State: KARNATAKA

Agriculture Contingency Plan for District: BELLARY

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Karnataka Plateau, Rayalaseema as inclusion (3.0)		
	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	Bijapur, Bellary, Raichur, Koppal, Bagalkot, Gadag, Davanagere, Dharawad, Belgaum		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		15° 09'00.89"N	76°52'07.05"E	1553 ft above MSL
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRS, Bijapur. University of Agricultural Sciences, Dharwad- 586151		
	Mention the KVK located in the district	KVK, Hagari, Bellary, Karnataka-583138		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	Regional Agricultural Research Station Bijapur-586 101		

1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep):	455.6		2nd week of June	4th week of September
	NE Monsoon(Oct-Dec):	127.3		1st week of October	2nd week of November
	Winter (Jan- March)	1.0			
	Summer (Apr-May)	46.2			

	Annual	630.1		-	-

1.3	**Land use pattern of the district** (latest statistics)	Geographical Area	Cultivable area	Forest area	Land under non-agricultural use	Permanent pastures	Cultivable wasteland	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (000 ha)	813.2	434.9	97	122	5.4	25	3.5	30.4	68	27

1. 4	**Major Soils (common names like shallow red soils etc.,)** (Source:Bellary District at a glance Published by NABARD,Bellary Branch. 2009-10)	**Area ('000 ha)**
	Black soils	369.0
	Red soils	407.9
	Sandy loams	25.4
	Sandy soils	10.7

(Source:Bellary District at a glance Published by NABARD,Bellary Branch. 2009-10)

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity
	Net sown area	434.9	125.1%
	Area sown more than once	140.8	
	Gross cropped area	575.8	

(Source:Bellary District at a glance Published by NABARD,Bellary Branch. 2009-10)

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	191.7		
	Gross irrigated area	281.3		
	Rainfed area	293.7		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		122.8	43.6
	Bore wells		90.2	32.1
	Tanks		2.9	1.1
	Open wells		8.4	2.9
	Lift irrigation		47.6	16.9
	Micro-irrigation			
	Other sources		9.2	3.3
	Total Irrigated Area		281.3	
	Pump sets			
	No. of Tractors	18298		
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	
	Over exploited		37.4	
	Critical		------	
	Semi- critical		14.2	
	Safe		48.4	
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

(Source:Bellary District at a glance Published by NABARD,Bellary Branch. 2009-10)

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*		
	Paddy	105.4	-	-	-	105.4	210.9
	Sunflower	31.4		86.7			118.2
	Maize	53.2		41.7			95.0
	Groundnut	15.7		57.0			72.7
	Sorghum	19.5		38.9			58.5
	Bengal gram	21.5		32.2			53.8
	Cotton	11.0		10.4			21.4
	Bajra	2.1		12.9			15.1
	Horticulture crops – Fruits(2008-09)	**Total area '000 (ha)**					
	Banana	2.9					
	Pomegranate	1.4					
	Mango	1.1					
	Citrus	0.2					
	Fig	1.02					
	Horticultural crops – Vegetables	**Total area '000 ha**					
	Green chili	1.4					
	Brinjal	0.3					
	Okra	0.2					
	Medicinal and Aromatic crops	**Total area**					
	Medicinal and Aromatic plants	0.9					
	Dry Chilli	11.4					

	Coriander	3.0
	Plantation crops	**Total area**
	Betel Vine	3.1
	Coconut	1.8
	Oil Palm	0.7
	Tamarind	0.2
	Fodder crops	**-**

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	-	-	374.2
	Crossbred cattle	-	-	16.9
	Non descriptive Buffaloes (local low yielding)	-	-	207.6
	Graded Buffaloes	-	-	-
	Goat	-	-	271.9
	Sheep	-	-	656.6
	Others (Camel, Pig, Yak etc.)	-	-	142.5
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	134	Total : 3503	
	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)	
	13920	Nil	Nil	Nil	4000	Nil

	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**	**No. of Reservoirs**	**No. of tanks**
		389	4 (Tunghabhadra, HB halli, Narihalla and Daroji reservoirs)	**132**

	B. Culture			
		Water Spread Area (ha)	**Yield (t/ha)**	**Production ('000 tons)**
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	Nil	Nil	Nil
	ii) **Fresh water** (Data Source: Fisheries Department)	12653(205 Tanks area) 40143(4 reservoir area)	3 to 3.5	10552.4
	Others	-	-	-

1.11 Production and Productivity of major crops (Average of last 3 years: 2006, 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)	
Major Field crops (Crops to be identified based on total acreage)										
	Paddy	189.9	5343	0.03	0	131.3	3729	321.2	3024	385.5
	Maize	264.1	4159	62.4	3176	2.0	2387	328.6	3241	460.0
	Sorghum	110.1	3.13	53.1	1686	2.2	2233	165.5	2344	215.1
	Sunflower	44.8	962	58.0	887	7.7	933	110.6	927	-
	Groundnut	41.7	1324	18.7	1455	17.7	1167	78.2	1315	-
	Cotton	27.2	722	38.9	283	0.3	333	66.5	446	-

	Bengal gram	-	-	37.2	1218	0	0	37.2	609	40.966
	Bajra	17.4	1225	4554	555	3.7	667	25.7	816	30.918
Major Horticultural crops (Crops to be identified based on total acreage)										
	Dry chillies							21.8	2000	
	Betelvine							4526	14260	
	Coriander							7.4	870	
	Coconut							93.3	36058	
	Banana							132400	100	

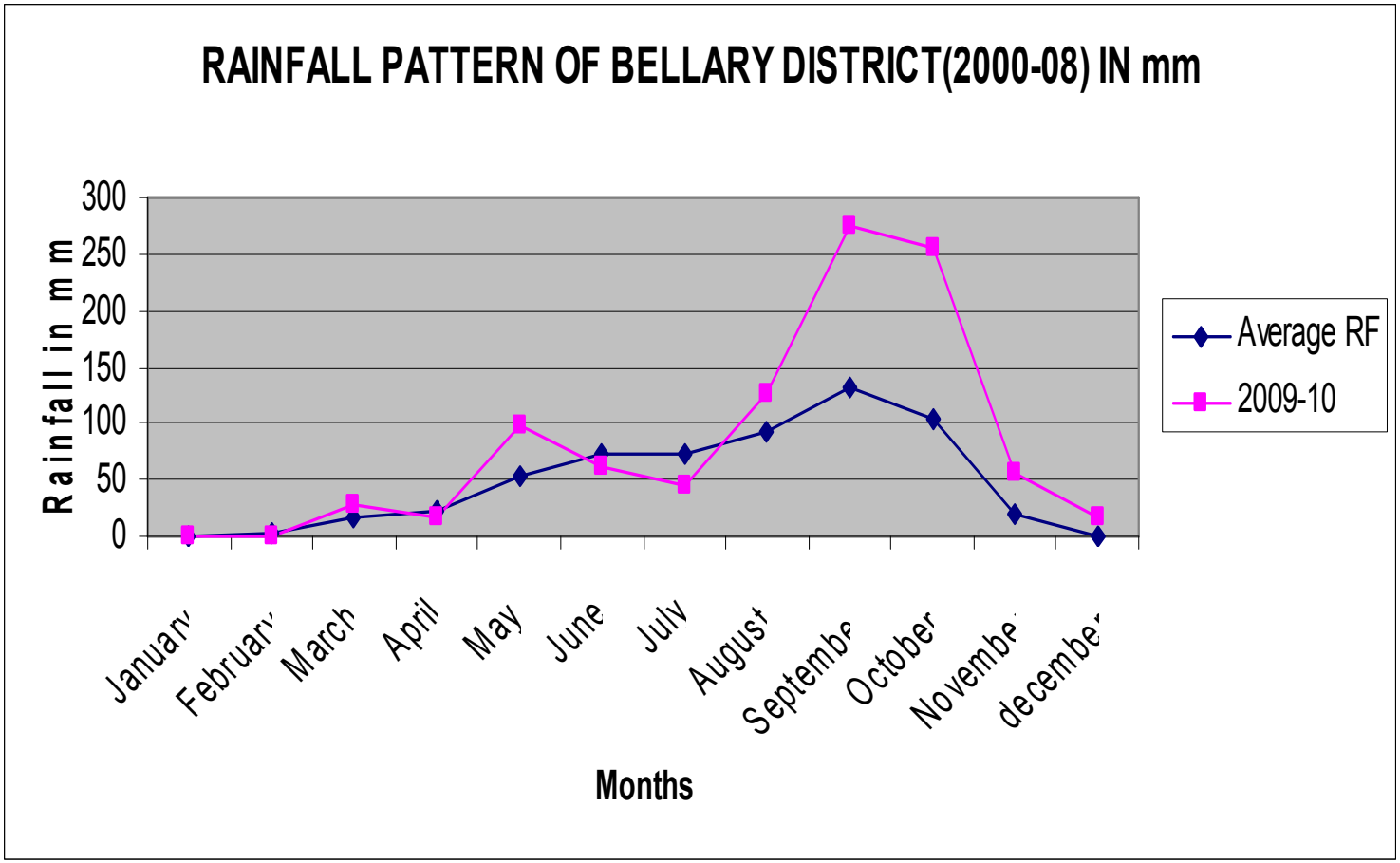
1.12	**Sowing window for 5 major field crops**	**Paddy**	**Maize**	**Sorghum**	**Sunflower**	**Groundnut**	**Bengal gram**
	Kharif- Rainfed		1st week of May – end of June	1st week of May – end of June	1st week of June – end of June	End of June	
	Kharif-Irrigated	1st week of June-end of July	1st week of May – end of June	1st week of May – end of June	1st week –last week of August	1st week of June – last week of July	
	Rabi- Rainfed	-	-	1st week of October-end of November	1st week of September-end of October		1st week of October-end of November
	Rabi-Irrigated	December last week to January end	1st week of September-end of October 1st week of January- end of February	1st week of October-end of November	1st week of September-end of October 1st week of December-end o f January	1st week of December-end of January	1st week of October-end of November

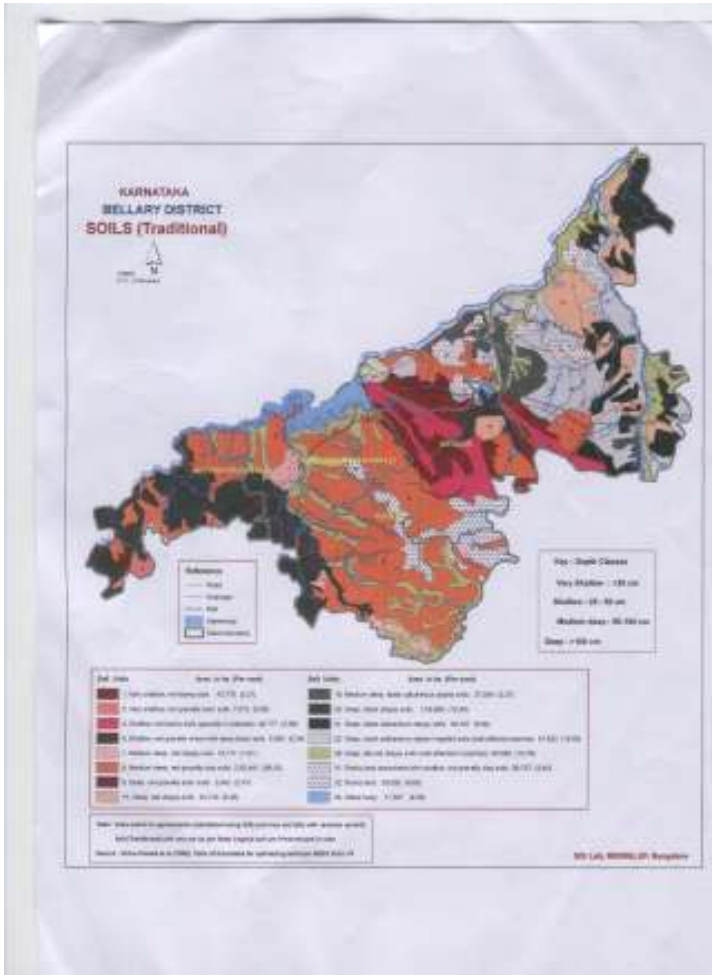
1.13	What is the major contingency the district is prone to? (Tick mark)	Regular	Occasional	None
	Drought	-	√	-
	Flood	-	√	-
	Cyclone	√	-	√
	Hail storm	-	-	√
	Heat wave	-	-	√
	Cold wave	-	-	√
	Frost	-	-	√
	Sea water intrusion	-	-	√
	Pests and disease outbreak (specify)	Brown plant hopper in paddy, Heliothis in cotton, Stem borer in paddy and Cob borer in maize. Bacterial blight & blast in paddy, powdery mildew in sunflower and Necrosis in sunflower	-	√

1.14	**Include Digital maps of the district for**	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 Bellary in Karnataka

Annexure-2: Rain fall pattern of Agricultural Research Station, Siruguppa, Bellary Dist (2009-10 and Average of 9 years)




KARNATAKA
BELLARY DISTRICT
SOILS (Traditional)

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	**Suggested Contingency measures**				
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping syste**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 4th week)	Shallow black soils and red sandy soils **(kharif)**	Maize (Deccan-103)	No change	-	-
		Bajra (ICTP-8203,ICMV-221,MH-946)	No change	-	-
		Sorghum (CSH-14,CSH-16,CSH-18,DSV-1 and 6,SSV-74)	No change	-	-
		Groundnut (TMV-2,S-206,JL-24,R-8808,R-2001-3)	No change	-	-
		Pigeonpea (ICP-8863,TS-3R,WRP-1)	No change	-	-
		Setaria (HMT-100-1) + Pigeonpea (4:2)	No change	-	-
		Sorghum+Groundnut(2:4)	No change	-	-
		Bajra+ Pigeonpea(2:1)	No change	-	-
	Deep black soils (rabi)	Rabi sorghum (M-35-1)	No change	Keep the land fallow in kharif by treating with compartment bunds & furrows for insitu moisture conservation	-
		Safflower (A-1,A-300,A-2)	No change		
		Cotton (Jayadhar,DB 3-12)	No change		
		Sunflower (KBSH-1,DSH-1,KBSH-41 and 44)	No change		
		Rabi- Sorghum(M-35-1) + Bengal gram (A-1): (2:1)	No change		
		Bengal gram + Safflower: (4:2)	No change		

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks July 2nd week	Shallow black soils and red sandy soils **(kharif)**	Maize	Bajra/Pigeonpea/ Groundnut/ Sunflower	-	-
		Bajra	No Change	Seed hardening and wider row spacing	-
		Sorghum	Bajra/Pigeonpea/ Groundnut/ Sunflower	-	
		Pigeon pea	No change	Higher seed rate by 20% with wider spacing of 90 x 20 cm	-
		Ground nut	No change	-	
		Sunflower	No change	Sow at wider spacing 90 x 20cm	-
		Bajra + Pigeonpea (2:1)	No change	-	-
		Setaria + Pigeonpea (4:2)	No change	-	
		Sorghum+ Groundnut(2:4)	No change	-	
	Deep black soils (rabi)	Rabi sorghum	No change	Keep the land fallow in kharif by treating with compartment bunds & furrows for in situ moisture conservation	-
		Safflower	No change		
		Cotton	No change		
		Sunflower	No change		
		Rabi- sorghum + Bengalgram : (2:1)	No change		
		Bengal gram + Safflower: (4:2)	No change		
Condition	**Suggested Contingency measures**				
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks July 4th week	Shallow black soils and red sandy soils (kharif)	Maize	Bajra/Pigeonpea/ Groundnut/Sunflower		Seed drills under RKVY
		Bajra	No Change	Seed soaking in water for 8-10	

				hours and shade drying before sowing and wider row spacing. with 60 x 15 cm	Supply of seeds through KSSC NFSM, ISOPOM
		Sorghum	Bajra/Pigeonpea/ Groundnut/Sunflower		
		Pigeon pea	No change	Higher seed rate by 20% with wider spacing of 90 x 20 cm	
		Ground nut	Bunch Groundnut	-	Sunflower: Breeder seeds supply- UAS(B) F1 seeds supply – KSSC
		Sunflower	No change	-	
		Bajra + Pigeonpea (2:1)	No Change	-	
		Setaria + Pigeonpea (4:2)	No change	-	
		Sorghum+ Groundnut(2:4)	Bajra + pigeon pea (4:2)	-	
	Deep black soils (rabi)	Rabi sorghum	No change	Keep the land fallow in kharif by treating with compartment bunds & furrows for insitu moisture conservation	
		Safflower			
		Cotton			
		Sunflower			
		Rabi- sorghum + Bengal gram : (2:1)			
		Bengal gram + Safflower: (4:2)			
		Chickpea + Safflower: (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**
Delay by 8 weeks August Ist week	Shallow black soils and red sandy soils (kharif)	Maize	Horsegram/Setaria/Sunflower	-	Seed drills under RKVY Supply of seeds through KSSC NFSM, ISOPOM
		Bajra	-do-	-	
		Sorghum	-do-	-	
		Pigeon pea	-do-	-	
		Ground nut	-do-		
		Sunflower	No change	Wider row spacing of 90 x 20 cm	

		Bajra + Pigeonpea (2:1)	Horsegram/Setaria//Sunflower	-	Sunflower: Breeder seeds supply- UAS(B) F1 seeds supply – KSSC
		Setaria + Pigeonpea (4:2)	-do-		
		Sorghum+ Groundnut(2:4)	-do-	-	
	Deep black soils (rabi)	Rabi sorghum	No change	Keep the land fallow in kharif by treating with compartment bunds & furrows for in - situ moisture conservation	
		Safflower	-do-		
		Cotton	-do-		
		Sunflower	-do-		
		Rabi Sorghum + Bengal gram (2:1)	-do-		
		Bengal gram + Safflower: (4:2)	-do-		

Condition			**Suggested Contingency measures**		
Early season drought	**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.	Shallow black soils and red sandy soils (kharif)	Maize	Thinning and intercultivation Gap filling Resowing the crop within 15 days when population is less than 30%.	Opening conservation furrows at 1.5-2.0m apart	1.Supply of inter cultural implements through RKVY 2.Farm ponds through IWSM programme 3.Pigeon pea seeds supply through NFSM
		Bajra	--do--	--do--	
		Groundnut	--do--	--do--	
		Sunflower	--do--	--do--	
		Sorghum	--do--	--do--	
		Bajra+Pigeonpea(2:1)	--do--	--do--	
		Setaria +Pigeonpea (4:2)	--do--	--do--	
		Sorghum+ Groundnut(2:4)	--do--		
	Deep black soils (rabi)	Rabi sorghum		Compartmental bunding	
		Safflower		--do--	

		Cotton		--do--	
		Sunflower		--do--	
		Rabi- Sorghum + Bengalgram: (2:1)		--do--	
		Bengalgram + Safflower: (4:2)		--do--	

Condition	Suggested Contingency measures				
	Major Farming situation	Crop/cropping system	Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period) At vegetative stage	Shallow black soils and red sandy soils (kharif)	Maize	Repeated intercultivation and weeding	Opening of conservation furrows at 15-20m apart	1.Supply of inter cultural implements through RKVY 2.Farm ponds through IWSM programme 3.Pigeon pea seeds supply through NFSM
		Bajra	Repeated intercultivation and weeding, Removal of seedlings between 30-45 DAS	---do---	
		Groundnut	Repeated intercultivation and weeding, Mulching in spreading groundnut	---do---	
		Sunflower	Repeated intercultivation and weeding	---do---	
		Sorghum	Repeated intercultivation and weeding, Removal of seedlings between 30-45 DAS	Opening of conservation furrows at 15-20m apart	
		Bajra+pigeonpea(2:1)	-do-	---do---	
		Setaria + pigeonpea (4:2)	Repeated intercultivation and weeding, Mulching in spreading groundnut	---do---	
		Sorghum+ groundnut(2:4)	Repeated intercultivation and weeding	---do---	
	Deep black soils (rabi)	Rabi sorghum		Compartment bunding	
		Safflower		---do---	
		Cotton	---do---		
		Horsegram	---do---		
		Sunflower	---do---		
		Rabi- Sorghum+ Bengalgram : (2:1)		---do---	

		Bengalgram +Safflower: (4:2)		---do---	

Condition	Suggested Contingency measures				
	Major Farming situation	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Mid season drought (Long dry spell) at flowering/ fruiting stage)	Shallow black soils and red sandy soils (kharif)	Maize	Repeated intercultivation and weeding. Harvesting for fodder purpose.	Opening conservation furrows at 1.5-2.0 m apart	1.Supply of inter cultural implements through RKVY 2.Farm ponds through IWSM programme 3.Pigeon pea seeds supply through NFSM
		Bajra	Repeated intercultivation and weeding .Harvest the crop for fodder purpose and allow for rationing	Opening conservation furrows at 1.5-2.0 m apart. Spray antitranspirants like 5% Kaolin. Provide supplemental irrigation.	
		Sunflower	Repeated intercultivation and weeding	Spray anti transpirants like kaolin @ 5%	
		Sorghum	Stripping of old & nonfunctional leaves. Repeated intercultivation and weeding	---do---	
		Pigeon pea	-do-	Spray anti transpirants like kaolin @ 5%	
		Groundnut	Harvesting for fodder purpose	Foliar spraying of 2% urea soon after receipt of rains	
		Bajra + pigeonpea (2:1)	Repeated intercultivation and weeding .Harvest the crop for fodder purpose and allow for ratooning	Opening conservation furrows at 1.5-2.0 m apart. Spray antitranspirants like 5% Kaolin. Provide supplemental irrigation.	
		Setaria + pigeonpea (4:2)	-do-	-do-	
		Sorghum+ groundnut(2:4)	Harvest pearlmillet for fodder and Repeated intercultivation	-do-	
	Deep black soils (rabi)	Rabi sorghum	-	Compartmental bunding	
		Safflower	-	-do-	
		Cotton	-		
		Horsegram	-		

		Sunflower	-		
		Rabi- Sorghum+Bengalgram: (2:1)	-	-do-	
		Bengalgram+Safflower: (4:2)		-do-	

Condition	Suggested Contingency measures				
	Major Farming situation	**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
Mid season drought (Long dry spell)	Shallow black soils and red sandy soils (kharif)	Maize	Harvest the crop at physiological maturity and go for early rabi crop. Harvest for fodder purpose in case of severe drought	Spraying of anti transpirants like 5% Kaolin and provide supplemental irrigation	1.Supply of inter cultural implements through RKVY 2.Farm ponds through IWSM programme 3.Pigeon pea seeds supply through NFSM
Terminal drought		Bajra	--do--	--do--	
		Sunflower	--do--		
		Sorghum	--do--	After harvest of crops early at physiological maturity, take up sowing of rabi sorghum and Bengal gram during Sept I F.N	
		Pigeon pea	--do--	--do--	
		Groundnut	--do--	--do--	
		Bajra+Pigeonpea (2:1)	--do--	--do--	
		Setaria + Pigeonpea (4:2)	--do--	--do--	
		Sorghum+Groundnut (2:4)	--do--	--do--	
	Deep black soils (rabi)	Rabi sorghum	-	Compartmental bunding	
		Safflower	-	--do--	
		Cotton	-		
		Horsegram	-		
		Sunflower	-		
		Rabi- Sorghum+Bengal gram (2:1)	-	--do--	
		Bengalgram+Safflower(4:2)		--do--	

2.1.2 Irrigated situation

Condition	Suggested Contingency measures				
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delayed release of water in canals due to low rainfall	Canal irrigated black soil	Paddy-paddy	Paddy- Sunflower Paddy-Sesamum Use of short duration paddy varieties like SIRI-1253, Gangavati sona, JGL-1798,IR-64 and ES-18	Use 4-5 seedlings/hill Add 25% extra Nitrogen Follow narrow spacing (15 cm x 10 cm as against 20 cm x 10 cm)	
		Bt cotton	No change	Follow 90 cm x 45 cm spacing as against 90 x 60 cm.	
		Paddy-paddy with short duration varieties (Erramallelu, ES-18 and Gangavati Sona)	Use 35-40 days old seedlings with 4-5 seedlings/hill		
Limited release of water in canals due to low rainfall	Canal irrigated black soils	Paddy-Paddy	Sunflower-Chickpea Maize- Chickpea Hy. Cotton (Bt.)	Alternate furrow irrigation Mulching Deep Intercultivation Foliar application of N & K	
		Bt Hybrid Cotton	No change	Raising cotton seedling in polythene bags before release of canal water and transplanting with closer spacing of 90 X 45 cm or 90 x 60 cm	
		Sorghum-Groundnut	No change		
		Pigeonpea	No change	Raising seedling in polythene bags before release of canal water and transplanting with wider spacing of 150 X 90 cm	
		Maize-Bengal gram	No change	-	-

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 catchments	Canal irrigated black soils	Paddy-paddy	Direct seeded paddy-sesamum Prefer short duration paddy varieties like IR-64, SIRI-1253, Ganga vatisona/JGL-1798	Aerobic system of paddy cultivation	
		Maize- Bengalgram	Sunflower/Rabi Sorghum/ Bengalgram		
		Maize- Coriander	Bengal gram/Sesamum/Sunflower		
		Bt Hybrid Cotton	Bengalgram/Coriander/Rabi Sorghum	Coriander is a short duration crop grown on residual moisture in black soils.	

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	Canal irrigated black soils	Paddy-Paddy	Direct seeded Paddy-Sesamum Use of short duration paddy varieties like IR-64, SIRI-1253, Gangavatisona/JGL-1798	Aerobic system of paddy cultivation	
		Maize- Bengalgram	Sunflower/Rabi Sorghum/Bengalgram		
		Maize- Coriander	Bengalgram /Sesamum /Sunflower		
		Bt Hybrid Cotton	Bengalgram/Coriander/Rabi Sorghum		

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	Black soil	Paddy-paddy	Sunflower /Chickpea /Sesamum /rabi sorghum	-	
		Cotton	Sunflower/Sesamum/Rabi sorghum	-	
		Maize	-do-	-	

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

Condition	**Suggested contingency measures**			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Paddy	• Top dress the crop with N & K • Intercultivation & weeding • Plant protection measures • Take up re transplanting, if necessary or Gap filling	• Top dress the crop with N & K.	• Harvest at physiological maturity. • Proper drying. • Spraying of fungicides to protect quality of grain.	
Cotton	• Drain out excess water • Top dress the crop with N & K • Intercultivation & weeding • Plant protection measures • Spraying of growth regulators	• Drain out the excess water • Top dress the crop with N & K. • NAA spray for retention of flower in Hybrid Cotton.		
Maize	-do-	-do-	• Harvest at physiological maturity. • Proper drying. • Spraying of fungicides to protect quality of grain.	
Sorghum	-do-	-do-	-do-	
Groundnut	Drain out excess water Intercultivation & weeding Plant protection measures	Drain out the excess water	Proper drying. Spraying of fungicides to protect quality of grain.	
Bajra	Drain out excess water Top dress the crop with N & K Intercultivation & weeding Plant protection measures Take up resowing, if necessary or Gap filling	Drain out the excess water Top dress the crop with N & K.	Harvest at physiological maturity. Proper dying. Spraying of fungicides to protect quality of grain.	

Horticulture				
Crop Dry chilli	Provide drainage and application of urea For induction of growth @ 15-20 Kg/ha at vegetative and flowering stages and harvest the crop at physiological maturity			
Heavy rainfall with high speed winds in a short span				
Horticulture **Dry chilli**	Provide drainage	Provide drainage	Provide drainage	
Outbreak of pests and diseases due to unseasonal rains				
Horticulture **Dry chilli**	Control of pest and disease in holistic approaches with proper PP chemicals. For control of thrips & mites use methyalparathion 50EC or 1gm 75 SP/lit of water. (For 1ha chemical requirement 450 to 540 gms). Follow IPDM for vegetables crops.	Adoption of IPM and IDM practices Go for need based plan protection	Quicker harvest	

2.3 Floods

Condition	**Suggested contingency measures**			
Transient water logging/ partial inundation	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**

Paddy	Drain out excess water Top dressing of extra 25 % N weeding Plant protection measures Take up re transplanting, if necessary or Gap filling	Drain out excess water Top dressing of extra 25 % N weeding Plant protection measures	Drain out excess water Topdressing Plant protection measures Harvesting at physiological maturity stage	
Maize	-do-	-do-	-do-	
Sorghum	-do-	-do-	-do-	
Groundnut	-do-	-do-	-do-	
Hybrid Cotton	Drain out excess water Topdressing Intercultivation & weeding Plant protection measures Spraying of plant growth regulators (NAA @ 10 PPM spray of 1 % MgS04 Take up re transplanting, if necessary or Gap filling	Drain out excess water Topdressing Intercultivation & weeding Plant protection measures	Drain out excess water Topdressing Plant protection measures	
Bajra	Drain out excess water Topdressing Intercultivation & weeding Plant protection measures Take up re transplanting, if necessary or Gap filling	-do-	Drain out excess water Topdressing Plant protection measures Harvesting at physiological maturity stage	
Continuous submergence for more than 2 days				
Paddy	Drain out excess water Top dressing of extra 25 % N weeding Plant protection measures Take up re transplanting, if necessary or Gap filling	Drain out excess water Top dressing of extra 25 % N weeding Plant protection measures	Drain out excess water Topdressing Plant protection measures	
Maize	Resowing Draining the excess water	-do-	-do-	

Hy. Cotton	-do-	-do-	-do-	
Sorghum	-do-	-do-	-do-	
Groundnut	-do-	-do-	-do-	
Bajra	-do-	-do-	-do-	
Sea water intrusion	Not Applicable			

2.4 Extreme events: Heat wave / Cold wave/Frost/ Hailstorm /Cyclone: Not Applicable

Extreme event type	**Suggested contingency measure**			
	Seedling / nursery stage	**Vegetative stage**	**Reproductive stage**	**At harvest**
Heat Wave	NA			
Cold wave	NA			
Frost	NA			
Hailstorm	NA			
Cyclone	NA			

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	Each district 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 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 Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and ***Cenchrus ciliaris*** as grass with ***Leucaena leucocephala*** as tree component 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, MP chari, HC-136, HD-2, GAINT BAJRA, L-74, K-677, Ananad/African Tall, Kisan composite, Moti, Manjari, B1-7 Chopping of fodder should be made as mandatory in every village through supply and establishment of good quality crop cutters. Establishment of backyard production of Azolla Establishment of backed yard cultivation of para grass with drain water from bath room/washing area Avoid feed wastage Avoid burning of wheat straw and maize stover Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon	Harvest and use all the failed crop (Sorghum, Bajra, Maize, Rice, Wheat, Horse gram, Groundnut) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipol etc) and unconventional feeds resources available and use as fodder for livestock (LS). Available feed and fodder should be cut from CPRs and stall fed in order to reduce the energy requirements of the animals **Mild drought :** hay should be transported to the needy areas **Moderate drought:** hay, silage and vitamin & minerals mixture should be transported to the needy areas **Severe drought:** UMMB, hay, concentrates and vitamin & mineral mixture should be transported to the needy areas. 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 should be given only to the highly productive and breeding animals Provision of emergency grazing/feeding (Cow-calf camps or other special arrangements to protect high productive & breeding stock) Available kitchen waste should be mixed with dry fodder while feeding Arrangements should be made for mobilization of small ruminants across the districts where no drought exits Unproductive livestock should to be culled during severe drought Create transportation and marketing facilities for the culled and unproductive animals (10000-20000 animals) Subsidized loans (5-10 crores) should be provided to the livestock keepers	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 Concentrates supplementation should be provided to all the animals.

	Proper drying, bailing and densification of harvested grass Creation of permanent fodder, feed and fodder seed banks in all drought prone areas		
Cyclone	Harvest all the possible wetted grain (sorghum/bajra/maize etc) and use as animal feed. 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. Don't allow the animals for grazing in case of earlyfore warning (EFW) In case of EFW, shift the animals to safer places.	Treatment of the sick, injured and affected animals through arrangement of mobile emergency veterinary hospitals / rescue animal health workers. Diarrhea out break may happen arrangement should be made to mitigate the problem Protect the animals from heavy rains and thunder storms In severe cases un-tether **or** let loose the animals Arrange transportation of highly productive animals to safer place Spraying of fly repellants in animal sheds	Repair of animal shed Deworm the animals through mass camps Vaccinate against possible out breaks Proper disposable of the dead animals / carcasses by burning / burying with line powder in pit Bleach / chlorinate (0.1%) drinking water or water resources Collect drowned crop material, dry it and store for future use Sowing of above mention short duration fodder crops in unsown and water logged areas Application of urea (20-25kg/ha) in the CPR's to enhance the bio mass production.
Floods	In case of EFW, harvest all the crops (Sorghum, Bajra, Maize, Rice, Wheat, Horse gram, Groundnut) that can be useful as fodder in future (store properly) Don't allow the animals for grazing 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 Arrangement for transportation of animals from low lying area and also for rescue animal health workers	Transportation of animals to elevated areas Stall feeding of animals with stored hay and concentrates Proper hygienic and sanitation of the animal shed In severe floods, un-tether or let loose the animals Emergency outlet establishment for required medicines or feeds in each village Spraying of fly repellants in animal sheds	Repair of animal shed Bring back the animals do the shed Cleaning and disinfection of the shed Bleach (0.1%) drinking water / water sources Deworming with brood spectrum dewormers

			Vaccination against possible out breaks Proper disposable of the dead animals / carcasses by burning / burying with line powder in pit drying the harvested crop material and proper storage.
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) H_2O sprinklers / foggers in the shed **iii)** Application of white reflector paint on the roof **Cold wave :** Covering all the wire meshed walls / open area with gunny bags/ polyethylene sheets (with a mechanism for lifting during the day time and putting down during night time)	Allow the animals early in the morning or late in the evening for grazing during heat waves Allow for grazing between 10AM to 3PM during cold waves Feed green fodder/silage / concentrates during day time and roughages / hay during night time in case of heat waves Add 25-50 ml of edible oil in concentrates and fed to the animal during cold waves Put on the foggers / sprinkerlers during heat weaves and heaters during cold waves In severe cases, vitamin 'C' and electrolytes should be added in H_2O during heat waves. Apply / sprinkle lime powder in the animal shed during cold waves to neutralize ammonia accumulation	Feed the animals as per routine schedule Allow the animals for grazing (normal timings)
Health and Disease management	Specify the endemic diseases (species wise) in that region Identification of veterinary staff and animal health workers Constitution of Rapid Action Veterinary Force Storage of emergency medicines and medical kits Timely vaccination (as per enclosed vaccination schedule) against all endemic diseases	Rescue of sick and injured animals and their treatment Conducting mass animal health camps	Conducting mass animal health camps Conducting fertility camps Mass deworming camps

	Surveillance and disease monitoring network establishment		
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	Rain water harvesting and create water bodies/watering points (when water is scarce use only as drinking water for animals) Identification of water resources	Restrict wallowing of animals in water bodies/resources	Specify the options (place and area) for establishment of drinking water reserves

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	**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 line 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 line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Cyclone			
Shortage of feed ingredients	In case of EFW, shift the birds to safer place Storing of 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 line powder in pit Disposal of poultry manure to prevent protozoal problem Supplementation of coccidiostats in feed Vaccination against RD
Heat wave and cold			

wave			
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	De worming and vaccination against RD and fowl pox	Supplementation of house hold grain Provide cool and clean drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed	Routine practices are followed
Cold wave			
Shelter/environment management	Provision of proper shelter Arrangement for brooding Assure supply of continuous electricity	Close all openings with polythene sheets In severe cases, arrange heaters Don't allow for scavenging during early morning and late evening	Routine practices are followed
Health and disease management	Arrangement for protection from chilled air	Supplementation of grains Antibiotics in drinking water to protect birds from pneumonia	Routine practices are followed

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
1) Drought			

A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow			
(ii) Changes in water quality			
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow			
(ii) Impact of salt load build up in ponds / change in water quality			
2) Floods			
A. Capture			
Marine			
Inland			
(i) Average compensation paid due to loss of human life			
(ii) No. of boats / nets/damaged			
(iii) No.of houses damaged			
(iv) Loss of stock			
(v) Changes in water quality			
(vi) Health and diseases			
B. Aquaculture			
(i) Inundation with flood water			
(ii) Water continuation and changes in water quality			

(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, huts etc)			
3. Cyclone / Tsunami			
A. Capture			
Marine			
(i) Average compensation paid due to loss of fishermen lives			
(ii) Avg. no. of boats / nets/damaged			
(iii) Avg. no. of houses damaged			
Inland			
B. Aquaculture			
(i) Overflow / flooding of ponds			
(ii) Changes in water quality (fresh water / brackish water ratio)			
(iii) Health and diseases			
(iv) Loss of stock and inputs (feed, chemicals etc)			
(v) Infrastructure damage (pumps, aerators, shelters/huts etc)			
4. Heat wave and cold wave			
A. Capture			
Marine			

Inland			
B. Aquaculture			
(i) Changes in pond environment (water quality)			
(ii) Health and Disease management			