State: KARNATAKA

Agriculture Contingency Plan for district: HAVERI

1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Deccan Plateau, Hot Semi-Arid Eco-Region (6.4)		
	Agro-Climatic Region (Planning Commission)	Southern Plateau and Hills region (X)		
	Agro Climatic Zone (NARP)	Nothern Transition zone, Northern Dry zone (KA-8, KA-3)		
	List all the districts or part thereof falling under the NARP Zone	Dharwad, Belgaum, **Haveri**		
	Geographic coordinates of district	Latitude	Longitude	Altitude
		14º47'59.85"N	75º23'59.92"	630m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station, Hanumanamatti – 581 135; Taluk &District: Haveri		
	Mention the KVK located in the district	Krishi Vigyan Kendra Hanumanamatti - 581 135, Tq:Ranebennur, Dist.: Haveri		
1.2	**Rainfall**	Average (mm)	Normal Onset	Normal Cessation
	SW monsoon (June-September)	484	1st week of June	2nd week of September
	NE Monsoon (October-December)	160	September II FN to October I fortnight	4th week of November
	Winter (January - Febraury)	6		
	Summer (March-May)	127		
	Annual	777		

1.3	**Land use pattern of the district** (latest statistics)	Geographical area (‘000 ha)	Land under non-agricultural use	Net sown area	Permanent pastures	Cultivable waste land	Land under Misc. tree crops and groves	Barren and uncultivable land	Current fallows	Other fallows
	Area (‘000 ha)	485.2	31.7	366.0	12.2	3.0	2.1	5.8	12.3	5.3

Source: Agricultural Census 2005-06, Directorate of Economics & Statistics

1. 4	**Major Soils**	Area (‘000 ha)	Percent (%) of total
	Medium to deep black soils	244.31	49.42
	Red Sandy loam Soils	228.34	46.18
	Red Shallow Soils	21.76	4.40
1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	366.0	116.9 %
	Area sown more than once	61.9	
	Gross cropped area	427.9	

1.6	**Irrigation**	**Area (‘000 ha)**			
	Net irrigated area	62.6			
	Gross irrigated area	71.7			
	Rainfed area	303.3			
	Sources of Irrigation	Number	Area (‘000 ha)		% area
	Canals		0.0		0.0
	Tanks	1904	9.9		14.0
	Open wells	2105			
	Bore wells	19606	44.1		62.4
	Lift irrigation	246			
	Other sources	-			
	Total	23862	16.7		23.6
	Pump sets	31223	70.7		100.0
	Micro-irrigation				
	Ground water availability and use	No. of blocks	% area	Quality of water	
	Over exploited	1			
	Critical	1			
	Semi- critical				
	Safe	Varada river belt & Hangal			
	Waste water availability and use				

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

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***		
	Maize	20.7	92.8	-	2.1	2.0	117.6
	Oilseeds	6.1	25.0	-	13.7	10.7	55.4
	Sorghum	6.0	22.4	-	20.6	0.4	49.5
	Paddy	16.9	27.4	-	-	1.5	45.7
	Cotton	6.4	25.7	-	11.9	-	43.9
	Horticulture crops - Fruits	**Total area**					
	Mango	2560					
	Banana	2125					
	Sapota	1451.0					
	Horticultural crops - Vegetables	**Total area**					
	Chilli	6084					
	Okra	1889					
	Brinjal	851					

	Medicinal and Aromatic crops	
	Plantation crops	**Total area**
	Dry Chilli	37204
	Coconut	3101
	Betlevine	980
	Flower crops	
	Marigold	543
	Fodder crops	**Total area**
	Total fodder crop area	N.A

	Grazing land	
	Sericulture etc	0.745
	Others (Specify)	

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)	164.4	90.7	255.1
	Crossbred cattle	7.2	49.3	56.5
	Non descriptive Buffaloes (local low yielding)	13.2	106.5	119.7
	Graded Buffaloes			
	Goat			150.5
	Sheep			265.7
	Others (Camel, Pig, Yak etc.)			4.9
	Commercial dairy farms (Number)			
1.9	**Poultry**			
	Commercial	515.3		
	Backyard			
1.10	**Fisheries**	Area (ha)	Yield (t/ha)	Production (tones)
	Brackish water	-	-	-
	Fresh water	-	-	-
	Others	-	-	-

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

1.11	**Production and Productivity of major crops**	**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)
	Maize	33.4	2650	2.9	2690.3	2.7	2625.4	38.9	2655.3
	Cotton	194.2	380	5.2	190	-	-	199.4	285

	Sorghum	38.9	1748	12.5	585	0.7	1845	52.1	1392.7
	Rice	75.6	1950	-	-	2.0	2250	77.7	2100
	Groundnut	21.3	1120	-	-	7.5	1220	28.8	1170
Others	Green gram	2.7	210	-	-	-	-	2.7	210
	Major Horticultural crops								
	Mango	-	-	-	-	-	-	22481	8.8
	Sapota							15696	12.9
	Banana	-	-	-	-	-	-	61896	29.1
	Chiili	-	-	-	-	-	-	48681	1.38
	Brinjal							20425	27.9
	Okra	-	-	-	-	-	-	15307	8.2
	Coconut	-	-	-	-	-	-	398 lakh nuts	0.1 lakh Nuts
	Betlevine							21688 lakh leaves.	24.9 lakh leaves.

Source : Directorate of Economics and Statistics

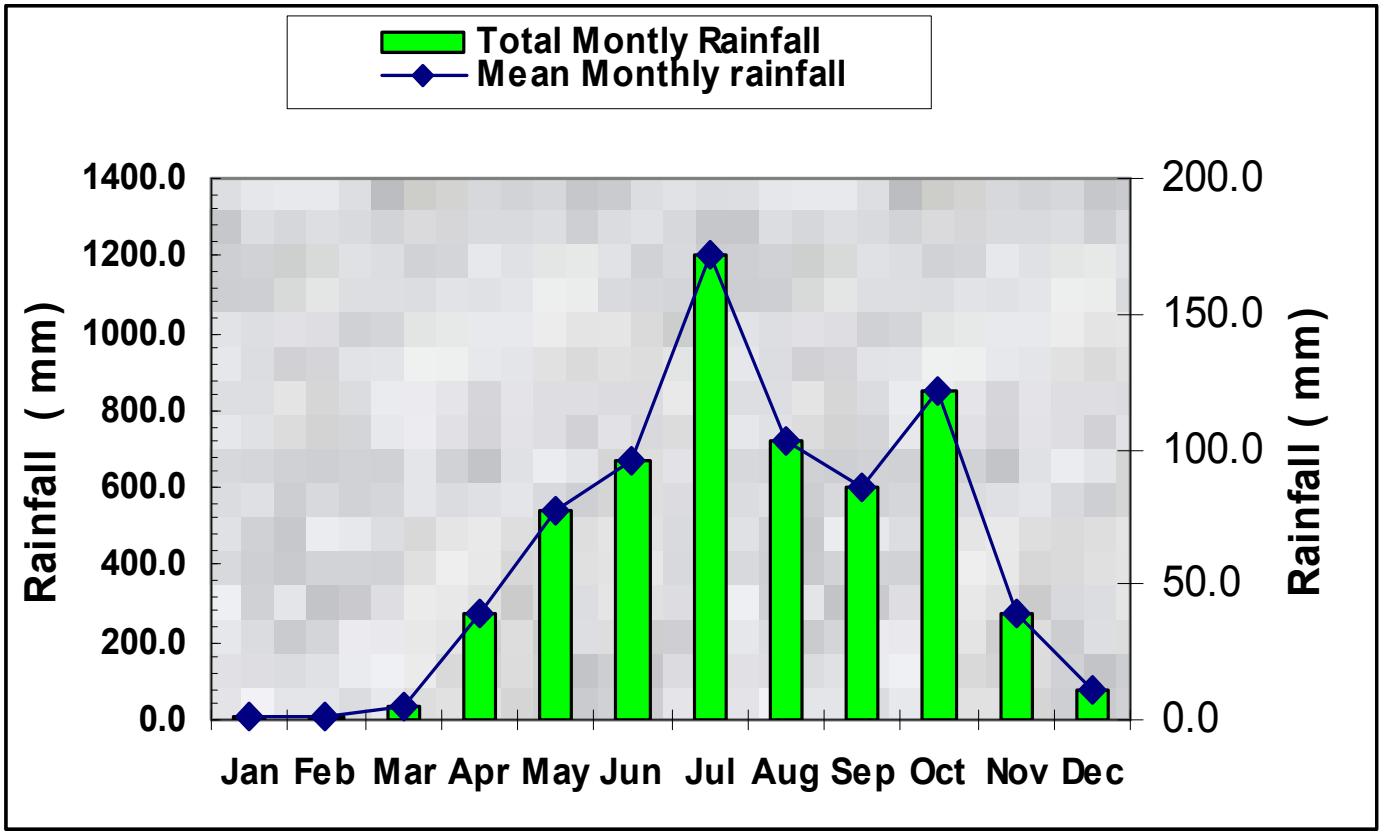
1.12	**Sowing window for 5 major crops (start and end of sowing period)**	**Maize**	**Cotton**	**Sorghum**	**Rice**	**Groundnut**
	Kharif- Rainfed	June 1st week-July 2nd week	June 1st week-July 2nd week	June 1st week-July 2nd week	May 4th week-June 4th week	June 1st week-July 2nd week
	Kharif-Irrigated	May 2nd week-July 2nd week	May 2nd week-July 2nd week	--	May 2nd week-July 2nd week	--
	Rabi- Rainfed	--		Sept 15th -Oct 15th		--
	Rabi-Irrigated	--		Sept 15th -Oct 15th		Dec 2nd week-Jan 2nd week

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) Sugarcane: Army worm & grass hopper Cotton: Rust and grey mildew Maize: Tersicum Leaf Blight , rust & stem borer Chilli: Murda complex,,Anthracnose & powdery mildew		√	

1.14	**Include Digital maps of the district**	Location map of district within State as Annexure I	Enclosed : Yes
		Mean annual rainfall as Annexure 2	Enclosed : No
		Soil map as Annexure 3	Enclosed : Yes

Annexure1: Location map of Haveri District in Karnataka State

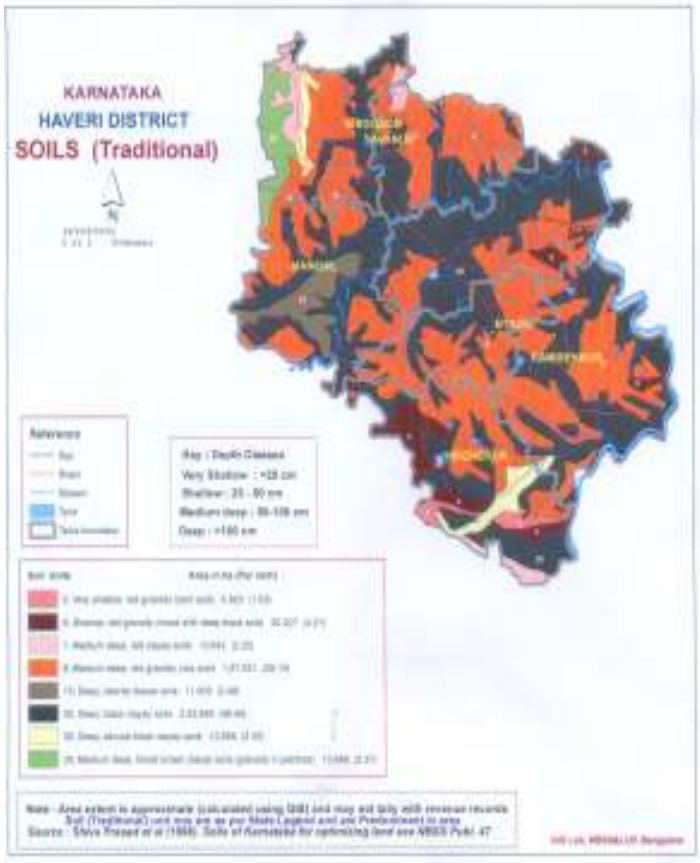
Annexure –II Mean Annual Rainfall



Rainfall received during current and previous years(mm)
HRS HAVERI(DEVIHOSUR)

Months	MEAN 1991-99	2002	2003	2004	2005	2006	2007	2008	2009
JANUARY	1.7	-	-	-	3.8	0.0	0.0	0.0	0.0
FEBRUARY	2.5	43.40	-	-	0	0.0	0.0	0.0	0.0
MARCH	3.4	-	51.00	10.60	0	2.6	0.0	116.0	41.2
APRIL	30.28	81.10	82.40	59.20	72	2.1	60.6	22.6	22.2
MAY	73.08	71.30	18.20	179.40	60.3	101.6	63.0	60.0	100.4
JUNE	126.14	103.80	63.60	73.40	112.7	142.6	144.30	131.2	42.8
JULY	149.33	35.60	64.80	56.20	296.5	149.1	177.80	106.4	281.2
AUGUST	116.73	123.90	34.00	165.30	159.4	119.5	237.60	167.6	88.8
SEPTEMBER	70.05	56.40	5.60	75.90	82.00	94.8	152.0	50.0	135.0
OCTOBER	145.78	109.50	165.40	42.20	75.4	10.8	120.0	69.0	122.4
NOVEMBER	68.63	-	-	0.80	0.20	61.30	34.80	46.0	69.7
DECEMBER	16.08	-	5.20	-	0.0	-	3.40	0.0	50.2
TOTAL	799.46	625.00	490.20	661.90	862.30	684.4	993.50	768.8	953.9

Annexure 3: Soil map of Haveri District



Source: NBSS & LUP

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition			Suggested Contingency measures		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks (June 3rd week)	Medium to deep black soils	Maize –Rabi sorghum	No change in cropping system	Follow normal agricultural practices	-
		Maize + Redgram (6:2)	-do-	-do-	-
		Hybrid cotton (Bt)	-do-	-do-	-
		Rice followed by short duration pulse (Green gram/ Black gram)	-do-	-do-	-
		Groundnut) - R. Jowar	-do-	-do-	-
		Soybean – Rabi Sorghum	-do-	-do-	-
		Green gram - Sorghum	-do-	-do-	-
		Chilli + Desi cotton	-do-	-do-	-
	Red loamy soils	Maize	No change in cropping system		-
		Hybrid cotton	-do-	-do-	
		Sorghum + Pigeonpea (5:1 and 4:2)	-do-	-do-	

		Spreading Groundnut	-do-	-do-	
		Little Millet + Redgram (6:1)	-do-	-do-	

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 4 weeks (July 1st week	Medium to deep black soils	Maize –Rabi sorghum	No Change	Ridge and furrow method of sowing;	
		Maize + Redgram (6:2)	-do-	-do-	
		Hybrid cotton (Bt)	-do-	Reduce spacing (90 x 60 cm)	
		Rice followed by short duration pulse (Green gram/ Black gram)	-do-	Normal	
		Groundnut) - R.Jowar	-do-	-do-	
		Soybean-Rabi Sorghum	Fallow- Rabi Sorghum	-do-	
		Green gram - Rabi Sorghum	Fallow- Rabi Sorghum	do-	
		Chillie + Desi cotton	No Change	do-	
	Red loamy soils	Maize	do-	-do-	

		Rice followed by short duration pulse	do-	-do-	
		Hybrid cotton	do-	-do-	
		Sorghum +Pigeon pea (5:1 and 4:2)	do-	do-	
		Groundnut	Spreading groundnut (DSG-1)	do-	
		Little Millets + Redgram (6:1)	No Change	-do-	

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 2nd week)	Medium to deep black soils	Maize –Rabi sorghum	No change	Ridge and furrow method of sowing	
		Maize + Redgram (6:2)	No change	Ridge and furrow method of sowing	
		Hybrid cotton (Bt)	No change	Reduce Spacing (90 cm x 60 cm)	
		Rice followed by short duration pulse (Green gram/ Black gram)	sowing	Seed Hardening, seed pelleting for Rabi crops	
		Groundnut) - R.Jowar	Sunflower-Rabi Sorghum	do-	
		Soybean - Rabi Sorghum	Sunflower -Rabi Sorghum	do-	
		Green gram - Sorghum	Sunflower-Rabi	do-	

			Sorghum		
		Chilli + Desi cotton	No change	Normal	
	Red loamy soils	Maize Rice followed by short duration pulse Hybrid cotton Sorghum +Pigeon pea (5:1 and 4:2) Spreading groundnut Little Millets + Redgram (6::1)	Avoid Kharif Sorghum + Pigeon pea sowing Avoid little millet Go for sunflower, Bajra, Horse gram	Ridge and furrow method of sowing Conservation furrows Use short duration rice varieties (IR 64/Rasi/MTU 1010), use 4-5 seedlings/hill for transplanted rice for aged seedlings Reduced Spacing for Hybrid cotton 60 x 60 cm Seed Hardening, seed pelleting Protective irrigation wherever possible	KSSC, NSC,UASD and private hybrid seed in changed cropping system

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 1st week)	Medium to deep black soils	Maize) –Rabi sorghum	Go for Sunflower sowing	Ridges and furrow method of sowing, compartment bunding for rabi crops Weed control Seed hardening, seed pelleting Protective irrigation wherever possible	
		Maize + Redgram (6:2)	Go for Sunflower sowing		
		Hybrid cotton (Bt)	Go for kharif fallow-Rabi Sorghum Avoid Hybrid cotton		
		Rice followed by short duration pulse (Greengram/ Blackgram)	-		
		Groundnut - R. Jowar	-		

		Soybean -R.Sorghum	Avoid soybean		
		Green gram - Sorghum	Avoid green gram		
		Chillie +Desi cotton	-		
	Red loamy soils	Maize	Go for Desi Cotton, Sunflower, Horse gram, Kharif fallow-Rabi Sorghum	Ridge and furrow method of sowing Conservation furrows Use short duration rice varieties (IR 64/Rasi/MTU 1010), use 4-5 seedlings/hill for transplanted rice for aged seedlings Reduced Spacing for Hybrid cotton 60 x 60 cm Seed hardening, seed pelleting	
		Rice followed by short duration pulse	-		
		Hybrid cotton	Go for Desi Cotton, Sunflower, Horse gram, Kharif fallow-Rabi Sorghum		
		Sorghum +Pigeonpea (5:1 and 4:2)	Go for Desi Cotton, Sunflower, Horse gram, Kharif fallow-Rabi Sorghum		
		Spreading groundnut	-		
		Little Millets + Red gram (6:1)	Go for Desi Cotton, Sunflower, Horse gram, Kharif fallow-Rabi Sorghum		

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 to deep black soils	Maize –Rabi sorghum Maize + Redgram (6:2) Hybrid cotton (Bt) Rice followed by short duration pulse (Green gram/ Blackgram) Groundnut - R.Jowar Soybean -R.Sorghum Green gram - Sorghum Chilli +Desi cotton	Frequent Intercultivation Gap filling with Cowpea/Horse gram	Conservation furrows Deep and frequent intercultivation/ soil mulch	Supply of intercultural implements through RKVY

	Red loamy soils	Maize Hybrid cotton Sorghum +Pigeon pea (5:1 and 4:2) Spreading groundnut Little Millets + Redgram (6:1)	Frequent intercultivation Dust mulching	Conservation furrows	

Condition			**Suggested Contingency measures**		
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)		**Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At vegetative Stage	Medium to deep black soils	Maize –Rabi sorghum Maize + Redgram (6:2) Hybrid cotton (Bt) Rice followed by short duration pulse (Green gram/ Blackgram) Groundnut - R.Jowar Soybean -R.Sorghum Green gram - Sorghum Chilli +Desi cotton	Foliar application of N & K 2% Plant Protection measures for Defoliators	Protective irrigation Thinning, Frequent intercultivation Weed control Spraying of antitranspirant Kaoline 6%	
	Red loamy soils	Maize Hybrid cotton Sorghum +Pigeon pea (5:1 and 4:2) Spreading groundnut Little Millet + Redgram (6:1)	Foliar application of N & K	Weed control Frequent Intercultivation Spraying of antitranspirants Kaoline 6%	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**
At flowering/ fruiting stage	Medium to deep black soils	Maize –Rabi sorghum Maize + Redgram (6:2) Hybrid cotton (Bt) Rice followed by short duration pulse (Green gram/ Blackgram) Groundnut - R.Jowar Soybean -R.Sorghum Green gram - Sorghum Chilli +Desi cotton	Foliar application of N & K Harvesting maize for green cob and fodder purpose Go for early rabi sowing PP for defoliators and sucking pests in groundnut and soybean, chilli, greengram	Compartment bunding in early harvested crop Protective irrigation	
	Red loamy soils	Maize Hybrid cotton Sorghum +Pigeon pea (5:1 and 4:2) Spreading groundnut Little Millets + Redgram (6:1)	Foliar application of N & K Horsegram Foliar application of N& K Harvesting maize for fodder and early rabi sowing Spraying of growth Hormones like Planofix @ 250ppm	Inter cultivation	

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Medium to deep black soils	Maize –Rabi sorghum Maize + Redgram (6:2) Hybrid cotton (Bt) Rice followed by short duration pulse (Green gram/ Blackgram) Groundnut - R.Jowar Soybean -R.Sorghum Green gram - Sorghum Chilli +Desi cotton	Life saving irrigation Harvesting at physiological maturity and plan for early rabi sowing	-	Threshing implements through RKVY; supply groundnut diggers
	Red loamy soils	Maize Hybrid cotton Sorghum +Pigeon pea (5:1 and 4:2) Spreading Groundnut Little Millets + Redgram (6:1)	Life saving irrigation Harvesting at physiological maturity Plan for growing rabi crops Horsegram	-	Supply cotton stack pullers

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/ limited release of water in canals due to low rainfall	Medium/Shallow red/black paddy soils	- Paddy	- Maize/Cotton in up lands.	- Earthing up, laying in to ridges and furrows Uplands are prone for weed menace, hence maize and cotton can be cultivated as in neighbouring districts.	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Non release of water in canals under delayed onset of monsoon in catchment	Medium/Shallow red/black paddy soils	Paddy	- Maize/Cotton in up lands.	-do-	

Condition			Suggested Contingency measures		
	Major Farming situation	**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	Tank fed black and red soils	Rice-pulse Hy.Cotton (Bt) Maize	Maize -pulse Hybrid Bt cotton Soybean-R.Sorghum	Alternate furrow irrigation Irrigation at critical stages Intercultivation Mulching.	

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	Bore well irrigated medium deep black and red loamy soils	Seed production in Cotton, Sunflower, Maize	No change	Adopt micro-irrigation systems Alternate furrow irrigation Mulching Growth retardant spray Paired row planting Frequent intercultivation,	Recharging of bore wells

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

Condition	Suggested contingency measure			
Continuous high rainfall in a short span leading to water logging	**Vegetative stage**	**Flowering stage**	**Crop maturity stage**	**Post harvest**
Maize	Drain out excess water; Top dress the crop with N & K; Intercultivation & weeding; Plant protection measures; Spraying of growth retardants	Drain out excess water; Top dress the crop with N & K; Hormonal spray for retention of flower in Hy. Cotton. Staking in maize& paddy. Plant protection measures, for control of diseases in particular	Drain out excess water. Harvest at physiological maturity. Proper dying. Spraying of fungicides to protect quality of grain. Prophylactic against store grain pests. Staking in maize & paddy.	Proper drying of produce after harvest Fumigation for stored grain pests
Hy. Bt. Cotton				
Rice				
Sorghum				
Groundnut				
Chilli + Cotton				
Horticulture				
Mango	Opening of the drainage and	Opening of the drainage and application	Opening of the drainage and application	Shift the produce

	application of urea as a top dress	of urea as a top dress	of urea as a top dress	to safer place
Sapota	-do-	-do-	-do-	-do-
Banana	-do-	-do-	-do-	-do-
Cocunut	-do-	-do-	-do-	-do-
Betlevine	-do-	-do-	-do-	-do-
Chilli	Opening of drainage, application of Urea (2%) and micronutrients through spray	Open drainage And Take up Plant protection	Open drainage And Take up Plant protection	Shift the produce to safer place
Okra	-do-	-do-	-do-	-do-
Brinjal	-do-	-do-	-do-	-do-
Heavy rainfall with high speed winds in a short span				
Maize	Drain out excess water Top dressing with nitrogen Intercultivation Weed control Spray plant protection chemicals	Drain out excess water Top dressing with nitrogen Intercultivation in hy. Cotton , groundnut and chilli + cotton Weed control Spray plant protection chemicals Hormonal spray for retention of flowers and bolls in HY. Cotton Staking in maize and rice	Drain out excess water Harvest at Physiological maturity Spraying of fungicides to protect quality of grains Staking in maize and rice	Proper drying of produce after harvest Fumigation for store-grain pests
Hy. Bt. Cotton				
Rice				
Sorghum				
Groundnut				
Chilli+cotton				
Horticulture				
Mango	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Shift the produce to safer place
Sapota	-do-	-do-	-do-	-do-

Banana	-do-	-do-	-do-	-do-
Coconut	-do-	-do-	-do-	-do-
Betlevine	Opening of the drainage and application of urea as a top dress. Staking of betlevine plants with suitable poles.	Opening of the drainage and application of urea as a top dress. Staking of betlevine plants with suitable poles.	Opening of the drainage and application of urea as a top dress. Staking of betlevine plants with suitable poles.	Shift the produce to safer place
Chilli	Earthing up ,opening of drainage, application of Urea (2%) and micronutrients through spray	Earthing up,open drainage, application of Urea (2%) and take up Plant protection	Earthing up ,open drainage, application of Urea (2%) and take up Plant protection	-do-
Okra	Earthing up ,opening of drainage, application of Urea (2%) and micronutrients through spray	Earthing up, open drainage, application of Urea (2%) and take up Plant protection	Earthing up, open drainage, application of Urea (2%) and take up Plant protection	-do-
Outbreak of pests and diseases due to unseasonal rains				
Maize	Plant Protection measures for TLB (Mancozeb 2.5g/l)	PP measures for Stalk rot/rust//TLB by spraying Contaff @ 0.1 %		
Cotton	Plant Protection measures for Mirid bug (acephate 1g/l)	PP measures for Reddening (MgSO4 1% 10g/l)/Mirid bug		
Sorghum				
Rice				
Groundnut	Plant Protection for Seedling rot /wilt	PP measures for LLS/wilt (Chlorothaloni 0.2 %)		

	(Captan 2g/kg seed treatment) /defoliators (Quinalphos@ 2ml/l)			
Horticulture				
Mango	1) **Hoppers :** a) Spray Nimbicidin (3000) ppm @ 5 ml / liter b) Spray Neemazol (10000 ppm) @ 2 ml / liter c) Spray Carbaryl 50 WP @ 4 g / liter d) Spray Imidachloprid 200 SL @ .25 ml / liter Anthracnose Powdery mildew : Spray withy Carben dazim 50WP @ 1 g /			
Sapota	Leaf eating caterpiler: Spray with Quinalphos 25EC @2ml/liter Crop2 SAPOTA			
Banana	**Rhizome weevil** **Pseudo stem weevil** 1) Apply Neem Cake @ 250 g / Plant + Apply Chlorpyriphos 25 G @ 15 g / Plant + Drench Chlorpyriphos 50 EC @ 5 ml / liter water (1-2 liters / plant) **Leaf Spot :** 1) Spray Propiconozole 25 EC @ 1.0 ml / liter **Panama wilt :** 1) Drench with Carben dazim @ 2 g / liter (2-3 liter / Plant)			
Coconut	**Mites :** 1) Spray with Neemazol (10,000 PPM) @ 3 ml / liter of water 2) Apply Neem Cake @ 0.5 - 1 kg / tree ,2 times at the interval of 6 weeks **Black Headed Hairy :** 1) Rlease biocantrol agent ,*Nephentis cerenopa* larval parasite @ 10 **Cater pillar** adults / tree 2) spray Quinolphos 50 EC or Profenophos 50 EC @ 2 ml / liter **Stem bleeding:** 1) Clean the Spot with Sharp Knife and apply Bordeux Paste (10%) or Colaxin (5%) paste to the spot. 2) Apply Neem Cake @ 5 kg / Plant			
Betlevine	Snail : Apply Metaldehyde bait @2-3kg /acre **Wilt:** 1) Seedling dip in *Pseudomonas florescence* solution of Conc. 10 g / liter. 2) Drench with *Pseudomonas florescence* @ 10 g / liter or Carbendazim @ 3 g / liter. 3) Apply neem cake @1kg/plant			

	4) Apply Carbofuran 3G @1O Kg/acre .
Chilli	**Thrips:** 1) Spray Imidachloprid 200 SL @ 0.25 ml / liter or Difenthuron 50 WP @ 1 g / liter or Fipronil 20 EC @ 1 ml / liter. **Mites :** 2) Spray Fenazaquin 25 EC @ 2 ml / liter or Vertimec 1.9 EC @ 0.5 ml / liter or Difenthuron 50 WP @ 1 g / liter. **Fruits borer:** 1) Grow 1 row of Mari gold as a trap crop after every 18 rows of Chilli. 2) Spray Nimbicidin (3000 PPM) @ 5 ml / liter or Profenophos 50 EC @ 2 ml / liter or Novaluron (IGR) 10 EC @ 1 ml / liter or Flubendiamide 18 wG @ 0.5 g / liter of water. **Powdery mildew:** 1) Spray with Haxaconozole 5 EC or Propiconozole 25 EC or Triademifon 50 ml / liter. **Wilt:** 1) Seedling dip in *Pseudomonas florescence* solution of Conc. 10 g / liter. 2) Drench with *Pseudomonas florescence* @ 10 g / liter or Carbendazim @ 3 g / liter.
Okra	Jassids - Imidacloprid 200SL @0.25ml/l Shoot and 1) Spray 0.5 ml Phosphomidon 85 W. S.C. along with sulphur @3 g/litre of water. Fruit borer 2) spray Melathion 50 E.C or Carboryl 4g 50 W.P. along with sulphur @3 g/litre of water. Cercospora leaf spot: Spray 1 g Carbendizen /litre of water. Yellow mosaic disease: spay 1.7 Dimethoate/litre of water Powdery mildew: spray 1 ml Penaconozole /litre.
Brinjal	Jassids - Imidacloprid 200SL @0.25ml/l Shoot and i) Apply neem cake at the time of planting @1q/acre 2) Spray 0.5 ml Phosphomidon 85 W. S.C. along with sulphur @3 g/litre of water. Fruit borer 3) Spray Melathion 50 E.C or Carboryl 4g 50 W.P. along with sulphur @3 g/litre of water. Yellow mosaic disease: spay 1.7 Dimethoate/litre of water Powdery mildew: spray 1 ml Penaconozole /litre. Wilt :1)Apply *Tichoderma* @2-3kg /acre 2) Seedling dip in *Pseudomonas florescence* solution of Conc. 10 g / liter. 3) Drench with *Pseudomonas florescence* @ 10 g / liter or Carbendazim @ 3 g / liter.

2.3 Floods

Condition	**Suggested contingency measures**			
Transient water logging/ partial inundation	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Maize Hy. cotton Rice Sorghum groundnut Chilli + Desi cotton	Drain out excess water Top dressing Intercultivation & weeding Plant protection measures	Drain out excess water Top dressing nitrogen Intercultivation & weeding Plant protection measures	Drain out excess water Topdressing Plant protection measures Harvesting at physiological maturity stage	Drain out excess water Harvest at physiological maturity Herbicide spray for control of weeds and prepare land for rabi sowing
Horticulture				
Mango	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Shift the produce to safer place
Sapota	-do-	-do-	-do-	-do-
Banana	-do-	-do-	-do-	-do-
Coconut	-do-	-do-	-do-	-do-
Betlevine	-do-	-do-	-do-	-do-
Chilli	-do-	-do-	-do-	-do-
Okra	-do-	-do-	-do-	-do-
Brinjal	-do-	-do-	-do-	-do-
Continuous submergence for more than 2 days				
Maize Hy. cotton Rice	Re-sowing Draining the excess water in sunflower, groundnut,	Drain out excess water Top dressing Intercultivation	Drain out excess water Topdressing Plant protection measures	Drain out excess water Harvest at physiological maturity

Sorghum groundnut Chilli + Desi cotton	Bt.cotton Avoid green gram, black gram, soybean	Re-sowing with suitable crop like maize, sunflower in the vent of crop failure	Harvesting at physiological maturity stage	Herbicide spray for control of weeds and prepare land for rabi sowing
Horticulture				
Mango	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Opening of the drainage and application of urea as a top dress	Shift the produce to safer place
Sapota	-do-	-do-	-do-	-do-
Banana	-do-	-do-	-do-	-do-
Coconut	-do-	-do-	-do-	-do-
Betlevine	-do-	-do-	-do-	-do-
Chilli	-do-	-do-	-do-	-do-
Okra	-do-	-do-	-do-	-do-
Brinjal	-do-	-do-	-do-	-do-
Sea water inundation	NA			

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

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

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	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	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.

	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 Proper drying, bailing and densification of harvested grass Creation of permanent fodder, feed and fodder seed banks in all drought prone areas	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	

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 early fore warning (EFW) Incase 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 Surveillance and disease monitoring network establishment	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
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[a]	**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	Use stored feed as supplement Don't allow for scavenging	Routine practices are followed

	grain like maize, broken rice, bajra etc, Culling of weak birds		
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	Deworming 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