State: KARNATAKA

Agriculture Contingency Plan for District: BIJAPUR

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau, hot semi arid ecosub region (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: Bijapur, Bagalkot, Gadag, Bellary, Koppal Part of District: Belgaum, Dharwad, Raichur, Davanagere		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		16º 49' N	75º 43' E	593 .0 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Agricultural Research Station, P. B.No. 18 BIJAPUR - 586 101		
	Mention the KVK located in the district	Krishi Vigyan Kendra, Bijapur		
1.2	**Rainfall**	**Average (mm)**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep):	387.5	2 nd week of June	
	NE Monsoon (Oct-Dec):	130.0		4 th week of October to 4 th week of November
	Winter (Jan- Feb)	6.8	-	-
	Summer (Mar-May)	56.1	-	-

	Annual	594.4	-	-

1.3	Land use pattern of the district	Geographical area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable Land	Current fallows	Other fallows
	Area ('000 ha)	1053.5	2.0	35.8	9.6	5.5	1.3	29.1	85.3	5.7

1. 4	Major Soils	Area ('000 ha)	Percent (%) of total
	Medium black soils	401.3	40
	Shallow black soils	262.5	26
	Deep black soils	234.2	23
	Red loamy soils	48.1	5
	Red sandy soils	20.2	2
	Red and black mixed soils	33.4	3
1.5	**Agricultural land use**	**Area ('000 ha)**	**Cropping intensity %**
	Net sown area	872.5	122.1
	Area sown more than once	192.7	
	Gross cropped area	1065.3	

1.6	**Irrigation**	**Area ('000 ha)**	**Per cent (%)**	
	Net irrigated area	237.4	27	
	Gross irrigated area	294.0		
	Rainfed area	635.2		
	Sources of Irrigation	**Number**	**Area ('000 ha)**	**% area**
	Canals	NA	72.6	26.1
	Tanks	NA	4.1	1.5
	Open wells	NA	56.0	24
	Bore wells	NA	75.2	27.0
	Lift irrigation	NA	-	-
	Microirrigation			
	Other sources	NA	19.213	6.9
	Total irrigated area		278.2	100.0
	Pumpsets	NA		
	No. of Tractors	NA		
	Groundwater availability and use	**No. of blocks**	**% area**	**Quality of water**
	Over exploited	-	41	Except at localized patches and all along Don River in Bijapur district, the groundwater quality is under Excellent, good and permissible classes.
	Critical	-	13	
	Semi- critical	-	23	
	Safe	-	23	
	Wastewater availability and use	-		

*NA=Not available

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

1.7	Major Field Crops cultivated	Area ('000 ha)*					
		Kharif		Rabi		Summer	Total
		Irrigated	Rainfed	Irrigated	Rainfed		
	Sunflower	-	109.4	-	109.2	3.4	222.1
	Sorghum	-	-	-	216.9	-	216.9
	Pigeonpea	-	127.0	-	-	-	127.0
	Pearlmillet	-	93.3	-	-	-	93.3
	Maize	24.0	-	6.4	-	1.1	31.6
	Chickpea	-	-	-	158.3	-	158.3

	S. No	Horticulture Fruits Crops	*Total Area (2008-09) ('000 ha)*	*Irrigated*	*Rainfed*
	1.	Grape (Variety: Thompson Seedless, Sonaka).	6.0	100 % area is irrigated through underground water by dripirrigation	-
	2.	Citrus (Acid lime; Kagazi lime)	3.0	Do	-
	3.	Pomegranate (Variety: Ganesh, Kesar, Arakta)	1.1	Do	-
	4.	Banana (Variety: Rajapuri, Grand naine, dwarf Cavendish)	0.6	Do	-
	5.	Mango (Variety: Baneshan, Totapuri, Alphonso)	0.2	0.06 (with protective irrigation)	0.23 (with water conservation methods)

	S .No	Horticulture Crops – Vegetables	Total Area (2008-09)	Irrigated	Rainfed
	1.	Onion (Variety: Telagi red, Arka Kalyan)	9.983	6.988 (70 %)	2.995 (30%)
	2.	Tomato (Hybrids from private companies)	1.729	1.550 (90 %)	0.229 (10 %)
	3.	Green Chillies (Variety: G-3 and hybrids from private companies)	1.229	100 % area is under irrigation	-
	4.	Brinjal (Variety: Kalpataru)	0.709	Do	-
	5.	5. Okra (Variety: Arka anamika)	0.459	Do	-
	S. No	**Medicinal and Aromatic crops**	**Total Area (2008-09)**	**Irrigated**	**Rainfed**
	1	Coleus forkslli	0.001	*100 % area is under irrigatio*	
	2	Others	0.070	-	
	S. No	**Spices and Plantation crops**	**Total Area (2008-09)**	**Irrigated**	**Rainfed**
		Dry Chillies (Variety: Pusa Jwala)	0.972.	100 % area under irrigation	-
		Coriander (Variety: DWD -3 and local cultivars)	0.731	0.150	0.581
		Garlic (Variety: Rajahalli gadde)	0.643	100 % area under irrigation	
		Coconut (Arasikere tall)	0.342	100 % area under irrigation	
		Tamarind (DTS-1, Pratisthan and local cultivars)	0.303		100 % area under rainfe condition
	S. No	**Flowers**	**Total Area (2008-09)**	**Irrigated**	**Rainfed**
	1.	Marigold (Variety: Tall)	0.224	0.124	0.100
	2.	Chrysanthemum (Variety: Raja, Kurnool)	0.089	100 % area under irrigation	
	3.	Jasmine (Variety: J. sambac , J. grandifloram)	0.088	0.050	0.038 (with protectiv irrigation

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	148.8	129.5	278.4
	Crossbred cattle	182	1.0	1.2
	Non descriptive Buffaloes (local low yielding)	23.2	168.2	191.4
	Graded Buffaloes			
	Goat			452.3
	Sheep			335.9
	Others (Pig + Dogs + Rabbit)			28.46
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds (number)**	
	Commercial		346372	
	Backyard			

1.10	**Fisheries** (Data source: Chief Planning Officer)					
	A. Capture -NA					
	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**	
		6	2		2	
	B. Culture					
		Water Spread Area (ha)	**Yield (t/ha)**		**Production ('000 tons)**	

	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	NA		
	ii) **Fresh water** (Data Source: Fisheries Department)	5.7	0.65	3.70
	Others			

1.11 Production and Productivity of major crops (Average of last 3 years i.e. 2006, 07, 08)

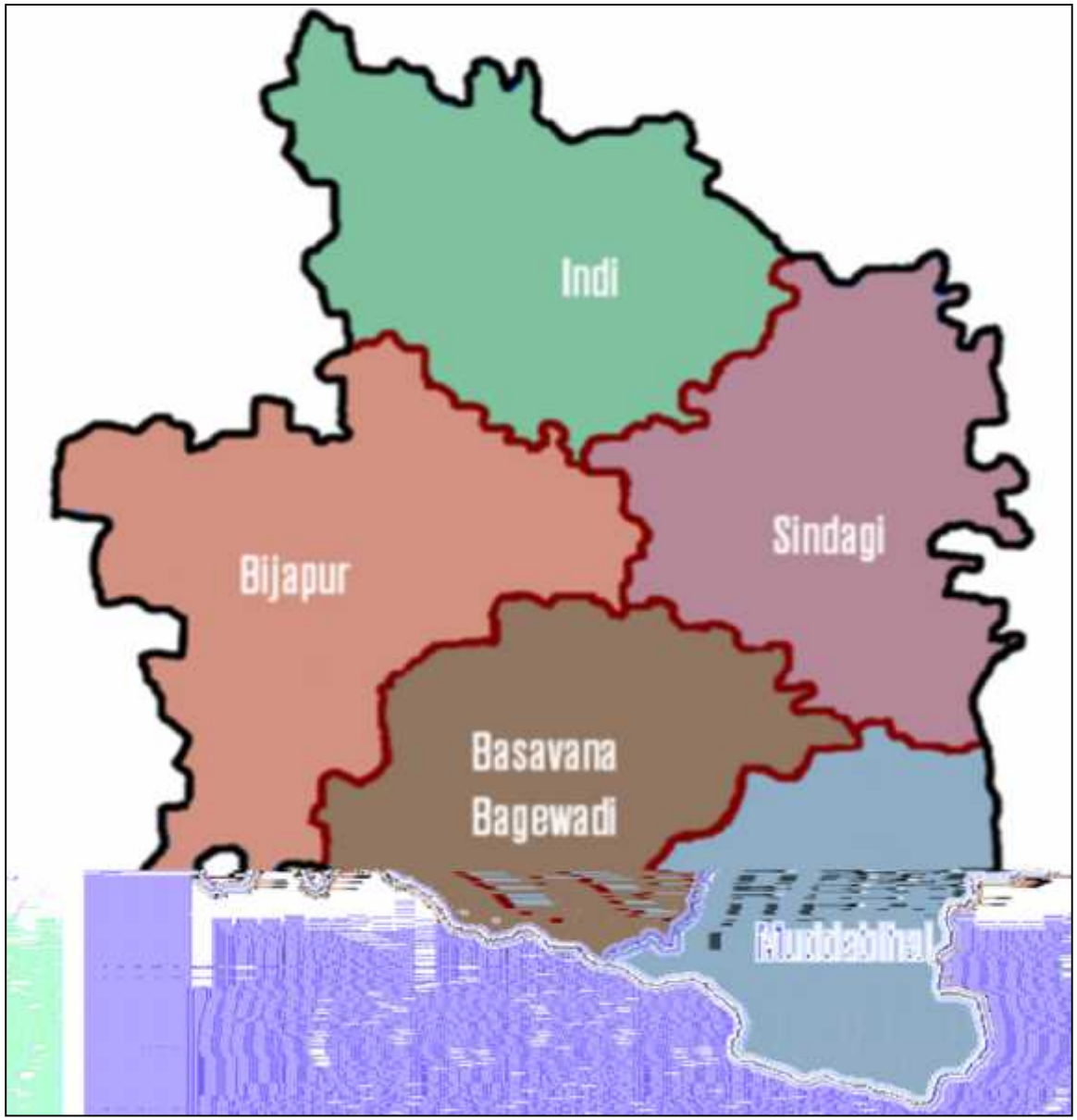
1.11	**Production and Productivity of major crops**	**Kharif**		**Rabi**		**Summer**		**Total**	
		Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)	Production ('000 t)	Productivity (kg/ha)
	Sunflower	7.1	400	8.2	200	0.4	700 .	15.8	266
	Pearlmillet	-	-	11.9	600	-	-	11.9	600
	Pigeonpea	9.6	201	-	-	-	-	9.6	201
	Maize	25.9	2600	4.9	2750	1.1	2550	31.9	2623
	Rabi Sorghum	-	-	37.8	700	-	-	37.8	700
	Chickpea	-	-	21.1	650	-	-	21.1	650

1.12	**Sowing window for 5 major crops (start & end of sowing period)**	Sunflower	Pearl millet	Pigeonpea	Maize	Sorghum	Chickpea
	Kharif- Rainfed	1 st week of June to 3rd week of August	1 st week of June to 2 nd week of July	1 st week of June to 4th week of July	1 st week of June to 4th week of July	-	-
	Kharif-Irrigated	-	-	-	1 st week of June to 4th week of July	-	-
	Rabi- Rainfed	1 st week to 4th week of September	-	-		2nd week of September to 2 nd week of October	1 st week of October to – 4th week of November
	Rabi-Irrigated	1 st week of December to 4 th week of January	-	-	1 st week of January to 4th week of February	-	1 st week of October to – 4th week of November

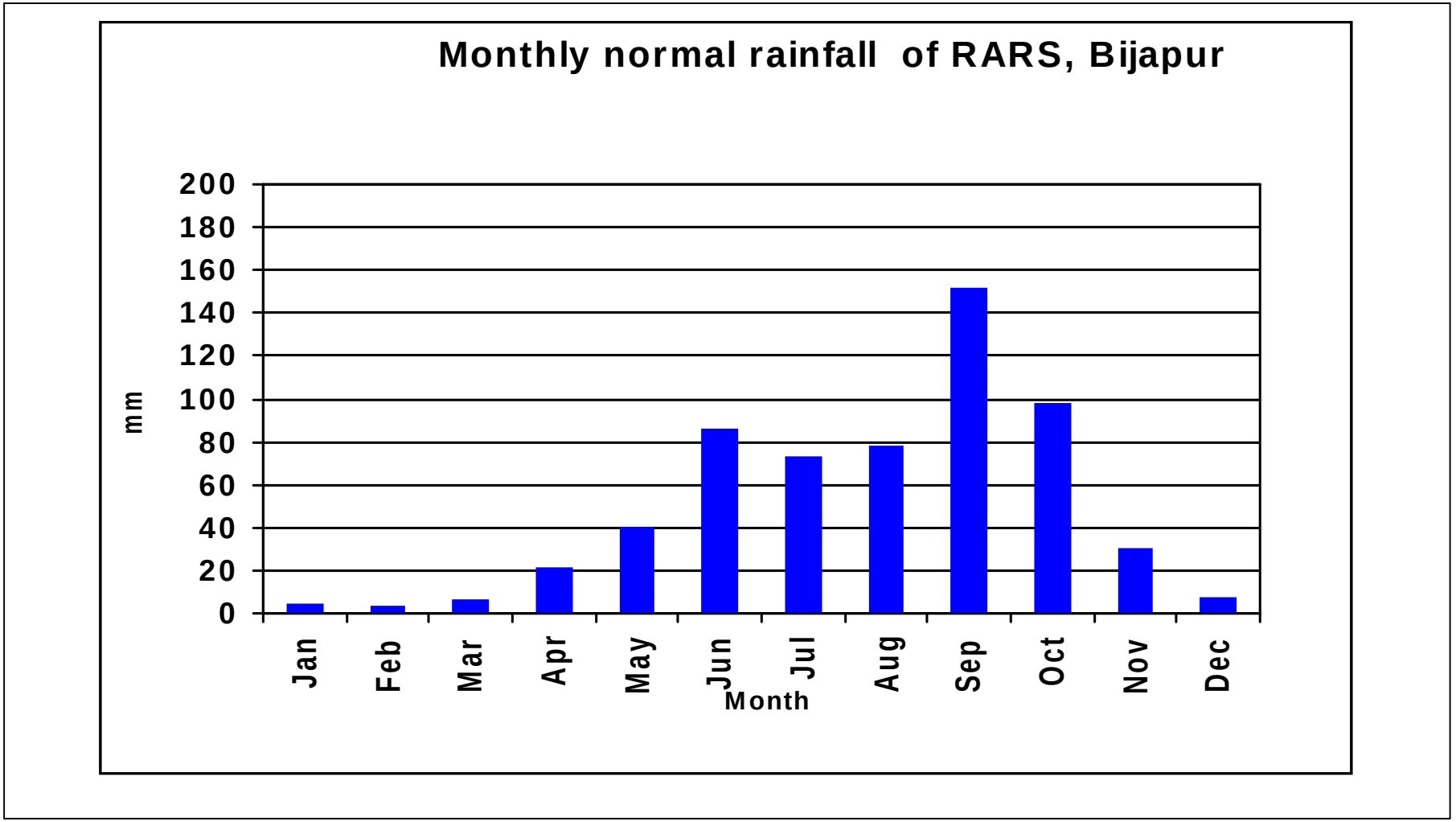
1.13	**What is the major contingency the district is prone to? (Tick mark)***	**Regular**	**Occasional**	**None**
	Drought	√		
	Flood			√
	Cyclone		√	
	Hail storm			√
	Heat wave			√
	Cold wave			√
	Frost			√
	Sea water inundation			√
	Pests and diseases (specify)		√	

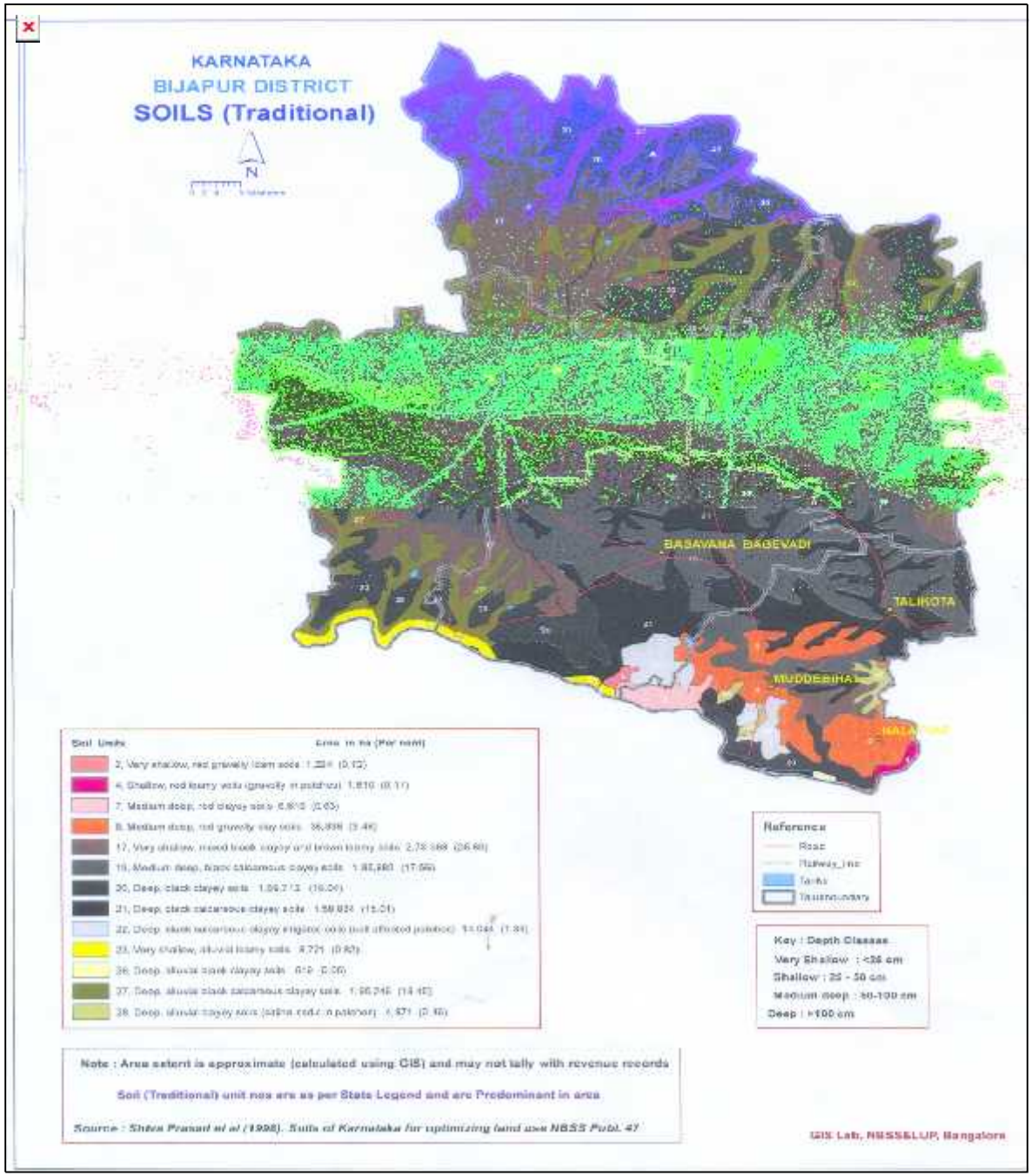
1.14	**Include Digital maps of the district for**	**Location map of district with in State as Annexure I**	Enclosed: Yes
		Mean annual rainfall as Annexure 2	Enclosed: Yes
		Soil map as Annexure 3	Enclosed: Yes


Agro Climatic Zones of Karnataka
NORTH-EASTERN DRY ZONE
NORTHERN DRY ZONE
CENTRAL DRY ZONE
EASTERN DRY ZONE
SOUTHERN DRY ZONE
HILLY ZONE
COASTAL ZONE
K9RSAC



Bijapur district map


Monthly normal rainfall of RARS, Bijapur
mm
200
180
160
140
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month



Source : NBSS & LUP

2.0 Strategies for weather related contingencies
2.1 Drought
2.1.1 Rainfed situation

Delay by 2 weeks (June 4th week)

Condition			Suggested Contingency measures		
Delayed onset	**Major Farming situation[a]**	**Normal Crop/cropping system**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 2 weeks (June 4th week) Kharif sowing : I FN of July	Shallow black and red soils (*Kharif* cropping area)	Sunflower	No change	-	-
		Pearlmillet	No change	-	-
		Pigeonpea	No change	-	-
		Pearl millet + Pigeonpea (2:1)	No change	-	-
		Ground nut + Pigeonpea (4:2)	Groundnut – spreading (S-230, Mardur local) + Pigeonpea	-	-
		Groundnut - bunch)	No change	-	-
		Other crops: Castor Sesame , Setaria	No change	-	-

	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum Safflower Sunflower Chickpea Chickpea (A-1) + Safflower (4:2) Rabi sorghum + Chickpea (2:1) Cotton Horsegram		No change		In situ SWC measures in fallow: ridges and furrows, Tied ridges, Compartmental, bunding to conserve the rain water during kharif for regular sowing of *Rabi* crops as above	Linkage with NREGA for SWC measures; Schemes for Ridger, bund former, MB plough
	Medium deep black soils (both kharif and rabi cropping areas)	***Kharif***	***Rabi***	***Kharif***	***Rabi***	-	
		Green gram	Rabi sorghum / Safflower	Fallow	No Change		
		Groundnut-bunchy	Sunflower	Groundnut - spreading (S-230, Mardur local)	No change	-	
		Pigeonpea	-	No change	-	-	
	Marginal/ denuded shallow soils	Horsegram, Mothbean, Pearl millet + Horsegram / Mothbean / Natural pasture	-	No change	-	-	

Delay by 4 weeks (July 2nd Week)

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
Delayed onset			**Change in crop/ cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (July 2nd week) Kharif sowing : II Fortnight of July	Shallow black and red soils (*Kharif* cropping area)	Sunflower	No change	-	-
		Pearl millet	No change	Seed hardening (soaking in water for 8-10 hrs before sowing) wider row spacing (120-135 cms)	-
		Pigeonpea	No change	Higher seed rate (20% more i.e. 3 kg more) than normal 15 kg/ha	-
		Pearl millet + Pigeonpea (2:1)	No change	-	-
		Ground nut + Pigeonpea (4:2)	Groundnut - spreading (S-230, Mardur local) + Pigeonpea (4:2)	-	-
		Groundnut - Bunchy	Groundnut - spreading (S-230, Mardur local)	-	-
		Castor, Sesame , Setaria	No change	-	-

	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum Safflower Sunflower Chickpea + Safflower Rabi sorghum + Chickpea (2:1) Others: Cotton , Horsegram		No change		In situ SWC measures in fallow: opening up of ridges and furrows at 45 and 90 cm apart and across the slope 45-50 days prior (July 2nd fortnight) to sowing of rabi sorghum, Tied ridges to conserve the rain water during kharif for regular sowing of *Rabi* crops Compartmental, bunding in medium and deep black soils at 4.5 x 4.5 m and 3 x 3 m on lands having 2-3% slope; ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of *Rabi* crops	Linkage with NREGA for SWC measures; Schemes for Ridger, bund former, MB plough
	Medium deep black soils (both kharif and rabi cropping areas)	***Kharif***	***Rabi***	***Kharif***	***Rabi***	-	
		Green gram	Rabi sorghum Safflower	**Fallow**	No Change		

		Groundnut	Sunflower	**Fallow**	No change	-	
		Pigeonpea	-	No change	-	-	
	Marginal/ denuded shallow soils	Horsegram	-	No change	-	-	Supply of good quality seed of Horsegram and Mothbean
		Mothbean	-	No change	-	-	
		Pearl millet + Horsegram / mothbean		Hosegram (GPM-6 / Mothbean (BMB-40)			

Delay by 6 weeks (July 4th Week)

Condition			Suggested Contingency measures		
Delayed onset	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 6 weeks (July 4th Week) Kharif sowing : I Fortnight of August	Shallow black and red soils (*Kharif* cropping area)	Sunflower	No change	-	-
		Pearl millet	No change	Seed hardening (soaking in water for 8-10 hrs before sowing) wider row spacing (120-135 cms)	-
		Pigeonpea	No change	Higher seed rate (20% more i.e. 5 kg more) than normal 25 kg/ha	-
		Pearl millet + Pigeonpea (2:1)	No change	-	-
		Ground nut – bunchy + Pigeonpea (4:2)	Pigeonpea (ICPL-87, Maruti, TS 3 R) / Sunflower (KBSH-53,KBSH-1)	Seed hardening, Higher seed rate by 20% more, wider row spacing	-
		Groundnut - bunch	Sunflower (KBSH-53,KBSH-1)	Wider row spacing (120-135 cms)	-
		Castor Sesame, Setaria	Horse gram (GPM-6), Mothbean (BMB-40)	-	-

	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum Safflower Sunflower Chickpea + Safflower (4:2) Rabi sorghum + Chickpea (2:1) Cotton , Horsegram		No change		In situ SWC measures in fallow: ridges and furrows, Tied ridges, Compartmental, bunding to conserve the rain water during kharif for regular sowing of *Rabi* crops as above	Linkage with NREGA for SWC measures; Schemes for Ridger, bund former, MB plough
	Medium deep black soils (both kharif and rabi cropping areas)	***Kharif***	***Rabi***	***Kharif***	***Rabi***		
		Green gram	Rabi sorghum Safflower	Fallow	No Change	In situ SWC conservation measures for rabi cropping	
		Groundnut	Sunflower	Fallow	No change	-Do-	
		Pigeonpea	-	No change	-	-	
	Marginal/ denuded shallow soils	Horsegram	-	No change	-	-	Supply of good quality seed of Horsegram and Mothbean
		Mothbean	-	No change	-	-	
		Pearl millet + Horsegram / mothbean		Hosegram (GPM-6) / Mothbean (BMB-40)			

Delay by 8 weeks (August 2nd Week)

Condition			Suggested Contingency measures		
Delayed onset	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Change in crop/ cropping system[c]**	**Agronomic measures[d]**	**Remarks on Implementation[e]**
Delay by 8 weeks (August 2nd Week) Kharif sowing : II Fortnight of August	Shallow black and red soils (*Kharif* cropping area)	Sunflower	No change	-	Supply of Horsegram (25 kg/ha and Setaria varieties (4 kg/ha)
		Pearlmillet	Horsegram (GPM-6)-/ Setaria (RS-118, HMT 100-1)	Seed hardening (soaking in water for 8-10 hrs before sowing) wider row spacing (120-135 cms)	-
		Pigeonpea	-Do-	Higher seed rate (20% more i.e. 5 kg more than normal) 15 kg/ha	-
		Pearl millet + Pigeonpea (2:1)	-Do-	-	-
		Ground nut – bunchy + Pigeonpea (4:2)	-Do-	Seed hardening, Higher seed rate by 20% more, wider row spacing	-
		Groundnut – bunchy	-Do-	Wider row spacing (120-135 cms)	-

		Castor , Sesame , Setaria		-Do-		-	-
	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum Safflower Sunflower) Chickpea + Safflower (4:2) Rabi sorghum + Chickpea (2:1) Cotton, Horsegram		No Change		In situ SWC measures in fallow: ridges and furrows, Tied ridges, Compartmental, bunding to conserve the rain water during kharif for regular sowing of *Rabi* crops as above	Linkage with NREGA for SWC measures; Schemes for Ridger, bund former, MB plough
	Medium deep black soils (both kharif and rabi cropping areas)	***Kharif***	***Rabi***	***Kharif***	***Rabi***		
		Green gram	Rabi sorghum / Safflower	Fallow	No Change	In situ SWC conservation measures for rabi cropping	
		Groundnut	Sunflower	Fallow	No change	-Do-	
		Pigeonpea	-	Fallow	Sorghum (M 35-1) + Chickpea(A -1, JG-11)	-	
	Marginal/ denuded shallow soils	Horsegram	-	No change	-	-	Supply of good quality seed of Horsegram
		Mothbean	-	Horsegram (GPM-6)	-	-	

		Pearl millet + Horsegram / mothbean		-Do-			
		Natural pasture		TBO based silvipasture systems like Pongamia+Anjan grass/Stylosanthus	-	-	Supply of appropriate seed material
		Setaria		No change			

Normal onset with Early, mid season and terminal drought situations

Condition	Major Farming situation[a]	Normal Crop/cropping system[b]	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues[d]	Remarks on Implementation[e]
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/ crop stand etc.	Shallow black and red soils (*Kharif* cropping area)	Sunflower	Thinning (30-35% of the population)	Opening of conservation furrows at an interval of 15-20 m	-
		Pearl millet	Thinning (30-35% of the population)	-Do-	-
		Pigeonpea	Thinning (30-35% of the population)	-Do-	-
		Pearl millet + Pigeonpea (2:1)	Thinning (30-35% of the population)	-Do-	-
		Ground nut – bunchy + Pigeonpea (4:2)	Thinning (30-35% of the population)	-Do-	-
		Groundnut – bunchy	-	-Do-	-
		Castor , Sesame , Setaria	-	-Do-	-
	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum , Safflower , Sunflower , Cotton , Horsegram , Chickpea + Safflower (4:2), Rabi sorghum + Chickpea (2:1)	-	Compartmental bunding, Ridge and Furrows, Tied ridges to conserve rainwater during kharif for regular sowing of rabi crops	
	Medium deep black soils (both kharif	Greengram – Rabi Sorghum /Safflower	-	Opening of conservation	

	and rabi cropping areas)			furrows at an interval of 15-20 m	
		Groundnut – Sunflower	-	-Do-	
		Pigeonpea	Intercultivation	-Do-	
	Marginal/ denuded shallow soils	Horsegram	-	-Do-	
		Mothbean	-	-Do-	
		Pearl millet + Horsegram / mothbean	-	-Do-	

Condition	Major Farming situation[a]	Normal Crop/cropping system[b]	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues[d]	Remarks on Implementation[e]
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) **At vegetative stage**	Shallow black and red soils (*Kharif* cropping area)	Sunflower	Repeated intercultivation and weeding	Opening of conservation furrows at an interval of 15-20 m	-
		Pearl millet	Repeated intercultivation an removal of every third row	-Do-	-
		Pigeonpea	Repeated intercultivation and weeding	-Do-	-
		Pearl millet + Pigeonpea (2:1)	-Do-	-Do-	-
		Ground nut – bunchy + Pigeonpea (4:2)	-Do-	-Do-	-
		Groundnut – bunchy	-Do-	-Do-	-
		Other crops: Castor, Sesame , Setaria	-Do-	-Do-	-
	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum , Safflower , Sunflower , Cotton , Horsegram Chickpea) + Safflower (4:2), Rabi sorghum + Chickpea (2:1)	-	Compartmental bunding, Ridge and Furrows, Tied ridges to conserve rainwater during kharif for regular sowing of rabi crops	
	Medium deep black soils (both kharif	Green gram -abi Sorghum /Safflower	-	Opening of conservation	

	and rabi cropping areas)			furrows at an interval of 15-20 m	
		Groundnut – Sunflower	-	-Do-	
		Pigeonpea	Intercultivation	-Do-	
	Marginal/ denuded shallow soils	Horsegram	-	-Do-	
		Mothbean	-	-Do-	
		Pearl millet + Horsegram / mothbean	-	-Do-	
		Natural pasture	-	-Do-	
		Setaria	-	-Do-	

Condition	**Major Farming situation**	**Normal cropping system**	**Suggested Contingency measures**		
			Crop management	**Soil nutrient & moisture conservation measues[d]**	**Remarks on Implementation[e]**
Mid season drought (Long dry spell) at flowering/ fruiting stage)	Shallow black and red soils (*Kharif* cropping area)	Sunflower	Repeated intercultivation and weeding	Spray anti-transparent Kaolin@ 5%	-
		Pearl millet	Harvest for fodder purpose and allow for ratooning	-	-
		Pigeonpea	Repeated intercultivation and weeding	-	-
		Pearl millet + Pigeonpea (2:1)	Harvest Pearl millet for fodder; Repeated intercultivation in pigeonpea	-	-

		Ground nut – bunchy + Pigeonpea (4:2)	Harvest groundnut for fodder purpose, Repeated intercultivation in pigeonpea	-	-
		Groundnut – bunchy	Harvest for fodder purpose		-
		Castor , Sesame, Setaria	-Do-	-	-
	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum , Safflower , Sunflower, Cotton , Horsegram chckpea + Safflower (4:2), Rabi sorghum + Chickpea (2:1)	-	Compartmental bunding, Ridge and Furrows, Tied ridges to conserve rainwater during kharif for regular sowing of rabi crops	
	Medium deep black soils (both kharif and rabi cropping areas)	Greengram -Rabi Sorghum / Safflower	Incorporate greengram in soil	Opening of conservation furrows at an interval of 15-20 m	
		Groundnut – Sunflower	-	-Do-	
		Pigeonpea	Intercultivation	-Do-	
	Marginal/ denuded shallow soils	Horsegram	Harvest and use as fodder	-Do-	
		Mothbean	-Do-	-Do-	
		Pearl millet + Horsegram / mothbean	-Do-	-Do-	
		Setaria	-Do-		
		TBO based silvipasture systems like Pongamia+Anjan grass/Stylosanthus	Mulching for TBOs with available farm waste	-Do-	

Condition	Major Farming situation[a]	Normal opping system[b]	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues[d]	Remarks on Implementation[e]
Terminal drought	Shallow black and red soils (*Kharif* cropping area)	Sunflower	-	Spray anti-transparent Kaolin@ 5%	-
		Pearl millet	-	-	-
		Pigeonpea (ICPL-87, Maruti, TS 3 R)	-	-	-
		Pearl millet + Pigeonpea (2:1)	-	-	-
		Ground nut – bunchy + Pigeonpea (4:2)	-	-	-
		Groundnut – bunchy	-		-
		Castor , Sesame , Setaria	-	-	-
	Deep black soils (Rabi cropping areas)	Kharif - Fallow During Rabi - Rabi sorghum , Safflower , Sunflower , Cotton , Horsegram Chickpea ,Safflower (4:2), Rabi sorghum + Chickpea (2:1)	-	Compartmental bunding, Ridge and Furrows, Tied ridges to conserve rainwater during kharif for regular sowing of rabi crops	
	Medium deep black soils (both kharif and rabi cropping areas)	Green gram - ri Sorghum / Safflower	Harvest greengram	-	
		Groundnut – Sunflower	-	-	

		Pigeonpea	Intercultivation and weeding	-	
	Marginal/ denuded shallow soils	Horsegram	Harvest and use as fodder	-	
		Mothbean	-Do-	-	
		Pearl millet + Horsegram / mothbean	-Do-	-	
		Setaria	-Do-	-	
		TBO based silvipasture systems like Pongamia+Anjan grass/Stylosanthus	Mulching for TBOs with available farm waste, Harvest and use of fodder	-	

2.1.2 Irrigated situation

Condition	Major Farming situation[a]	Normal Crop/cropping system[b]		Suggested contingency measure			
				Change in crop/ cropping system[c]		Agronomic measures[d]	Remarks on Implementation
Delayed/ limited release of water in canals due to low rainfall	**Cropping with canal irrigation both in black soils and red soils**	*Kharif*	*Rabi*	*Kharif*	*Rabi*		
		Maize	Chickpea	No change	No change	Alternate furrow irrigation during kharif	
		Maize	Groundnut				
		Sunflower	Maize				
		Ground nut	Wheat / Chickpea	Sunflower	Groundnut (TMV-2, S-230, Mardur local)/ chickpea (A-1, ICCV-10, GVS-964, ICCV-2)/wheat (HD-2189, DWR-16, DWR-39, DWR-162)	Broad bed and furrow irrigation during kharif	
		Bt cotton	-	No change	-	Transplant 25-30 days aged seedlings. Alternatively alternate furrow irrigation	
		Pigeonpea	-		-		

		Sugarcane	-	-	Sugarcane (COC-671, CO-86032, CO-94012)	Alternate furrow irrigation during kharif, Trash mulching	
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	Fallow/ No change of crops except Groundnut and Pigeonpea	No Change	If left fallow , compartment bunding/ridges and furrows/Tied ridges to conserve the rain water during kharif for regular sowing of *Rabi* crops.	
		Ground nut	Wheat / Chickpea		Groundnut (TMV-2, S-230, Mardur local)/ chickpea (A-1, ICCV-10, GVS-964, ICCV-2)//wheat (HD-2189, DWR-16, DWR-39, DWR-162)		
		Sunflower	Maize		No change		
		Maize	Groundnut		Groundnut (TMV-2, S-230, Mardur local)/ wheat		
		Bt cotton	-	No change	-	Alternate furrow irrigation	
		Pigeonpea	-		-	Transplant 25-30 days aged seedlings	
		Sugarcane	-	-	Sugarcane (COC-671, CO-86032, CO-94012)	Alternate furrow irrigation during kharif, Trash mulching	
Lack of inflows	**Cropping**	*Kharif*	*Rabi*	*Kharif*	*Rabi*		

into tanks due to insufficient /delayed onset of monsoon	**with tank bed /bore-wel irrigation both in black and red soils**	Maize	Chickpea	Fallow	No Change		
		Ground nut	Wheat / chickpea	Fallow	Groundnut (TMV-2, S-230, Mardur local)/ chickpea (A-1, ICCV-10, GVS-964, ICCV-2)/wheat (HD-2189, DWR-16, DWR-39,		
		Sunflower	Maize	Fallow	No change		
		Maize	Groundnut	Fallow	Groundnut (TMV-2, S-230, Mardur local)/wheat		
		Bt cotton	-	No change	-	Alternate furrow irrigation	
		Pigeonpea	-		-	Transplant 25-30 days aged seedlings.	
		Sugarcane	-	-	Sugarcane (COC-671, CO-86032, CO-94012)	Alternate furrow irrigation during kharif, Trash mulching	
Insufficient groundwater recharge due to low rainfall	**Cropping with bore-well / Open well irrigation**	Sunflower	Maize	No change	No change	Alternate furrow irrigation during kharif	
		Maize	Groundnut	Sunflower	Groundnut (TMV-2, S-230, Mardur local)/ wheat		
		Maize	Chickpea		No Change		

	both in black and red soils or any other sources	Ground nut	Wheat/ chickpea	No change	Groundnut (TMV-2, S-230, Mardur local)/ chickpea (A-1, ICCV-10, GVS-964, ICCV-2)/wheat (HD-2189, DWR-16, DWR-39, DWR-162)		
		Bt cotton	-	Desi cotton	-	Protective irrigation	
		Pigeonpea	-	No change	-		
		Sugarcane	-	-	Sugarcane (COC-671, CO-86032, CO-94012)	Alternate furrow irrigation during kharif. Trash mulching	

2.2 Unusual rains (untimely, unseasonal etc) (for both rainfed and irrigated situations) and Heavyy rainfall with high speed winds in a short span[2]

Condition	**Suggested contingency measure**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage[k]**	**Flowering stage[l]**	**Crop maturity stage[m]**	**Post harvest[n]**
Sunflower	Drain out excess water, Weeding and top dressing with urea	Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of earheads	Proper drying and storage of grains
Sorghum			Drain out excess water, Tying up of lodged plants drying of earheads and Harvesting	
Chickpea		Drain out excess water	Drain out excess water, Harvesting and drying of plants	
Pearl millet			Drain out excess water, Tying up of lodged plants, drying of earheads and harvesting	
Maize		Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of cobs	
Pigeonpea		Drain out excess water; Spraying with NAA @ 25 ppm	Drain out excess water, Harvesting and drying of plants	
Horticulture Fruit crops				
Grapes	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	Providing drainage trench (1.5 cu. ft) across the slope	Treatment of 0.1 % carbendizime to the bunches to protect from diseases
Citrus	-do-	-do-	-do-	Storing in Cold storage

Pomegranate	-do-	-do-	-do-	Storing in Cold storage
Banana	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-do-	-
Mango	-do-	-do-	-do-	-
Vegetable crops				
Onion	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to control sprouting in storage	Store in well ventilated structure
Tomato	-do-	Application of 10 ppm NAA spray	-	-
Green Chillies	-do-	Application of 10 ppm NAA spray	-	-
Brinjal	-do-	Application of 10 ppm NAA spray	-	-
Okra	-do-	Application of 10 ppm NAA spray	-	-
Spice and Plantation Crops				
Dry Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray	-	-
Coriander	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-	-
Garlic	-do-	-do-	-	-

Coconut	-do-	-do-	-	-
Tamarind	-do-	-do-	-	-
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope		
Chrysanthemum	-do-	-do-		
Jasmine	-do-	-do-		
Outbreak of pests and diseases due to unseasonal rains	The control measures may be taken up as per package of practices			
Sunflower	Control measures for Control measures for Bihar hairy caterpillar and Necrosis disease	Control measures for Earhead borer	-	-
Sorghum	---	Control measures for Rust	Control measures for Grain molds	-
Chickpea	Control measures for Wilt	Control measures for Pod borer	Control measures for Pod borer	-
Pearl millet	-	Control measures for Ergot	-	-
Maize	Control measures for Leaf blight	-	-	-
Pigeonpea	Control measures for Blight	Control measures for Pod borer and Sterility mosaic	Control measures for Pod borer	-

2.3 Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Sunflower	Drain out excess water, Gap filling and drenching with fungicides	Drain out excess water, Weeding and top dressing with urea	Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of earheads
Sorghum	Drain out excess water, Gap filling		Do	Drain out excess water, Tying up of lodged plants, drying of earheads and Harvesting
Chickpea	Drain out excess water, Gap filling and drenching with fungicides		Do	Drain out excess water, Harvesting and drying of plants
Pearl millet	Drain out excess water		Do	Drain out excess water, Tying up of lodged plants, drying of earheads and Harvesting
Maize	Drain out excess water, Gap filling		Drain out excess water, Earthing up	Drain out excess water, Harvesting and drying of cobs
Pigeonpea	Drain out excess water, Gap filling and drenching with fungicides		Drain out excess water, Spraying with NAA@ 25 ppm	Drain out excess water, Harvesting and drying of plants
Continuous submergence for more than 2 days[2]				
Sunflower	Drain out excess water, Resowing with seed treatment in case of more than 50% mortality; otherwise gap filling and drenching with fungicides	Drain out excess water, Weeding and top dressing with urea; Replacing mortalilty with sorghum	Drain out excess water, Earthing up; Spray borax (0.5%) to the earhead	Drain out excess water, Harvesting and drying of earheads

		(K)/chickpea (R)		
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
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	Drain out excess water, Harvesting and drying of plants
Pearl millet	Drain out excess water	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
Maize	Drain out excess water, Gap filling		Drain out excess water, Earthing up; Tying up of lodged plants	Drain out excess water, Harvesting and drying of cobs
Pigeonpea	Drain out excess water, Gap filling and drenching with fungicides		Drain out excess water, Spraying with NAA@ 25 ppm	Drain out excess water, Harvesting and drying of plants
Horticulture Fruit crops				
Grapes	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope and application of 10 ppm NAA spray	Providing drainage trench (1.5 cu. ft) across the slope	Treatment of 0.1 % carbendizime to the bunches to protect from diseases
Citrus	-do-	-do-	-do-	Storing in Cold storage

Pomegranate	-do	-do-	-do-	Storing in Cold storage
Banana	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-do-	Storing in Cold storage
Mango	-do-	-do-	-do-	Storing in Cold storage
Vegetable crops				
Onion	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	2000 ppm of MH spray 15 days before the harvest to control sprouting in storage	Store in well ventilated structure
Tomato	-do-	Application of 10 ppm NAA spray	-	-
Green Chillies	-do-	Do	-	-
Brinjal	-do-	Do	-	-
Okra	-do-	Do	-	-
Spice and Plantation Crops				
Dry Chillies	Providing drainage trench (1.5 cu. ft) across the slope	Application of 10 ppm NAA spray	-	-
Coriander	-do-	Providing drainage trench (1.5 cu. ft) across the slope	-	-
Garlic	-do-	-do-	-	-
Coconut	-do-	-do-	-	-

Tamarind	-do-	-do-	-	-
Flowers				
Marigold	Providing drainage trench (1.5 cu. ft) across the slope	Providing drainage trench (1.5 cu. ft) across the slope	-	-
Chrysanthemum	-do-	-do-	-	-
Jasmine	-do-	-do-	-	-

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

Extreme event type	**Suggested contingency measure[r]**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave[p]	-NA-	-NA-	-NA-	-NA-
Cold wave[q]	-NA-	-NA-	-NA-	-NA-
Frost	-NA-	-NA-	-NA-	-NA-
Hailstorm	-NA-	-NA-	-NA-	-NA-
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	As chronically drought prone district, it should have reserves of the following at any point of the year for mobilization to the needy areas (for feeding 5000 ACU (maintenance ration) for about 1-3 weeks period) 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 Available sorghum /pearl millet/maize stover should be properly stored for future use. Encourage silage making with available	Harvest and use biomass of dried up crops (sorghum /pearl millet/maize) material as fodder. In severe drought, hay should be mixed with silage while feeding high productive livestock Harvest the tree fodder (Neem, Subabul, Acasia, Pipal etc) and unconventional feeds resources available and use as fodder for livestock (LS). Stall fed the LS to reduce the energy requirements of the animals **Mild drought:** hay should be transported to the drought affected villages **Moderate drought:** hay, silage and vitamin & minerals mixture should be transported to the drought affected villages **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 to LS Herd should be split and supplementation (either groundnut haulms or concentrate mixture) should be given only to the	Encourage progressive farmers to grow fodder crops of sorghum/bajra/maize(UP chari, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 on their own lands & supporting them with assisting infrastructures like seeds, money manure. Capacity building to stake holders on drought/flood mitigation in livestock sector Flushing the stock to recoup Replenish the feed and fodder banks Supply of quality seeds of fodder varieties and motivating the farmers to cultivate at least 10% of their land holding for fodder production

	maize fodder in the villages Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in common property resources (CPRs) like temple lands, panchyat lands or private property resources (PPRs) like waste and degraded lands with the monsoon pattern for higher biomass production Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality chaff cutters. Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon Proper drying, bailing and densification of harvested grass from previous season Creation of permanent fodder, feed and fodder seed banks in all drought prone villages Capacity building and preparedness of the stakeholders and official staff for the unexpected events	highly productive and breeding animals Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock) Motivate the farmers to mix the dry fodder with available kitchen waste or groundnut haulms while feeding Arrangements should be made for mobilization of small ruminants across the villages where no drought exits with subsidized road/rail transportation and temporary shelter provision for the shepherds Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals. Supply silage and or hay on subsidized rates to the farmers having high productive stock Subsidized loans should be provided to the livestock keepers	
Heat wave	i) Plantation of trees like Neem, Pipal, Subabul around the shed ii) Spreading of husk/straw/coconut leaves on the roof of the shed iii) Water sprinklers / foggers in	Allow the animals preferably 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 during heat weaves and heaters during cold waves in case of high productive animals	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)

	the animal shed **iv)** Application of white reflector paint on the roof to reduce thermal radiation effect	In severe cases, vitamin 'C' (5-10ml per litre) and electrolytes (Electral powder @ 20g per litre) should be added in water during severe heat waves.	
Health and Disease management	List out the endemic diseases (species wise) in the district and store vaccines for those diseases Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases Surveillance and disease monitoring network to be established at Joint Director (Animal Husbandry) office in the district	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 Rescue of sick and injured animals and their treatment Rescue of sick and injured animals and their treatment	Conducting mass animal health camps Conducting fertility camps Mass deworming camps
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
Drinking water	Identification of water resources Rain water harvesting and create water bodies / watering points (when water is scarce use only as drinking water for animals)	Restrict wallowing of animals in water bodies/resources	Bleach (0.1%) drinking water / water sources Provide clean drinking water

Vaccination programme for cattle and buffalo:

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

Vaccination schedule in small ruminants (Sheep & Goat)

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

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Storing of house hold grain like maize, broken rice, bajra etc, in to use as feed in case of severe drought	Supplementation only for productive birds with house hold grain Supplementation of shell grit (calcium) for laying birds Culling of weak birds	Supplementation to all survived birds
Drinking water		Use water sanitizers or offer cool drinking water	
Health and disease management	Culling of sick birds. Deworming and vaccination against RD and fowl pox	Mixing of Vit. A,D,E, K and B-complex including vit C in drinking water (5ml in one litre water)	Hygiene and sanitation of poultry house Disposal of dead birds by burning / burying with lime powder in pit
Heat wave			
Shelter/environment management	Provision of proper shelter with good ventilation	In severe cases, foggers/water sprinklers/wetting of hanged gunny bags should be arranged Don't allow for scavenging during mid day	Routine practices are followed

Health and disease management	Deworming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C (5-10 ml per litre) In hot summer, add anti-stress probiotics in drinking water or feed (Reestobal etc., 10-20ml per litre)	Routine practices are followed

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			
A. Capture			
Marine	NA	NA	NA
Inland			
(i) Shallow water depth due to	Observe water level. Advice fishermen to harvest as much as possible fish live stock	Harvest the complete fish live stock	Report the loss to Revenue & Fisheries Dept.
insufficient rain/inflow			
(ii) Changes in water quality	Observe water quality like dis- solved Oxygen & pH	Report the matter to Revenue & Fisheries Dept.	
(iii) Any other	To explore the possibility of shifting the live stock to other water resources		
B. Aquaculture			
(i) Shallow water in ponds due to	Observe water level.	Addition of water, lime for	

insufficient rain/inflow	Advice for fishermen to harvest maxi-mum fish live stock.	tackling salt load	
(ii) Impact of salt load build up in		Report the matter to Revenue & Fisheries Dept.	Report the loss to Revenue & Fisheries Dept.
ponds/change in water quality			
(iii) Any other			
2) Floods			
A. Capture			
Marine	1) Helpt the district administration in providing Savi monsoon and boat 2) Prior wawrning is given for fishrmen as per advice of Meteorological Dept.		

(i) Average compension paid due to	Help the district administration in providing the necessary help concerned with Revenue Dept.authorities.		
loss of fishermen life			
(ii) Avg no.of boats/nets/damaged			
(iii)_ Avg no.of boats damaged			

Inland			
(i) Average compension paid due to loss of human life	Revenue authorities pay the compension to boats / nets / houses / fish live stock damaged	Addition of water, lime for tackling salt load	
(ii) No.of boats/nets/damaged			Report the loss to Revenue & Fisheries Dept.
(iii) No.of houses damaged		Report the matter to Revenue & Fisheries Dept.	
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases	should be reported to Revenue Dept.authorities.		
B. Aquaculture			
(i) Inundation with flood water	Monitor the floods and harvest maximum fish live stock before floods. Report the loss to Revenue and Fisheries Dept. authorities.		
(ii) Water continuation and changes in water quality			
(iii) Health and Diseases			
(iv) Loss of stock and inputs (ffed, chemicals etc.)			
(v) Infrastructure damage (pumps, aerators, huts etc.)			
(vi) Any other			