

**STATE: KARNATAKA**

**AGRICULTURE CONTINGENCY PLAN FOR DISTRICT: GULBARGA**

<b>1.0 District Agriculture profile</b>				
<b>1.1</b>	<b>Agro-Climatic/Ecological Zone</b>			
	Agro Ecological Sub Region (ICAR)	Semi arid Deccan Plateau , hot arid ecosubregion (3.0)		
	Agro-Climatic Region (Planning Commission)	Southern plateau and hill region (X)		
	Agro Climatic Zone (NARP)	North Eastern Dry Zone (KA-2) North Eastern transition zone (KA-1) and North Dry Zone (KA-3)		
	List all the districts or part thereof falling under the NARP Zone	Gulbarga, Yadgir, Raichur		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		16°20" N	76°42" E	444 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Aland Road, Gulbarga - 585 201, Karnataka		
Mention the KVK located in the district	Krishi Vigyan Kendra, Aland Road, Gulbarga -585 201, Karnataka			

<b>1.2</b>	<b>Rainfall</b>	Normal RF(mm)	Normal Rainy days (number)	Normal Onset ( specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	644	-	2 <sup>nd</sup> Week of June	1 <sup>st</sup> Week of October
	NE Monsoon(Oct-Dec):	121	-	2 <sup>nd</sup> Week of October	2 <sup>nd</sup> week of November
	Winter (Jan- March)	16	-	-	-
	Summer (Apr-May)	61	-	-	-
	Annual	842	-	-	-

<b>1.3</b>	<b>Land use pattern of the district</b> (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
	<b>Area (Lakh ha)</b>	1610.2	69.1	68.0	37.6	11.8	1.8	63.2	178.0	23.0

<b>1.4</b>	<b>Major Soils (common names like shallow red soils etc.)</b>	<b>Area ('000 ha)</b>	<b>Percent (%) of total</b>
	Deep black clayey soils	390	35
	Shallow mixed black clayey and loamy soils	372	34
	Deep alluvial black calcareous clayey soils	218	20
	Very shallow alluvial loamy soils	49	4
	Others (specify):	-	

<b>1.5</b>	<b>Agricultural land use</b>	<b>Area ('000 ha)</b>	<b>Cropping intensity %</b>
	Net sown area	1156.7	123.2
	Area sown more than once	268.9	
	Gross cropped area	1425.6	

<b>1.6</b>	<b>Irrigation</b>	Area ('000 ha)		
	Net irrigated area	182.6		
	Gross irrigated area	227.0		
	Rainfed area	974.1		
	<b>Sources of Irrigation</b>	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		129.7	67.3
	Tanks		3.2	1.7
	Open wells		32.9	
	Bore wells		16.2	8.4
	Lift irrigation		1.5	
	Micro-irrigation		-	
	Other sources		6.0	3.2
	Total Irrigated Area		192.8	
	Pump sets			
	No. of Tractors			
	<b>Groundwater availability and use* (Data source: State/Central Ground water Department /Board)</b>	No. of blocks/ Tehsils	(%) area	
	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 etc. (2008-09)

1.7	Major Field Crops cultivated	Area ('000 ha)					
		<i>Kharif</i>		<i>Rabi</i>		Summer	Total
		<i>Irrigated</i>	<i>Rainfed</i>	<i>Irrigated</i>	<i>Rainfed</i>		
1	Redgram	6.4	378.8	-	-	-	385.2
2	Sorghum	0.0	7.3	6.4	171.7	0.01	179.0
3	Chickpea	-	-	5.4	115.6	-	121.5
4	Sunflower	-	47.0	-	22.3	0.5	89.0
5	Bajra	0.003	34.3	-	-	-	34.3
	<b>Horticulture crops - Fruits</b>	<b>Total area ('000 ha)</b>					
1	Mango	2.4					
2	Banana	2.1					
3	Citrus	1.6					
4	Annonaceous	0.7					
5	Grapes	0.4					
	<b>Horticultural crops - Vegetables</b>	<b>Total area ('000 ha)</b>					
1	Tomato	1.2					
2	Brinjal	1.5					
3	Onion	1.6					
4	Green chillies	1.8					
5	Leafy vegetables	0.8					
	<b>Flowers</b>	<b>Total area ('000 ha)</b>					
1	Marigold	0.2					
2	Jasmine	0.1					
3	Rose	0.1					
4	Tuberose	0.02					
5	Aster	0.01					

	<b>Spices and Plantation crops</b>	<b>Total area ('000 ha)</b>
1	Tamarind	0.5
2	Dry chilli	3.7
3	Coconut	0.5
4	Btelvine	0.1
5	Turmeric	0.7
	<b>Grazing land</b>	
	<b>Sericulture etc</b>	0.2
	<b>Others (Specify)</b>	

1.8	<b>Livestock</b>	<b>Male ('000)</b>	<b>Female ('000)</b>	<b>Total ('000)</b>
	<b>Non descriptive Cattle (local low yielding)</b>	405.5	487.3	892.9
	<b>Crossbred cattle</b>	3.3	11.0	14.4
	<b>Non descriptive Buffaloes (local low yielding)</b>	-	-	249.2
	<b>Graded Buffaloes</b>	-	-	
	<b>Goat</b>			755.6
	<b>Sheep</b>			582.1
	<b>Others (Pig + Dogs + Rabbit)</b>			40.04
	<b>Commercial dairy farms (Number)</b>			-

1.9	<b>Poultry</b>	<b>No. of farms</b>	<b>Total No. of birds (number)</b>
	Commercial	-	914868
	Backyard	-	-

<b>1.10</b>	<b>Fisheries</b> (Data source: Chief Planning Officer)						
	<b>A. Capture</b>						
	<b>i) Marine</b> (Data Source: Fisheries Department)	<b>No. of fishermen</b>	<b>Boats</b>		<b>Nets</b>		<b>Storage facilities (Ice plants etc.)</b>
			Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	
	NA						
	<b>ii) Inland</b> (Data Source: Fisheries Department)	<b>No. Farmer owned ponds</b>		<b>No. of Reservoirs</b>		<b>No. of village tanks</b>	
		5		8		316	
	<b>B. Culture</b>						
			<b>Water Spread Area (ha)</b>		<b>Yield (t/ha)</b>		<b>Production ('000 tons)</b>
	<b>i) Brackish water</b> (Data Source: MPEDA/ Fisheries Department)		-		-		-
<b>ii) Fresh water</b> (Data Source: Fisheries Department)		9.237		3.90		36	
<b>Others</b>		-		--		-	

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

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)	
<b>Major Field crops (Crops to be identified based on total acreage)</b>										
1	Redgram	164	640	-	-	-	-	164	640	----
2	Sorghum	11060	1515	184704	1037	-	-	195764	1276	
3	Chickpea		-	82	582	-	-	82	582	

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)	
4	Sunflower	17868	380	8056	362	-	-	25924	371	
5	Bajra	452	730	-	-	-	-	452	730	
	Others									
<b>Major Horticultural crops (Crops to be identified based on total acreage)</b>										
<b>Fruits</b>										
1	Mango	-	-	-	-	-	-	17.12	7.19	---
2	Banana	-	-	-	-	-	-	56.57	27.17	
3	Citrus	-	-	-	-	-	-	32.91	20.71	
4	Annonasceous	-	-	-	-	--	-	5.50	8.56	
5	Grapes	-	-	-	-	-	-	4.82	13.92	
<b>Vegetables</b>										
1	Tomato	-	-	-	-	-	-	23.16	20.21	-
2	Brinjal	-	-	-	-	-	-	37.40	22.99	
3	Onion	--	-	-	-	-	-	23.72	14.96	
4	Green chilli	-	--	-	-	-	-	13.20	7.67	
5	Leafy veg	-	-	-	-	-	-	7.45	8.90	
<b>Spices and plantation crops</b>										
1	Tamarind	-	-	-	-	-	-	2.92	3.70	--
2	Dry chilli	-	-	-	-	-	-	4.04	1.06	
3	Coconut	-	-	-	-	-	-	0.09	0.16	
4	Betel vine	-	-	-	-	-	-	1.95	20.19	
5	Turmeric	-	-	-	-	-	-	3.84	5.30	
<b>Flowers</b>										
1	Marigold	-	-	-	-	-	-	1.93	9.30	
2	Jasmine	-	-	-	-	-	-	0.59	6.07	---
3	Rose	-	-	-	-	-	-	0.15	2.04	

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)	
4	Tuberose	-	-	-	-	-	-	0.79	6.48	
5	Aster	-	-	-	-	-	-	0.08	9.10	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Redgram	Sorghum	Chickpea	Sunflower	Bajra
	Kharif- Rainfed	June I <sup>nd</sup> FN to July II <sup>nd</sup> FN	June I <sup>st</sup> FN to June II <sup>nd</sup> FN	-	August II <sup>nd</sup> FN to September II <sup>nd</sup> FN	June II <sup>nd</sup> FN to July II <sup>nd</sup> FN
	Kharif-Irrigated	-	-	-	-	-
	Rabi- Rainfed	-	Sept II <sup>nd</sup> FN to Oct 1 <sup>st</sup> FN	October 1 <sup>st</sup> FN to NOV II <sup>nd</sup> FN	I <sup>st</sup> FN to II <sup>nd</sup> FN October	-
	Rabi-Irrigated	-	-	Oct ober 1 <sup>st</sup> FN to NOV II <sup>nd</sup> FN	-	-

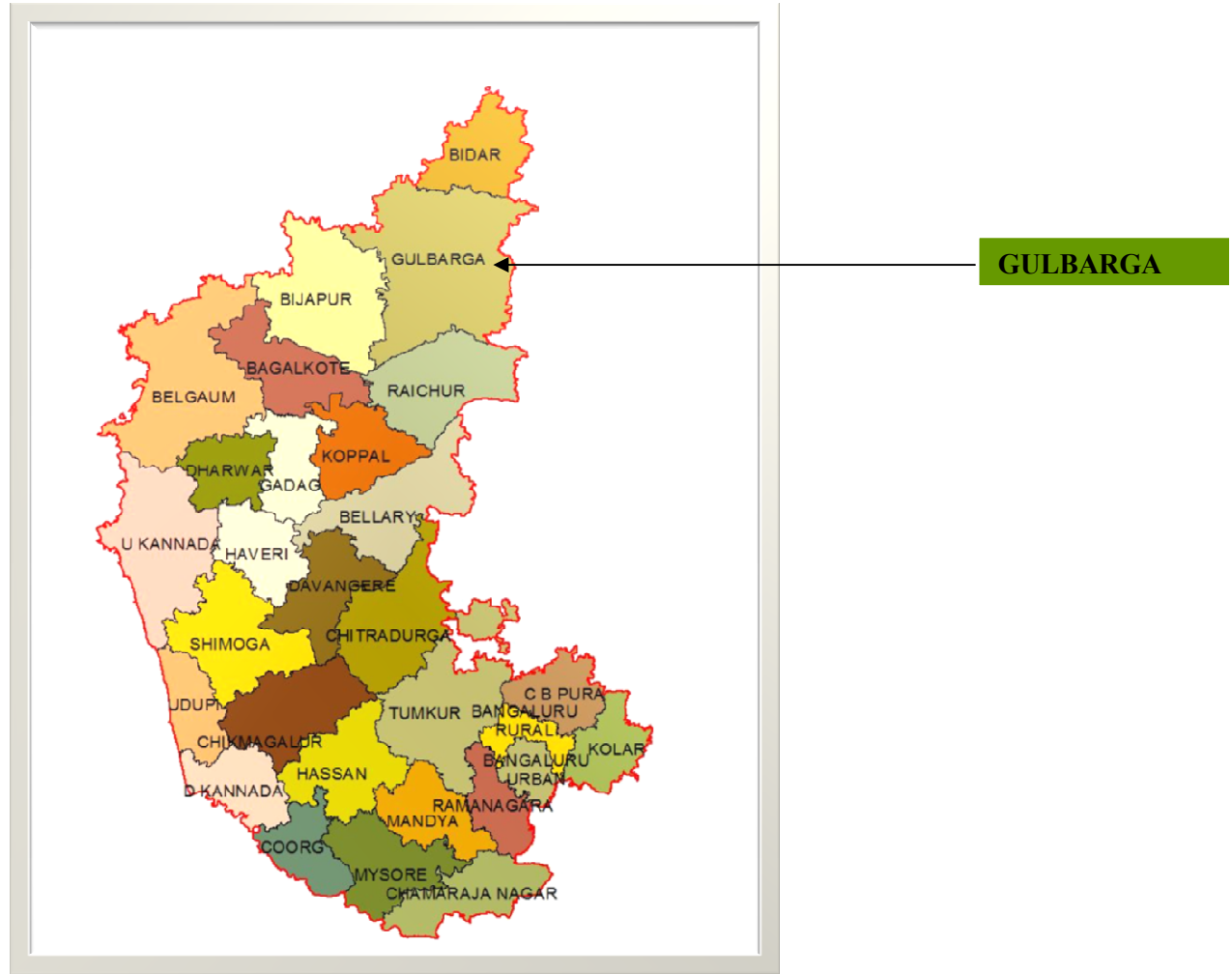
1.13	What is the major contingency the district is prone to? (Tick mark and mention years if known during the last 10 year period)	Regular	Occasional	None
	Drought	√		
	Flood	-	-	√
	Cyclone			√
	Hail storm	-	-	√
	Heat wave	-	-	√
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion		-	√
	Pests and diseases (specify)	√	-	



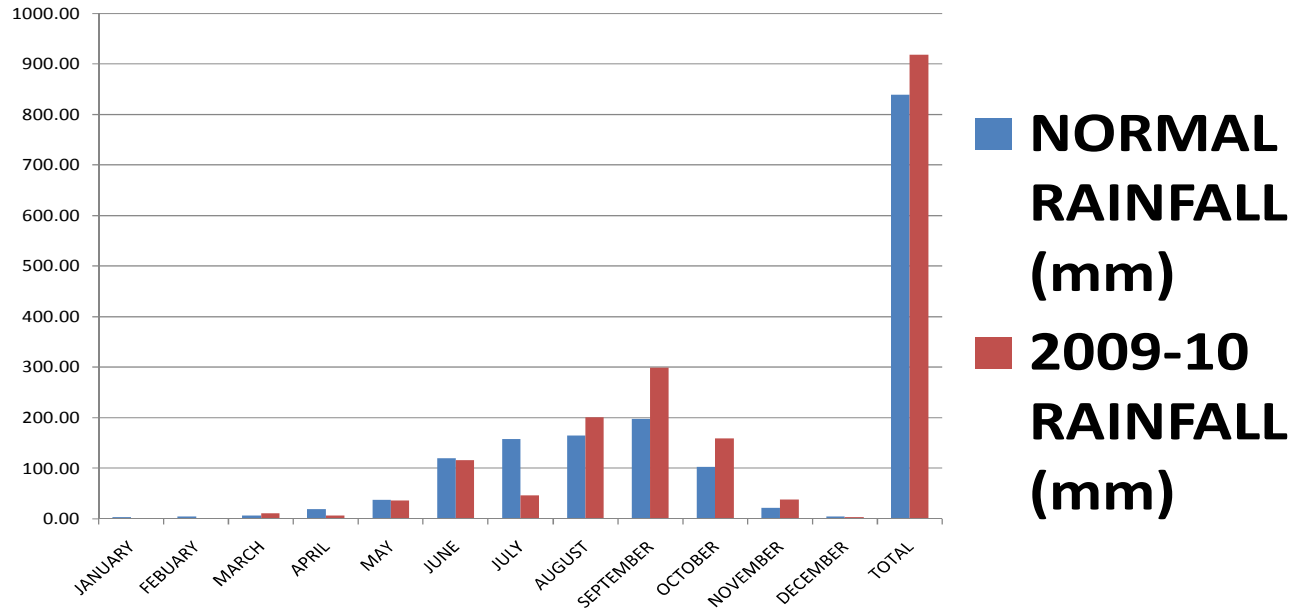
	Others	-	-	√
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<b>1.14</b>	<b>Include Digital maps of the district for</b>	Location map of district within State as Annexure I	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes

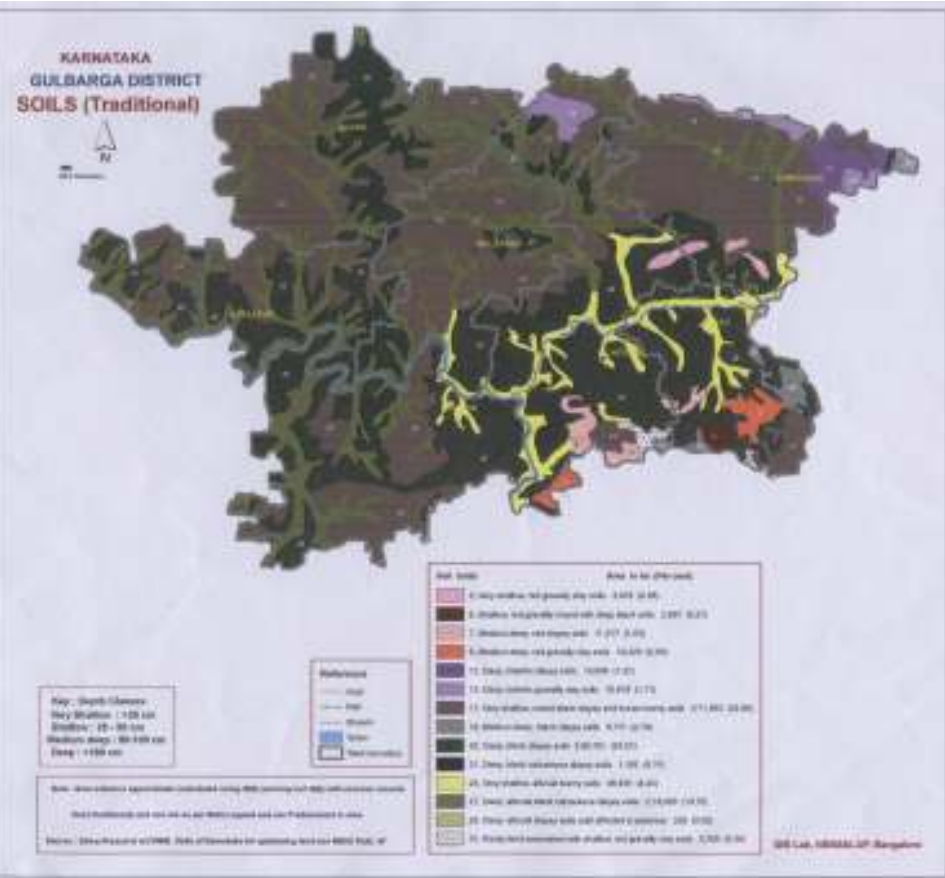
Annexure-1. Location map of Gulbarga district in state



# RAINFALL GRAPH



Annexure-2 : Average rainfall map of Gulbarga district



## 2.0 Strategies for weather related contingencies

### 2.1 Drought

#### 2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures			
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation	
<b>Early season drought (delayed onset)</b>  <b>Delay by 2 weeks (June 4<sup>th</sup> week)</b>  <b>Kharif sowing : June II fort night</b>	Medium deep black and red clay loams (kharif and rabi )	Redgram	No Change	Follow dry sowing technique in redgram-		
		Bajra				
		Sorghum				
		Sunflower				
		Redgram+greengram/blackgram/soy bean (2:4 or 1:2)				
		Bajra+redgram (2:1)				
		Sorghum+redgram (2:1)				
	Redgram + Groundnut (2:4)	Follow dry sowing technique in redgram-				
	Medium and deep black soils and red clay loam soils (kharif)	Redgram				
		Redgram+greengram/blackgram (2:4 or 1:2)				
		Bajra+redgram (2:1)				
		Sorghum+redgram (2:1)				
		Groundnut+redgram (4:2)				
		Soybean+redgram (4:2)				

Condition	Major Farming situation	Normal Crop/cropping system		Suggested Contingency measures		Remarks on Implementation
		Change in crop/cropping system		Agronomic measures		
Early season drought (delayed onset)	Medium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	
		Greengram	Chickpea	No change	No change	
		Blackgram	Chickpea			
		Soybean	R. Jowar			
		Sunflower	Chickpea			
		Green manuring crops	Rabi crops			
	Shallow black soils and red sandy soils (kharif)	Bajra		No change		
		Sorghum				
		Sunflower				
		Redgram + Ground nut (2:4)				
		Bajra+redgram (2:1)				
		Sorghum+redgram (2:1)				
		Setaria+redgram (2:1)				
Delay by 4 weeks (July 2 week)  Kharif sowing : July I FN	Medium deep black and red clay loams (kharif and rabi )	Redgram		No change		In redgram use 20% extra seeds, avoid long duration varieties, follow dry sowing techniques, or transplant 25-30 days old raised seedlings .
		Bajra				
		Sorghum				
		Sunflower				
		Redgram + ground nut (2:4)				
		Redgram+greengram/blackgram/soy bean(2:4 or 1:2)				
		Bajra+redgram (2:1)				
Sorghum+redgram (2:1)						

Condition			Suggested Contingency measures				
Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system		Agonomic measures	Remarks on Implementation	
	Medium and deep black soils and red clay loam soils (kharif)	Redgram			In redgram use 20% extra seeds, avoid long duration varieties, follow dry sowing techniques, or transplant 25-30 days old raised seedlings		
		Redgram+greengram/blackgram (2:4 or 1:2)					
		Bajra+redgram (2:1)					
		Sorghum+redgram (2:1)					
		Groundnut+redgram (4:2)					
		Soybean+redgram (4:2)					
	Medium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>		Compartmental bunding in kharif fallow areas
		-	Chickpea	Fallow	No change		
		-	Chickpea				
		-	Rabi Jowar				
		Sunflower	Chickpea				
	Green manuring crops	Rabi crops					
	Shallow black soils and red sandy soils (kharif)	Groundnut (bunch)	Ground nut (Spreading)-		Adopt wider row spacing for sunflower		
		Groundnut (spreading)	No change				
		Bajra	Bajra/Setaria+ Redgram				
Sorghum							
Sunflower		No change					
Soybean		Foxtail millet					
Castor		No change					
Ground nut + Redgram(4:2)							
Bajra+redgram (2:1)							
Sorghum+redgram (2:1)							
Setaria+redgram (2:1)							

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
<b>Delay by 6 weeks (July 4 week)</b>  <b>Kharif sowing : July II FN</b>	Medium deep black and red clay loams (kharif and rabi )	Redgram	No change	<ul style="list-style-type: none"> <li>Follow dry sowing practice in regram with ridges and furrows at 90 cm apart</li> <li>Use 25% higher seed rate in redgram with 90 x 20 cm spacing.</li> <li>Transplant the 25-30 days old redgram seedlings of BSMR – 736 variety.</li> <li>Grow medium and long duration varieties.</li> <li>Treat the seeds of redgram and bajra with 2% CaCl<sub>2</sub></li> </ul>	-
		Blackgram	Redgram/Bajra/sunflower/groundnut(spreading)		
		Greengram			
		Bajra	No change		
		Sorghum	Redgram/Bajra/sunflower/groundnut(spreading)		
		Soybean			
		Sunflower			
		Redgram + groundnut (2:4)			
		Groundnut (bunch)	Groundnut(spreading)-		
		Redgram+greengram/blackgram/soybean(2:4 or 1:2)	Redgram/Bajra/sunflower/groundnut(spreading)		
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
		Medium and deep black soils.and red clay loam soils (kharif)	Redgram		
	Redgram+greengram/blackgram (2:4 or 1:2)		Redgram +Sunflower-		
	Bajra+redgram (2:1)				
	Sorghum+redgram (2:1)				
	Groundnut+redgram (4:2)				
	Soybean+redgram (4:2)				



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
	Meium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Follow in situ moisture conservation practices like Compartment bunds, tied ridges & furrows to conserve rain water for regular sowing of rabi crops	
		-	Chickpea	Fallow	No change		
		-	Chickpea				
		-	R. Jowar				
		Sunflower	Chickpea				
		Green manuring crops	Rabi crops				
	Shallow black soils and red sandy soils (kharif)	Bajra	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram		Sow Sunflower at wider spacing at 90 x 20 cm		
			No change				
			No change				
		Sorghum	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram				
		Sunflower	No change				
		Redgram + groundnut(2:4)	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram				
		Bajra+redgram (2:1)	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram				
		Sorghum+redgram (2:1)	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram				
	Setaria+redgram (2:1)	Groundnut(Spreading)/Sunflower/Castor/Setaria/Horsegram					

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
<b>Early season drought (delayed onset)</b>  <b>Delay by 8 weeks (Aug 2 week)</b>  <b>Kharif sowing : July II FN</b>	Medium deep black and red clay loams (kharif and rabi )	Redgram	Sunflower/Horsegram/ Navane	Sow Sunflower at wider spacing at 90 x 20 cm	
		Bajra			
Sorghum					
Sunflower					
Redgram + ground nut (2:4)					
Groundnut (bunch)					
Redgram+greengram/blackgram/soybean(2:4 or 1:2)					
Bajra+redgram (2:1)					
Sorghum+redgram (2:1)					
Medium and deep black soils and red clay loam soils (kharif)	Redgram	Sunflower/Fodder crops			
	Redgram+greengram/blackgram (2:4 or 1:2)				
	Bajra+redgram (2:1)				
	Sorghum+redgram (2:1)				
	Groundnut+redgram (4:2)				
	Soybean+redgram (4:2)				

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures			
			Change in crop/cropping system		Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)			<i>Kharif</i>	<i>Rabi</i>		
	Medium to deep black soils (rabi)					Keep the land fallow in Kharif by treating with compartment bunds and furrows for in situ moisture conservation
		-	Chickpea	Fallow	No change	
		-	Chickpea			
		-	R. Jowar			
		Sunflower	Chickpea	Fallow	No change	
		Green manuring crops	Rabi crops	Fallow	No change	
	Shallow black soils and red sandy soils (kharif)	Bajra	Sunflower/Castor/Setaria/ Niger/Horse gram			
		Sorghum				
		Sunflower				
		Redgram + Groundnut(2:4)				
		Bajra+redgram (2:1)				
		Sorghum+redgram (2:1)				
		Setaria+redgram (2:1)				

Condition			Suggested Contingency measures		
Early season drought (Normal onset)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/crop stand etc.	Medium deep black and red clay loams (kharif and rabi )	Redgram	<ul style="list-style-type: none"> <li>• Thinning, intercultivation and gap filling</li> <li>• Take up 2% urea spray to rejuvenate vegetative growth soon after receipt of rains in Groundnut</li> <li>• Resow the crop within 15 days when population is less than 30 %</li> </ul>	Opening of furrows to conserve rainwater at a distance of 15-20m	
		Bajra			
		Sorghum			
		Sunflower			
		Redgram ground nut(2:4)			
		Groundnut (bunch)			
		Redgram+greengram/blackgram/soybean (2:4 or 1:2)			
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
	Medium and deep black soils and red clay loam soils (kharif)	Redgram	<ul style="list-style-type: none"> <li>• Thinning, intercultivation and gap filling</li> <li>• Take up 2% urea spray to rejuvenate vegetative growth soon after receipt of rains in Groundnut</li> <li>• 3. Resow the crop within 15 days when population is less than 30 %</li> </ul>	Opening of furrows to conserve rainwater at a distance of 15-20m	
		Redgram+greengram/blackgram (2:4 or 1:2)			
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
		Groundnut+redgram (4:2)			
Soybean+redgram (4:2)					

Condition	Major Farming situation	Normal Crop/cropping system		Suggested Contingency measures		Remarks on Implementation
		<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	
Early season drought (Normal onset)	Meium to deep black soils (rabi)		Chickpea	No change		Compartment bunding
			Chickpea			
			R. Jowar			
		Sunflower	Chickpea			
		Green manuring crops	Rabi crops			
	Shallow black soils and red sandy soils (kharif)			1. Thinning, intercultivation and gap filling . 2. Take up 2% urea spray to rejuvenate vegetative growth soon after receipt of rains in Groundnut 3. Resow the crop within 15 days when population is less than 30 %		Opening of furrows to conserve rainwater at a distance of 15-20m
		Bajra				
		Sorghum				
		Sunflower				
		Redgram + Groundnut(2:4)				
		Bajra+redgram (2:1)				
		Setaria+redgram (2:1)				

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)	Major Farming situation	Normal Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
At vegetative stage	Medium deep black and red clay loams (kharif and rabi )	Redgram	<ul style="list-style-type: none"> <li>• Thinning/ removal of alternate rows or plants within in sorghum and bajra rows at 30-45 DAS.</li> <li>• Grazing leaf tips in bajra</li> <li>• Apply gypsum to groundnut after receipt of rains(before 45 days)</li> <li>• Repeated inter cultivation and weeding</li> <li>• Removal of weaklings in Sorghum/Bajra</li> </ul>	<ul style="list-style-type: none"> <li>• Spraying of 5% kaolin (Antitransparent)</li> <li>• Provide supplemental irrigation</li> </ul>	
		Bajra			
		Sorghum			
		Sunflower			
		Redgram+greengram/blackgram/soybean (2:4 or 1:2)			
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
	Medium and deep black soils.and red clay loam soils (kharif)	Redgram			
		Redgram+greengram/blackgram (2:4 or 1:2)			
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
		Groundnut+redgram (4:2)			
		Soybean+redgram (4:2)			

Condition			Suggested Contingency measures			
<b>Mid season drought (long dry spell, consecutive 2 weeks rainless (&gt;2.5 mm) period)</b>	<b>Major Farming situation</b>	<b>Normal Crop/cropping system</b>		<b>Crop management</b>	<b>Soil nutrient &amp; moisture conservation measures</b>	<b>Remarks on Implementation</b>
	Medium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>	Compartment bunding
			Chickpea	No change		
			Chickpea			
			R. Jowar			
		Sunflower	Chickpea			
	Green manuring crops	Rabi crops				
	Shallow black soils and red sandy soils (kharif)	Bajra		<ul style="list-style-type: none"> <li>• Removal/thinning of alternate rows.</li> <li>• Repeated intercultivation &amp; weeding</li> <li>• Grazing Leaf tips in bajra</li> <li>• Removal of weaklings in sorghum/bajra</li> </ul>	<ul style="list-style-type: none"> <li>• Spraying of anitranspirants like kaolin @ 5%</li> <li>• provide protective irrigation</li> </ul>	
		Sorghum				
		Sunflower				
		Bajra+redgram (2:1)				
		Sorghum+redgram (2:1)				
	Setaria+redgram (2:1)					

Condition	Major Farming situation	Normal 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	Medium deep black and red clay loams (kharif and rabi )	Redgram	<ul style="list-style-type: none"> <li>• Life saving irrigation</li> <li>• Harvest bajra for fodder and allow for rationing.</li> <li>• Stripping of lower old and non functional leaves at late vegetative and flowering stage in sorghum and bajra</li> <li>• Repeated intercultivation and weeding</li> <li>• Incorporate greengram and pulses into soil as green manure</li> </ul>	<ul style="list-style-type: none"> <li>• Intercultivation</li> <li>• Conservation furrow</li> <li>• Foliar spray of urea (2% ) or 0.2 % Feso4 on groundnut after receipt of fresh showers</li> <li>• Provide supplemental irrigation.</li> </ul>	
		Bajra			
		Sorghum			
		Sunflower			
		Redgram +Groundnut(2:4)			
		Groundnut (bunch)			
		Redgram+greengram/blackgram/soybean (2:4 or 1:2)			
		Bajra+redgram (2:1)			
	Sorghum+redgram (2:1)				
	Medium and deep black soils and red clay loam soils (kharif)	Redgram			
		Redgram+greengram/blackgram (2:4 or 1:2)			
		Bajra+redgram (2:1)			
		Sorghum+redgram (2:1)			
		Groundnut+redgram (4:2)			
Soybean+redgram (4:2)					



Condition	Major Farming situation	Suggested Contingency measures					
		Normal Crop/cropping system		Crop management		Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell)	Medium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>		
			Chickpea	No change			
			Chickpea				
			R. Jowar				
		Sunflower	Chickpea				
		Green manuring crops	Rabi crops				
	Shallow black soils and red sandy soils (kharif)	Bajra		<ul style="list-style-type: none"> <li>• Life saving irrigation</li> <li>• Harvest bajra for fodder and allow for rationing.</li> <li>• Stripping of lower old and non functional leaves at late vegetative and flowering stage in sorghum and bajra</li> <li>• Repeated intercultivation and weeding</li> <li>• Incorporate greengram and pulses into soil as green manure</li> </ul>		<ul style="list-style-type: none"> <li>• Intercultivation</li> <li>• Conservation furrow.</li> <li>• Foliar spray of urea (2% ) or 0.2 % Feso4 on groundnut after receipt of fresh showers</li> <li>• Provide supplemental irrigation.</li> </ul>	
		Sorghum					
		Sunflower					
		Redgram + groundnut(2;4)					
		Bajra+redgram (2:1)					
		Sorghum+redgram (2:1)					
		Setaria+redgram (2:1)					

Condition			Suggested Contingency measures				
Terminal drought	Major farming situation	Normal Crop/cropping system		Crop management	Rabi Crop planning	Remarks on Implementation	
	Medium deep black and red clay loams (kharif and rabi )	Redgram		<ul style="list-style-type: none"> <li>• Life saving irrigation</li> <li>• Pigeonpea and greengram can be harvested for vegetable purpose</li> <li>• Harvest at physiological maturity</li> <li>• Close soil cracks by repeated intercultivation</li> </ul>	---		
		Bajra					
		Sorghum					
		Sunflower					
		Redgram + groundnut(2:4)					
		Groundnut (bunch)					
		Redgram+greengram/blackgram/soybean (2:4 or 1:2)					
		Bajra+redgram (2:1)					
		Sorghum+redgram (2:1)					
	Medium and deep black soils.and red clay loam soils (kharif)	Redgram		No change	---		
		Redgram+greengram/blackgram (2:4 or 1:2)					
		Bajra+redgram (2:1)					
		Sorghum+redgram (2:1)					
		Groundnut+redgram (4:2)					
	Soybean+redgram (4:2)						
	Medium to deep black soils (rabi)	<i>Kharif</i>	<i>Rabi</i>	<i>Kharif</i>	<i>Rabi</i>		Compartment bunding
			Chickpea				
			Chickpea				
			R. Jowar				
		Sunflower	Chickpea				
		Green manuring crops	Rabi crops				
Shallow black soils and red sandy soils (kharif)	Bajra		<ul style="list-style-type: none"> <li>• Life saving irrigation</li> <li>• Harvest at physiological maturity</li> <li>• Close soil cracks by repeated intercultivation</li> </ul>	----			
	Sorghum						
	Sunflower						
	Redgram + groundnut(2:4)						
	Bajra+redgram (2:1)						
	Sorghum+redgram (2:1)						
	Setaria+redgram (2:1)						

## 2.1.2 Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Irrigated Medium Black soils Lower Mulla mari/ Bennetora/ Chandarpalli Projects)	Not applicable			
		Redgram	No change	Soil Moisture Conservation Ridges Furrow Method to be adopted  Go in for protective Irrigation	
		Cotton	Redgram		
		Sunflower	Redgram		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Limited release of water in canals due to low rainfall	Irrigated Medium Black soils Lower Mulla mari/ Bennetora/ Chandarpalli Projects)	Not applicable			
		Redgram	No change	Soil Moisture Conservation Ridges Furrow Method to be adopted  Go in for protective Irrigation	
		Cotton	Redgram		
		Sunflower	Redgram		

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	--	Not applicable			
	Irrigated Medium Black soils Lower Mulla mari/ Bennetora/ Chandarpalli Projects)	Redgram	No change	Soil Moisture Conservation Ridges Furrow Method to be adopted	
		Cotton	Redgram		
		Sunflower	Redgram		

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	Irrigated Medium Black soils	Redgram	No change	Soil Moisture Conservation Ridges Furrow Method to be adopted  Go in for protective Irrigation	
		Cotton	Redgram		
		Sunflower	Redgram		

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	Irrigated Medium Black soils	Redgram	No change	Soil Moisture Conservation Ridges Furrow Method to be adopted  Go in for protective Irrigation	
		Cotton	Redgram		
		Sunflower	Redgram		
Any other condition (specify)					

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
<b>Continuous high rainfall in a short span leading to water logging</b>				
Redgram	Drain out excess water, and top dressing with urea	Drain out excess water Spraying with NAA	Drain out excess water, Harvesting and drying of plants	Proper drying and storage of grains
Sorghum				
Chickpea				
Sunflower				
Bajra				

<b>Horticulture</b>				
Onion	Drainage Spray of urea	Drainage, Spraying NAA with liquid NPK	Drainage	Proper drying and storage of tubes
Brinjal	Drainage Nutrient management	Drainage, Spraying NAA with liquid NPK	Drainage	
Bhendi	Drainage Nutrient management	Drainage, Spraying NAA with liquid NPK	Drainage	
Cauliflower	Drainage Nutrient management	Drainage, Spraying NAA with liquid NPK	Drainage	
Tomato	Drainage Nutrient management Pest and Disease management	Drainage, Spraying NAA with liquid NPK	Drainage	
chilli	Drainage Nutrient management Pest management	1 Drainage, Spraying NAA with liquid NPK 2.Spray of planofix	Drainage,value addition	Proper drying and storage of tubes
Mango	Drainage	Management of diseases(PM) Drainage, Spraying NAA with liquid NPK	Drainage	
Banana	Drainage and stacking the plant	Drainage, Spraying NAA with liquid NPK	Harvest the bunch	Proper storage
Citrus	Drainage	Drainage, Spraying NAA with liquid NPK	Drainage	-
Grape	Drainage Disease management	Drainage, Spraying NAA with liquid NPK	<b>-do</b>	-
Cauliflower	Drainage and Pest management	Drainage, Spraying NAA with liquid NPK	<b>-do-</b>	-

<b>Heavy rainfall with high speed winds in a short span</b>				
Onion	Drain out excess water, Weeding and top dressing with urea	Drain out excess water Spraying with NAA	Drain out excess water, Harvesting and drying of plants	Proper drying and storage of grains
Brinjal	Drainage and Nutruent management	Drainage Tying of fallen plants	Uprooting and sowing of other crops	
Bhendi	-do-	Drainage and Nutruent management	Drainage and Nutruent management	
Cauliflower	Drainage and Nutruent management	Uprooting and sowing of other crops	Uprooting and sowing of other crops	
Tomato	Uprooting and resowing	Uprooting and sowing of other crops	-	
<b>Horticulture</b>				
Mango	Nutrient management	Nutrient management	Control of hopper and powdery mildew	
Banana	Drainage and stacking the plant	Nutrient management	Harvest the bunch	Proper storage
Citrus	Nutrient management	Nutrient management	-	
Grape	Drainage	Nutrient management	-	
Cabbage	Nutrient management	Nutrient management Harrowing and sowing of short duration crops (if more damage)	Harrowing and sowing of short duration crops (if more damage)	
Green chilli	Nutrient management Harrowing and sowing of short duration crops (If more damage)	Nutrient management Harrowing and sowing of short duration crops (if more damage)	Harrowing and sowing of short duration crops (if more damage)	

<b>Outbreak of pests and diseases due to unseasonal rains</b>	Need based plant protection IPM and IDM	Need based plant protection		Safe storage against storage pest and diseases
Redgram	Blight	Pod borer; Sterility mosaic	Pod borer	-
Sorghum	---	Rust	Grain mold	-
Chickpea	Wilt	Pod borer	Pod borer	-
Sunflower	Bihar hairy caterpillar and Necrosis disease	Earhead borer	-	-
Bajra	-	Ergot	-	-
<b>Horticulture</b>				
Mango	Leaf spot disease management	PM disease and jassid management	PM disease and jassid management	
Banana	Panama disease management	Rhizom weevil management	Bunchy top of banana disease management	
Citrus	Citrus cancar management	Citrus cancar management	Citrus cancar management	
Grape	PM and DM management	PM and DM management	PM and DM management	
Cabbage	Pest and disease management	Pest and disease management	-	
chilli	Pest and disease management	Pest and disease management	Pest and disease management	



### 2.3 Floods

Condition	Suggested contingency measure			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation <sup>1</sup>				
Red gram	Drain out excess water Resowing / Gap filling	Drain out excess water	Drain out excess water	Drain out excess water
Sorghum				
Chickpea				
Sunflower				
Bajra				

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

Extreme event type	Suggested contingency measure <sup>r</sup>			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave <sup>p</sup>	NA			
Cold wave <sup>q</sup>				
Frost				
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
<b>Drought</b>			
Feed and Fodder availability	<ul style="list-style-type: none"> <li>All the available crop residues especially maize stover, paddy straw, sorghum /Bajra stover and groundnut haulms should be stored properly in the farm of hay.</li> </ul>	<ul style="list-style-type: none"> <li>Harvest and use all the failed crop (Paddy, Sorghum, Maize, Bajra, Groundnut, Green gram, Soybean) material as fodder.</li> <li>Harvest all the top fodder available (Neem, Subabul, Acasia, Pipol etc) and feed the LS during drought</li> </ul>	<ul style="list-style-type: none"> <li>Flushing the stock to recoup</li> <li>Replenish the feed and fodder banks</li> <li>Encourage progressive farmers to grow multi cut fodder crops of</li> </ul>
<b>Cyclone</b>	NA		
<b>Floods</b>	NA		
<b>Heat &amp; Cold wave</b>	NA		
<b>Health and Disease management</b>	<ul style="list-style-type: none"> <li>Procure and stock emergency medicines and vaccines for important endemic diseases of the area</li> <li>All the stock must be immunized for endemic diseases of the area</li> <li>Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district</li> </ul>	<ul style="list-style-type: none"> <li>Carryout deworming to all animals entering into relief camps</li> <li>Identification and quarantine of sick animals</li> <li>Constitution of Rapid Action Veterinary Force</li> <li>Performing ring vaccination (8 km radius) in case of any outbreak</li> <li>Restricting movement of livestock in case of any epidemic</li> <li>Rescue of sick and injured animals and their treatment</li> <li>Organize with community, daily lifting of dung from relief camps</li> </ul>	<ul style="list-style-type: none"> <li>Keep close surveillance on disease outbreak.</li> <li>Undertake the vaccination depending on need</li> <li>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</li> </ul>
<b>Insurance</b>	<ul style="list-style-type: none"> <li>Encouraging insurance of livestock</li> </ul>	<ul style="list-style-type: none"> <li>Listing out the details of the dead animals</li> </ul>	<ul style="list-style-type: none"> <li>Submission for insurance claim and availing insurance benefit</li> <li>Purchase of new productive animals</li> </ul>

<b>Drinking water</b>	<ul style="list-style-type: none"> <li>• Identification of water resources</li> <li>• Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals)</li> <li>• Construction of drinking water tanks in herding places/village junctions/relief camp locations</li> </ul>	<ul style="list-style-type: none"> <li>• Restrict wallowing of animals in water bodies/resources</li> </ul>	<ul style="list-style-type: none"> <li>• Bleach (0.1%) drinking water / water sources</li> <li>• Provide clean drinking water</li> </ul>
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#### 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

#### 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 <sup>a</sup>	During the event	After the event
<b>Drought</b>			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc,	Supplementation only for productive birds with house hold grain	Supplementation to all
Drinking water	Rain water harvesting	Sanitation of drinking water	Give sufficient water as per the
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
<b>Floods</b>	NA		
<b>Cyclone</b>	NA		
<b>Heat wave and cold wave</b>	NA		

<sup>a</sup> based on forewarning wherever available