	
Cyclone	<p>Harvest all the possible wetted grain (Rice/maize/bajra/jowar/groundnut etc) and use as animal feed.</p> <p>As the district is chronically prone for cyclone, arrange for storing minimum required quantity of hay (25-50 kg) and concentrates (10-25 kg) per animal in farmer's / LS keepers house/ shed for feeding during cyclone.</p> <p>Stock of anti-diarrheal drugs and electrolytes should be made available for emergency transport</p> <p>Don't allow the animals for grazing in case of early forewarning (EFW) of cyclone</p> <p>Incase of EFW of severe cyclone, shift the animals to safer places.</p>	<p>Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers.</p> <p>Diarrhea out break may happen. Health camps should be organized</p> <p>In severe cases un-tether or let loose the animals</p> <p>Arrange transportation of highly productive animals to safer place</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Repair of animal shed</p> <p>Deworm the animals through mass camps</p> <p>Vaccinate against possible disease out breaks like HS, BQ, FMD and PPR</p> <p>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</p> <p>Bleach / chlorinate (0.1%) drinking water or water resources</p> <p>Collect drowned crop material, dry it and store for future use</p> <p>Sowing of short duration fodder crops in unsown and water logged areas when crops are damaged and no chance to replant</p> <p>Application of urea (20-25kg/ha) in the inundated areas and CPR's to enhance the bio mass production.</p>
Floods	<p>In case of early forewarning (EFW), harvest all the crops (Rice, Bajra, Groundnut, jowar, maize etc.,) that can be useful as fodder/feed in future (store properly)</p>	<p>Transportation of animals to elevated areas</p> <p>Stall feeding of animals with stored hay and concentrates</p> <p>Proper hygiene and sanitation of the animal shed</p> <p>In severe floods, un-tether or let loose the animals</p> <p>Emergency outlet establishment for required medicines or</p>	<p>Repair of animal shed</p> <p>Bring back the animals to the shed</p> <p>Cleaning and disinfection of the shed</p> <p>Bleach (0.1%) drinking water / water sources</p> <p>Deworming with broad spectrum dewormers</p>

	<p>Don't allow the animals for grazing if severe floods are forewarned</p> <p>As regularly flood prone district, arrange for storing minimum required quantity of hay (25-50kg) and concentrates (25kgs) per animals in farmer / LS keepers house / shed for feeding animals during floods</p> <p>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</p>	<p>feed in each village</p> <p>Spraying of fly repellants in animal sheds</p>	<p>Vaccination against possible disease out breaks like HS, BQ, FMD and PPR</p> <p>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</p> <p>Drying the harvested crop material and proper storage for use as fodder.</p>
Heat & Cold wave	NA		
Health and Disease management	<p>Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases</p> <p>Procure and stock emergency medicines vaccines for important endemic diseases of the area</p> <p>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</p>	<p>Carryout deworming to all animals entering into relief camps</p> <p>Identification and quarantine of sick animals</p> <p>Constitution of Rapid Action Veterinary Force</p> <p>Performing ring vaccination (8 km radius) in case of any outbreak</p> <p>Restricting movement of livestock in case of any epidemic</p> <p>Rescue of sick and injured animals and their treatment</p> <p>Organize with community daily lifting of dung from relief camps</p>	<p>Keep close surveillance on disease outbreak.</p> <p>Undertake the vaccination depending on need</p> <p>Keep the animal houses clean and spray disinfectants</p> <p>Farmers should be advised to breed their milch animals during July-September so that the peak milk production does not coincide with mid summer</p>
Insurance	Encouraging insurance of livestock	Listing out the details of the dead animals	<p>Submission for insurance claim and availing insurance benefit</p> <p>Purchase of new productive animals</p>
Drinking water	<p>Identification of water resources</p> <p>Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</p> <p>Construction of drinking water tanks in herding places/village junctions/relief camp locations</p>	Restrict wallowing of animals in water bodies/resources	<p>Bleach (0.1%) drinking water / water sources</p> <p>Provide clean drinking water</p>

3 Vaccination schedule in small ruminants (Sheep & Goat)

Disease	Season
Foot and mouth disease (FMD)	Preferably in winter / autumn
PPR	All seasons, preferably in June-July
Black quarter (BQ)	May / June
Enterotoxaemia (ET)	May
Haemorrhagic septicaemia (HS)	March / June
Sheep pox (SP)	December / march

4 Vaccination programme for cattle and buffalo:

Disease	Age and season at vaccination
Anthrax	In endemic areas only, Feb to May
HS	May to June
BQ	May to June
FMD	November to December

2.5.2 Poultry

	Suggested contingency measures		
	Before the event	During the event	After the event
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds	Supplementation to all
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the bird's requirement
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water	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 EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of house hold grain like maize, broken rice, bajra etc, Culling of weak birds	Use stored feed as supplement Don't allow for scavenging Protect from thunder storms	Routine practices are followed
Drinking water	Provide clean drinking water	Sanitation of drinking water	Sanitation of drinking water
Health and disease management	In case of EFW, add antibiotic powder in drinking water to prevent any disease outbreak	Sanitation of poultry house Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia accumulation due to dampness	Disposal of dead birds by burning / burying with lime powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Heat wave and cold wave	NA		

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	During the event	After the event
1) Drought			
A. Capture	NA		
Marine	NA		
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Stocking of advanced fingerlings in half or even less than the normal stocking density or stocking of common carp seed	Immediate harvesting or decreasing the density commensurate with the water quantity.	De weeding and deepening of tank to ensure retention of water for a longer period and provision of employment under MGNREGP
(ii) Changes in water quality	Regular monitoring of water quality parameters and application of geolites, soil probiotics, etc to maintain water quality	Immediate harvesting or changing the water quality by application of sanitisers.	Removal of top layer, deep ploughing of tank and application of lime
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Crop holiday or going for stocking of yearlings by reducing the density according to availability of water	Harvesting of fish and leaving the pond fallow till next season	Removal of top layer, deep ploughing of tank and application of lime
(ii) Impact of salt load build up in ponds / change in water quality	Stocking of salinity tolerant fish / shrimp, application of geolites and other buffers	Frequent change of water with fresh water	Frequent draining of the pond with fresh water, removal of top layers
(iii) Any other			
2) Floods			
A. Capture	NA		
Marine	NA		
Inland			
(i) Average compensation paid due to loss of human life	Shifting the people from low lying areas to relief camps	Deployment of specially trained persons for rescue operations by providing life bouys, jackets, ropes, boats, etc	Payment sufficient ex-gratia to the families
(ii) No. of boats / nets/damaged	Shifting and relocating boats and nets to safer places when warnings are	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of

	issued, to avoid fishing, etc		livelihoods
(iii) No.of houses damaged	Avoidance of construction of houses in flood prone areas, construction of pucca houses at elevated places,	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
(iv) Loss of stock	Avoidance of surface species like catla, silver carp since they are vulnerable in tanks prone to floods, erection of nets across the spill way or just beyond it	Erection of nets at spill ways	Taking up compensatory stocking
(v) Changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(vi) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Hemorrhagic septicemia. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
B. Aquaculture			
(i) Inundation with flood water	Raising and rivetting the bunds, construction of spill way to release excess water, erection of nets to avoid escape of fish	Continuous pumping of excess water, erection of nets low lying areas	Strengthening of bunds, excavating channels along the sides of the ponds for free escape of water
(ii) Water continuation and changes in water quality		When dissolved oxygen levels go down, aerators, recirculation of water, etc are to be attempted to maintain DO levels, going for partial harvest, etc	
(iii) Health and diseases	Sometimes there may be heavy accumulation of nutrients and organic matter.	There may be break out of Hemorrhagic septicemia. Addition of antibiotics like Chloro Tetra Cycline or Oxy Tetra Cycline to the feed to control the disease	Removal of weeds, top layer of soil, deep ploughing of tank and application of lime, exposing to sun light
(iv) Loss of stock and inputs (feed, chemicals etc)	Advance erection of nets, strengthening of bunds where they are	Suspension of feeding, application of organic manures	Compensatory stocking, assessment of values and payment of subsidy on inputs

	prone to breaches, harvesting or reducing the density		
(v) Infrastructure damage (pumps, aerators, huts etc)	Insuring pond, accessories, etc., Shifting of aerators, pumps soon after warnings are issued	Relocating pumps, aerators to elevated places	Assessment of damages and provision of them on subsidy
(vi) Any other			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives	Avoidance of fishing, preventing fishermen from venturing into sea, carrying of safety equipment and VHF sets, shifting fishermen from vulnerable areas to relief camps, etc	To ensure the return of fishing boats on long voyages, provision of information on such boats to coast Guard	Payment sufficient ex-gratia to the families
(ii) Avg. no. of boats / nets/damaged	Avoidance of fishing when warnings are issued, shifting of boats and nets to safe places	Shifting and relocating boats and nets to safer places	Assessment of damages to boats and nets and provision of boats and nets for restoration of livelihoods
(iii) Avg. no. of houses damaged	Avoidance of houses in Coastal Regulation Zone, designing of houses to withstand impact of turbulent wind and water	Shifting of people by relief boats to the relief camps	Assessment of damages to houses and provision of compensation in case of partial damage and sanction house under existing schemes
Inland	Erection of protective nets across the surplus weir to prevent fish loss due to overflows	Continuous monitoring to prevent or minimise escape of fish along with surplus water	Compensatory stocking of seed
B. Aquaculture			
(i) Overflow / flooding of ponds	The design of the pond must be in such a manner as to bail out surplus water and to prevent loss of standing crop	Continuous monitoring to prevent or minimise escape of fish along with surplus water	Compensatory stocking of seed
(ii) Changes in water quality (fresh water / brackish water ratio)	Recirculation water to replenish and ensure sufficient dissolved oxygen levels in the pond. Maintenance of salinity levels by pumping in water from creeks.	Continuation of the same process.	Restoration of physical and chemical parameters

(iii) Health and diseases	Removal of stress causing factors to maintain the health of the animal	Removal of stress causing factors to maintain the health of the animal	
(iv) Loss of stock and inputs (feed, chemicals etc)	Preventive nets must be erected to minimise loss of stock	Continuation of the same process.	Compensatory stocking of seed
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)	Pumps, aerators, etc must be protected by moving them to safe locations	To avoid use of aerators, pumps and other appliances	Overhauling of the equipment to prevent from being damaged
(vi) Any other			
4. Heat wave and cold wave	NA		
A. Capture			
Marine			
Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			
(iii) Any other			