State: Rajasthan

Agriculture Contingency Plan for District: Hanumangarh

1.0 District Agriculture profile					
1.1	**Agro-Climatic/Ecological Zone**				
	Agro Ecological Sub Region (ICAR)	Western Plain, Kachchh And Part Of Kathiawar Peninsula, Hot Arid Eco-Region (2.1) & Western Plain, Kachchh And Part Of Kathiawar Peninsula, Hot Arid Eco-Region (2.3)			
	Agro-Climatic Zone (Planning Commission)	TRANS GANGETIC PLAIN REGION (VI)			
	Agro Climatic Zone (NARP)	IRRIGATED NORTH WEST PLAIN ZONE (RJ-2)			
	List all the districts or part thereof falling under the NARP Zone	Hanumangarh & Sriganganagar districts			
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude	
		28°45’35’’ to 29°57’25’’	74°17’51’’ to 75°31’04’’	177 msl	
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Agricultural Research Station (SK Rajasthan Agricultural University) Sriganganagar-335001			
	Mention the KVK located in the district	Krishi Vigyan Kendra, Sangaria			
1.2	**Rainfall**	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep):	218.6	**12.2**	2nd Week July	3rd week Sept
	NE Monsoon(Oct-Dec):	19.3	**0.6**	NA	NA
	Winter (Jan- March)	39.5	**2.6**	-	-
	Summer (Apr-May)	36.2	**1.3**	-	-
	Annual	313.6	**16.7**	-	-

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)	970.3	**886.8**	18.4	**56.5**	3.7	4.8	**Nil**	**0.2**	41.5	**26.0**

*Source: Rajasthan Agricultural statistics at a glance 2008-09

1. 4	**Major Soils (common names like red sandy loam deep soils (etc.,)***	**Area ('000 ha)**	**Percent (%) of total**
	Medium, Light yellowish brown, Loamy	189.95	21.42
	Deep, Light yellowish brown, Loamy	434.71	49.02
	Deep, Light yellowish brown, Clayey	40.70	04.59
	Deep, Yellowish brown, Sandy	221.35	24.96

* mention colour, texture (sandy, loamy, clayey etc), depth and give vernacular name in brackets

1.5	**Agricultural land use**	Area ('000 ha)	Cropping intensity %
	Net sown area	819.3	150.6
	Area sown more than once	414.7	
	Gross cropped area	1234.0	

*Source: Rajasthan Agricultural statistics at a glance 2008-09

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	367.3		
	Gross irrigated area	669.1		
	Rainfed area	**452.0**		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		652.9	98.5
	Tanks	NIL	NIL	NIL
	Open wells	NIL	NIL	NIL
	Bore wells	**20625**	16.2	01.5
	Lift irrigation schemes	NIL:	NIL:	NIL:
	Micro-irrigation		**-**	**-**
	Other sources (please specify)	NIL:	NIL:	NIL:
	Total Irrigated Area		669.1	
	Pump sets (Diesel)	**16395**		
	No. of Tractors	**-**		
	Groundwater availability and use* (Data source: State/Central Ground water Department /Board)	No. of blocks/ Tehsils	(%) area	Quality of water (specify the problem such as high levels of arsenic, fluoride, saline etc)
	Over exploited	**NIL**	**NIL**	**NIL**
	Critical	**NIL**	**NIL**	**NIL**
	Semi- critical	**2**	**66.6**	**Good to Saline**
	Safe	**1**	**33.3**	**Saline**
	Wastewater availability and use	**-**	**-**	**-**
	Ground water quality	Marginal to poor (Only in ghaggar flood area ground water quality is good)		
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

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

1.7	**Major Field Crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***			**Summer**	**Total**
		Irrigated	***Rainfed***	**Total**	***Irrigated***	***Rainfed***	**Total**		
	A. cotton / Wheat	69.4	**-**	69.4	178.7	**-**	178.7	**-**	**-**
	D. Cotton / Mustard	9.7	-	9.7	-	-	109.4	-	-
	Paddy / Gram	18.4	-	18.4	-	-	273.4	-	-
	Guar / Barley	-	-	247.4	-	-	48.4	-	-
	Bajra / Fodder	-	-	57.3	-	-	14.5	-	-
	Moth	-	46.6	46.6					
	Mung	-	-	44.2					
	G.Nut	8.7	-	8.7					
	Others (specify)								
	Horticulture crops - Fruits	**Total area**			**Irrigated**		**Rainfed**		
	Kinnow	1.00			1.00		NIL		
	Malta & Mosambi	0.12			0.12		NIL		
	Pomagranate	0.50			0.50		NIL		
	Ber	0.45			0.45		NIL		
	Aonla	0.42			0.42		NIL		
	Others (specify)	0.20			0.20		NIL		
	Horticultural crops - Vegetables	**Total area**			**Irrigated**		**Rainfed**		
	Cucurbits	0.63			0.63		NIL		
	Cole crops	0.38			0.38		NIL		
	Tomato	0.38			0.38		NIL		
	Potato	0.20			0.20		NIL		
	Onion	0.15			0.15		NIL		
	Others	1.73			1.73		NIL		
	Medicinal and Aromatic crops	**Total area**			**Irrigated**		**Rainfed**		

		Negligible	Negligible	Negligible

	Plantation crops	**Total area**	**Irrigated**	**Rainfed**
		Negligible	Negligible	Negligible
	Others such as industrial pulpwood crops etc (specify)			
	Fodder crops	**Total area**	**Irrigated**	**Rainfed**
	Berseem, oat, Lucern	11.78	11.78	NIL
	Sorghum, Bajra	10.35	10.35	NIL
	Others (specify)			
	Total fodder crop area	**22.13**	**22.13**	
	Grazing land	3.7		
	Sericulture etc	Negligible		
	Others (Specify)	**-**		

Source: Rajasthan Agricultural statistics at a glance 2008-09

1.8	**Livestock**	**Male ('000)**	**Female ('000)**	**Total ('000)**
	Non descriptive Cattle (local low yielding)			401.6
	Crossbred cattle			**41145**
	Non descriptive Buffaloes (local low yielding)			323.1
	Graded Buffaloes			**NA**
	Goat			277.6
	Sheep			284.4
	Others (Camel, Pig, Yak etc.)			119
	Commercial dairy farms (Number)			
1.9	**Poultry**	**No. of farms**	**Total No. of birds ('000)**	
	Commercial	75	**NA**	
	Backyard	50	**NA**	
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)	
		NIL	**NIL**	**NIL**	**NIL**	**NIL**	**NIL**
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		NA		**NA**		**NA**	

	B. Culture			
		Water Spread Area (ha)	**Yield (t/ha)**	**Production ('000 tons)**
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)	**NA**	**NA**	**NA**
	ii) **Fresh water** (Data Source: Fisheries Department)	**NA**	**NA**	**NA**
	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)										
	Cotton/Wheat	333.9	3.25	586.7	3317	-	-	-	-	NA
	Cotton/ Mustard	59.3	2.92	142.9	1200	-	-	-	-	NA
	Guar/Gram	109.0	604	134.7	617	-	-	-	-	NA

	Bajra/Barley	48.8	701	97.4	2983	-	-	-	-	NA
	Paddy/Taramira	71.6	4124	0.5	250	-	-	-	-	NA
*For A cotton and D cotton production and productivity is in '000 bales										
Major Horticultural crops (Crops to be identified based on total acreage)										
	Kinnow							5.6	160000	
	Malta & Mosambi							0.4	12000	
	Pomagranate							0.1	7000	
	Ber							2.1	14000	
	Aonla							0.3	10000	
	Others (specify)									

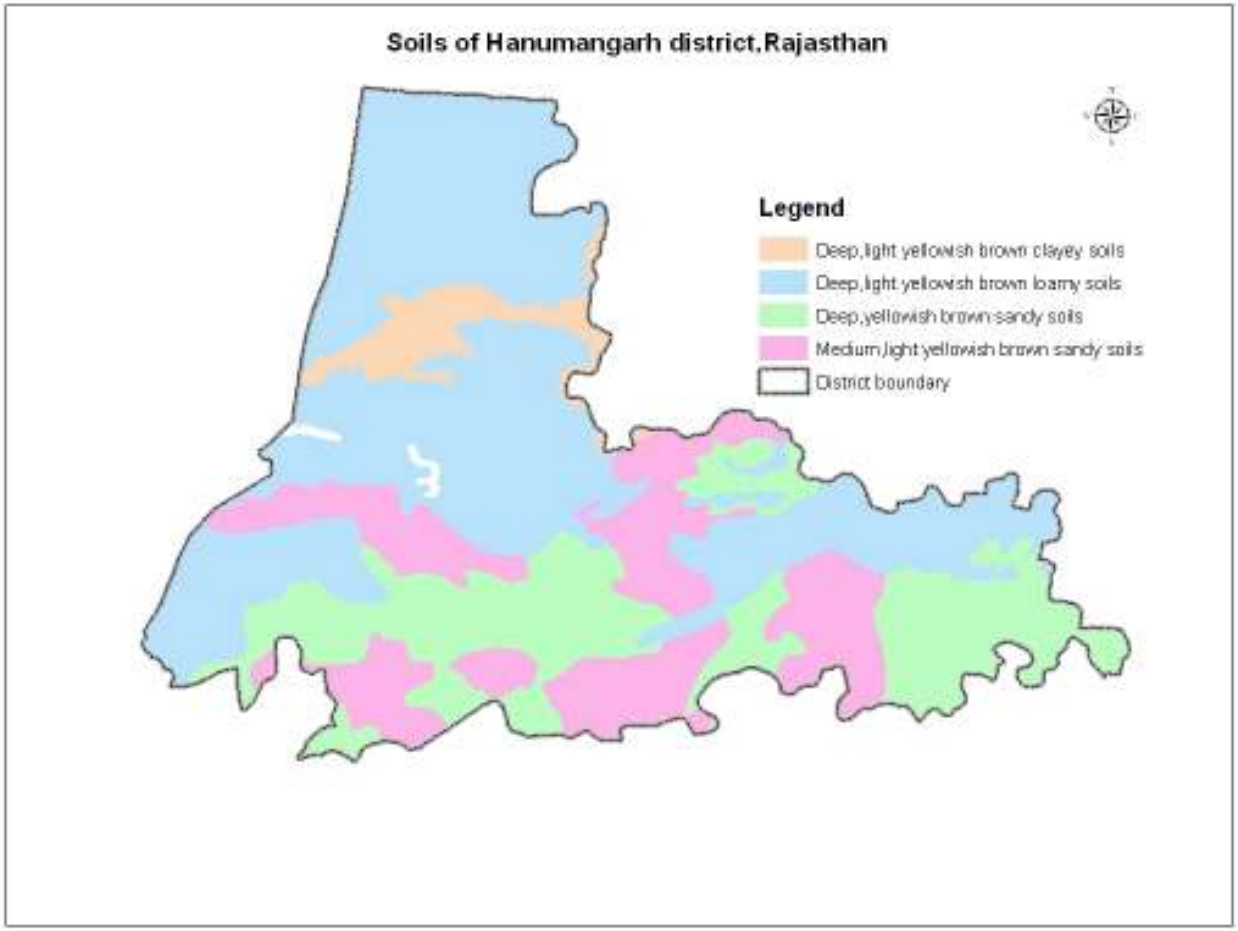
1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Cotton**	**D.cotton**	**Guar**	**Mungbean**	**Paddy**
	Kharif- Rainfed	-	-	July 8-30	July 8-20	-
	Kharif-Irrigated	May 1-20	April 1-May 7	June 15-July 7	July 1-15	June 25- July 7
		Wheat	**Mustard**	**Gram**	**Barley**	**Taramira**
	Rabi- Rainfed	-	-	15-25 October	-	15 Sept - 15 Oct
	Rabi-Irrigated	10-20 Nov.	5-20 Oct.	Oct. 20-Nov 15	Nov. 15-30	--

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)	√		
	Others (specify)			

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: No
		Soil map as Annexure 3	Enclosed: Yes

Location map


Soils of Hanumangarh district,Rajasthan
Legend
Deep,light yellowish brown clayey soils
Deep,light yellowish brown loamy soils
Deep,yellowish brown sandy soils
Medium,light yellowish brown sandy soils
District boundary

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 (July 4th wk)	Rainfed (deep light yellowish brown loamy soils)	Guar/ Mungbean/ Moth bean / Bajra	**Guar** (RGC-936, RGC 1002) **Moth bean** (RMO-40, RMO 435, CAZRI moth 3) **Bajra** (HHB 67, RHB 30, HHB 60) **Mungbean** (SML 668, RMG 62, RMG 268)	Normal recommended agronomical practices	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar/ Mungbean/ Moth bean / Bajra	**Guar** (RGC-936, RGC 1002) **Moth bean** (RMO-40, RMO 435, CAZRI moth 3) **Bajra** (HHB 67, RHB 30, HHB 60) **Mungbean** (SML 668, RMG 62, RMG 268)	Normal recommended agronomical practices	
	Rainfed (medium light yellowish brown soil)	Guar/ Mungbean/ Moth bean / Bajra	**Guar** (RGC-936, RGC 1002) **Moth bean** (RMO-40, RMO 435, CAZRI moth 3) **Bajra** (HHB 67, RHB 30, HHB 60) **Mungbean** (SML 668, RMG 62, RMG 268)	Normal recommended agronomical practices	
	Rainfed (other soils)	Guar/ Mungbean/ Moth bean / Bajra	**Guar** (RGC-936, RGC 1002, RGC 1003, RGM 112) **Moth bean** (RMO-40, RMO 435, CAZRI moth 3) **Bajra** (HHB 67) **Mungbean (**SML 668, RMG 62, RMG 268)	Normal recommended agronomical practices	

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 (Aug 2nd wk)	Rainfed (deep light yellowish brown loamy soils)	Guar /Moth bean/ Bajra/ Mungbean	Moth bean (RMO-40 Bajra (Fodder) Bajra + Moth inter crop	Reduce seed rate by 10-15% Increase row to row spacing to 45 cm	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar /Moth bean/ Bajra/ Mungbean	Moth bean (RMO-40) Bajra (Fodder) Bajra + Moth inter crop	Reduce seed rate by10-15% Increase row to row spacing to 45cm	
	Rainfed (medium light yellowish brown soil)	Guar /Moth bean/ Bajra/ Mungbean	Moth bean (RMO-40) Bajra (Fodder) Bajra + Moth inter crop	Reduce seed rate by 10-15% Increase row to row spacing to 45 cm	
	Rainfed (other soils)	Guar /Moth bean/ Bajra/ Mungbean	Moth bean (RMO-40) Bajra (Fodder) Bajra + Moth inter crop	Reduce seed rate by 10-15 percent Increase row to row spacing to 45 cm	

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 (Aug 4th wk)	Rainfed (deep light yellowish brown loamy soils)	Guar /Moth bean/ Bajra/ Mungbean	Bajra (Fodder) Fallow	Increase N application by 10-15% Moisture conservation by shallow tillage + planking	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar /Moth bean/ Bajra/ Mungbean	Bajra (Fodder) Fallow	Increase N application by 10-15% Moisture conservation by shallow tillage + planking	
	Rainfed (medium light yellowish brown soil)	Guar /Moth bean/ Bajra/ Mungbean	Bajra (Fodder) Fallow	Increase N application by 10-15% Moisture conservation by shallow tillage + planking	
	Rainfed (other soils)	Guar /Moth bean/ Bajra/ Mungbean	Bajra (Fodder) Fallow	Increase N application by 10-15% Moisture conservation	

Early season drought (delayed onset)	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				by shallow tillage + planking	

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 (Sep 2nd wk)	Rainfed (deep light yellowish brown loamy soils)	Guar /Moth bean/ Bajra/ Mungbean	No Kharif crop can be taken and Prepare land for rainfed rabi crops	Conserve soil moisture by shallow ploughing for Rabi crops	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar /Moth bean/ Bajra/ Mungbean	No Kharif crop can be taken and Prepare land for rainfed rabi crops	Conserve soil moisture by shallow ploughing for Rabi crops	
	Rainfed (medium light yellowish brown soil)	Guar /Moth bean/ Bajra/ Mungbean	No Kharif crop can be taken and Prepare land for rainfed rabi crops	Conserve soil moisture by shallow ploughing for Rabi crops	
	Rainfed (other soils)	Guar /Moth bean/ Bajra/ Mungbean	No Kharif crop can be taken and Prepare land for rainfed rabi crops	Conserve soil moisture by shallow ploughing for Rabi crops	

Early season drought (Normal onset, followed by 15-20 days dry spell after sowing leading to poor	**Major Farming situation**	**Normal Crop/cropping system[b]**	**Crop management**	**Soil management**	**Remarks on Implementation**
	Rainfed (deep light yellowish brown loamy soils)	Guar /Moth bean/ Bajra/ Mungbean	Gap filling/ Re-sowing of crops just after rains received after dry spell, depending upon plant stand	Dust mulching	Seed source 1.NSSC 2.RSSC 3.NSP

germination/crop stand etc.)	Rainfed (deep yellowish brown sandy soil)	Guar /Moth bean/ Bajra/ Mungbean	Gap filling/ Re-sowing of crops just after rains received after dry spell, depending upon plant stand	Dust mulching	
	Rainfed (medium light yellowish brown soil)	Guar /Moth bean/ Bajra/ Mungbean	Gap filling/ Re-sowing of crops just after rains received after dry spell, depending upon plant stand	Dust mulching	
	Rainfed (other soils)	Guar /Moth bean/ Bajra/ Mungbean	Gap filling/ Re-sowing of crops just after rains received after dry spell, depending upon plant stand	Dust mulching	

Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil management[d]**	**Remarks on Implementation[e]**
At vegetative stage	Rainfed (deep light yellowish brown loamy soils)	Guar/ Mungbean / Moth bean/ Bajra	Reduce the plant population Depending on the period of drought Foliar Spray of 2% urea just after rains	Inter culture operation for moisture conservation	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar/ Mungbean / Moth bean/ Bajra	Reduce the plant population Depending on the period of draught Foliar Spray of 2% urea just after rains	Inter culture operation for moisture conservation	
	Rainfed (medium light yellowish brown soil)	Guar/ Mungbean / Moth bean/ Bajra	Reduce the plant population Depending on the period of draught Foliar Spray of 2% urea just after rains	Inter culture operation for moisture conservation	

Mid season drought (long dry spell)	Major Farming situation[a]	Normal Crop/cropping system[b]	Crop management[c]	Soil management[d]	Remarks on Implementation[e]
	Rainfed (other soils)	Guar/ Mungbean / Moth bean/ Bajra	Reduce the plant population Depending on the period of draught Foliar Spray of 2% urea just after rains	Inter culture operation for moisture conservation	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil management[d]**	**Remarks on Implementation[e]**
At flowering/ fruiting stage	Rainfed (deep light yellowish brown loamy soils)	Guar/ Mungbean/ Moth bean/ Bajra	Life saving irrigation may be applied if available Reduce the plant population by 50 % depending on the period of drought Under severe condition crop may be harvested as fodder crop	Inter culture operation for moisture conservation Use uprooted plants as green mulch	Seed source 1.NSSC 2.RSSC 3.NSP
	Rainfed (deep yellowish brown sandy soil)	Guar/ Mungbean / Moth bean/ Bajra	Life saving irrigation may be applied if available Reduce the plant population by 50 % depending on the period of drought Under severe condition crop may be harvested as fodder crop	Inter culture operation for moisture conservation Use uprooted plants as green mulch	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil management[d]**	**Remarks on Implementation[e]**
	Rainfed (medium light yellowish brown soil)	Guar/ Mungbean / Moth bean/ Bajra	Life saving irrigation may be applied if available Reduce the plant population by 50 % depending on the period of drought Under severe condition crop may be harvested as fodder crop	Inter culture operation for moisture conservation Use uprooted plants as green mulch	
	Rainfed (other soils)	Guar/ Mungbean / Moth bean/ Bajra/	Life saving irrigation may be applied if available Reduce the plant population by 50 % depending on the period of drought Under severe condition crop may be harvested as fodder crop	Inter culture operation for moisture conservation Use uprooted plants as green mulch	
Terminal drought	**Major Farming situation[a]**	**Crop/cropping system[b]**	**Crop management[c]**	**Rabi Crop planning[d]**	**Remarks on Implementation[e]**
Terminal drought (Early withdrawal of monsoon)	Rainfed (deep light yellowish brown loamy soils)	Guar/ Mungbean / Moth bean/ Bajra	Life saving irrigation may be applied if available Under severe condition crop may be harvested if forced maturity is there	If marginal quality ground water is available then Toria (variety TL-15) may be grown after pre sowing irrigation	Seed source 1.NSC, 2.RSSC 3.NSP Water harvesting structure can be constructed under MANREGA
	Rainfed (deep yellowish brown sandy soil)	Guar/ Mungbean / Moth bean/ Bajra	Life saving irrigation may be applied if available Under severe condition crop may be harvested if forced maturity is there	If marginal quality ground water is available then Toria (variety TL-15) may be grown after pre sowing irrigation	Seed source 1.NSC, 2.RSSC 3.NSP Water harvesting structure can be constructed under MANREGA

Condition			Suggested Contingency measures		
Mid season drought (long dry spell)	**Major Farming situation[a]**	**Normal Crop/cropping system[b]**	**Crop management[c]**	**Soil management[d]**	**Remarks on Implementation[e]**
	Rainfed (medium light yellowish brown soil)	Guar/ Mungbean / Moth bean/ Bajra	Life saving irrigation may be applied if available Under severe condition crop may be harvested if forced maturity is there	If marginal quality ground water is available then Toria (variety TL-15) may be grown after pre sowing irrigation	Seed source 1.NSC, 2.RSSC 3.NSP Water harvesting structure can be constructed under MANREGA

2.1.2 Irrigated situation

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Normal Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Delayed release of water in canals due to low rainfall	Canal irrigated Light to medium Soil (Light brown colour, deep, loamy sand to sandy loam soils with scarce rainfall)	A. cotton, D. Cotton. Guar Ground Nut, Sugar Cane, Mungbean , Castor, Bajra, Fodder crops	Prefer American cotton instead of desi cotton, Prefer cotton varieties instead of hybrids, Sowing of Clusterbean, mungbean, Bajra etc. low water requiring crops may be encouraged	Use Pressurized irrigation method, Furrow and alternate furrow irrigation in wide row crops	Seed source 1.NSC, 2.RSSC 3.NSP
	Ghaggar Flood Plain Soil (Dark brown colour, deep, silty clay loam soils with scarce rainfall)	Paddy, A. cotton D. Cotton. Fodder crops Sugarcane, Guar	Prefer American cotton instead of desi cotton, Replace part of paddy area under cotton and guar	Delay transplanting of paddy by two weeks Apply irrigation to paddy two days after disappearance of ponded water	Seed source 1.NSC, 2.RSSC 3.NSP
	Salt affected soils (Variable in colour, deep, Loamy sand to silty clay loam soils with scarce rainfall)	A. cotton, D. Cotton, Sugar Cane, Castor, Bajra, Fodder crops	Prefer American cotton instead of desi cotton, Replace part of cotton area by Castor and Bajra	Use Pressurized irrigation method, Furrow and alternate furrow irrigation in wide row crops	Seed source 1.NSC, 2.RSSC 3.NSP

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Limited release of water in canals due to low rainfall	Canal irrigated Light to medium Soil (Light brown colour, deep, loamy sand to sandy loam soils with scarce rainfall)	A. cotton, D. Cotton. Guar Ground Nut, Sugar Cane, Mungbean , Castor, Bajra, Fodder crops	Prefer desi cotton varieties instead of hybrids and American cotton, Sowing of Guar, mungbean, Bajra etc. low water requiring crops may be encouraged	Use Pressurized irrigation method, Irrigation at critical stages, Furrow and alternate furrow irrigation in wide row crops Use mulches	Seed source 1.NSC, 2.RSSC 3.NSP
	Ghaggar Flood Plain Soil (Dark brown colour, deep, silty clay loam soils with scarce rainfall)	Paddy, A. cotton D. Cotton. Fodder crops Sugarcane, Guar	Prefer desi cotton varieties instead of hybrids and American cotton, Replace part of paddy area under cotton and guar	Delay transplanting of paddy by two weeks, Irrigation at critical stages, Apply irrigation to paddy two days after disappearance of ponded water	Seed source 1.NSC, 2.RSSC 3.NSP
	Salt affected soils (Variable in colour, deep, Loamy sand to silty clay loam soils with scarce rainfall)	A. cotton, D. Cotton, Sugar Cane, Castor, Bajra, Fodder crops	Prefer desi cotton varieties instead of hybrids and American cotton, Replace part of cotton area by Castor and Bajra	Use Pressurized irrigation method, Irrigation at critical stages, Furrow and alternate furrow irrigation in wide row crops Use mulches	Seed source 1.NSC, 2.RSSC 3.NSP

Condition			Suggested Contingency measures		
	Major Farming situation[f]	**Crop/cropping system[g]**	**Change in crop/cropping system[h]**	**Agronomic measures[i]**	**Remarks on Implementation[j]**
Non release of water in canals under delayed onset of monsoon in catchment	Canal irrigated Light to medium Soil	A. cotton, D. Cotton. Guar Ground Nut, Sugar Cane, Mungbean been, Castor, Bajra, Fodder crops	Grow cotton in limited area, Grow guar, mungbean, Bajra, Ground nut, fodder crops on onset of monsoon	Sowing of cotton under limited area may be done where ground water having E C up to 5 dS/m is available. Use gypsum with irrigation for alkali waters	Seed source 1.NSC, 2.RSSC 3.NSP
	Ghaggar Flood Plain Soil	Paddy, A. cotton D. Cotton. Fodder crops Sugar Cane, Guar	Reduce paddy cultivation, Grow cotton in tube well command area Grow guar, mungbean, fodder crops on onset of monsoon	Delay transplanting of paddy by two weeks Apply irrigation to paddy two days after disappearance of ponded water	Seed source 1.NSC, 2.RSSC 3.NSP
	Salt affected soils	A. cotton, D. Cotton, Sugar Cane, Castor, Bajra, Fodder crops	Grow cotton in limited area, Grow Bajra and fodder crops on onset of monsoon	Sowing of cotton under limited area may be done where ground water having E C up to 5 dS/m is available. Use gypsum with irrigation for alkali waters	Seed source 1.NSC, 2.RSSC 3.NSP
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	N. A.	N. A.	N. A.	N. A.	N. A.
Insufficient groundwater recharge due to low rainfall	Ghaggar Flood Plain Soil	Paddy, A. cotton D. Cotton. Fodder crops Sugar Cane, Guar	Avoid paddy cultivation Restrict cotton cultivation, Encourage low water requiring crops like Guar,	Encourage pressurized irrigation, Irrigate at critical growth stages Extensive use of irrigation water	Seed source 1.NSC, 2.RSSC 3.NSP

2.2 Un-timely (unseasonal) rains

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]**
Crop1 (specify)	N.A.	N.A.	N.A.	N.A.
Horticulture				
Crop1 (specify)	N.A.	N.A.	N.A.	N.A.
Heavy rainfall with high speed winds in a short span[2]				
Chickpea	N.A.	Hormonal spray is advised to induce flowering	Control heliothis by spraying chemicals like Indoxacarb 14.5 SC 0.1% or Spinosad 45 SC 0.03%. To control fungal diseases spray 0.2% carbendazim	Dry the produce before storage to prevent the attack of storage pest and fungal infection
Condition	**Suggested contingency measure**			
Mustard	N.A.	Hormonal spray is advised to induce flowering	To prevent stem rot disease spray 0.2% Carbendizim	
Wheat		N.A.	Stop irrigation in lodged crop	
Horticulture				
Kinnow	N.A.	Spray hormones	Spray Antracol 0.2% to avoid secondary fungal infection	
Outbreak of pests and diseases due to unseasonal rains				
Chickpea	N.A.	Hormonal spray is advised to induce flowering	Control heliothis by spraying chemicals like Indoxacarb 14.5 SC 0.1% or Spinosad 45 SC 0.03%. To control fungal diseases spray 0.2% carbendazim	Dry the produce before storage to prevent the attack of storage pest and fungal infection

Mustard	N.A.	Hormonal spray is advised to induce flowering	To prevent stem rot disease spray 0.2% Carbendizim	
Wheat		N.A.	Stop irrigation in lodged crop	
Horticulture				

2.3 Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Crop1 (specify)	N.A.	N.A.	N.A.	N.A.
Continuous submergence for more than 2 days[2]				
Sea water inundation[3]				

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]				
Wheat	N.A.	N.A.	Apply irrigation, spray 1000 ppm thiourea	Water spray in evening
Mustard	Delay sowing by 10 – 15 days, Use variety RGN 13	N.A.	N.A.	Water spray in evening
Chickpea	N.A.	N.A.	N.A.	Water spray in evening
Cotton	N.A.	spray 500 ppm thiourea	Spray 500 ppm thiourea along with 2% KNO_3	N.A.
Crop 5				
Horticulture				
Kinnow	N.A.	Apply irrigation, spray	Spray of 10 ppm 2 4 D	N.A.

		500 ppm thiourea	(Horticultural grade) or 20 ppm GA	
Cold wave[q]				
Mustard	N.A.	N.A.	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea	N.A.
Chickpea	N.A.	N.A.	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 1000 ppm thiourea	N.A.
Castor	N.A.	N.A.	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea	N.A.
Horticulture				
Aonla	N.A.	N.A.	N.A.	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea
Frost				
Mustard	N.A.	Apply irrigation, Spray of 0.1% H_2SO_4 , or spray 500 ppm thiourea	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea	N.A.
Chickpea	N.A.	Apply irrigation, Spray of 0.1% H_2SO_4 , or spray 500 ppm thiourea	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea	N.A.
Castor	N.A.	N.A.	Spray of 0.1% H_2SO_4 , mass smoking at night, apply light irrigation or spray 500 ppm thiourea	N.A.
Horticulture				
Aonla	N.A.	N.A.	Apply irrigation, Spray of 0.1%	Apply irrigation, Spray of 0.1%

			H_2SO_4 , or spray 500 ppm thiourea	H_2SO_4 , or spray 500 ppm thiourea
Hailstorm				
Wheat	N.A.	N.A.	Harvest and use as fodder	
Mustard	N.A.	N.A.	Spray 0.2% Ridomil (Metalaxyl + Mencozeb)	
Chickpea	N.A.	N.A.	Spray 0.1% Carbendazim to control secondary fungal infection, Spray chemicals like Indoxacarb 14.5 SC 0.1% or Spinosad 45 SC 0.03%.	
Horticulture				
Kinnow	N.A.	N.A.	Spray 100 ppm streptocycline + 0.2% Copper Oxichloride to prevent bacterial infection	Spray 100 ppm streptocycline + 0.2% Copper Oxichloride to prevent bacterial infection
Cyclone	N.A.	N.A.	N.A.	N.A.
Crop1				
Horticulture				
Crop1 (specify)				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event[s]	**During the event**	**After the event**
Drought			
Feed and fodder availability	Training for mass awareness and establishment of fodder bank	Provide sufficient feed & fodder along with mineral mixture. Harvest and use all failed crop material	Provide sufficient feed & fodder along with mineral mixture.

		as fodder. Use MNB, urea treatment of poor fodder	
Drinking water	Storage of water in reservoirs	Provide sufficient water along with mineral mixture, Hygiene and sanitation, avoid wallowing of animals in water bodies	Provide sufficient water along with mineral mixture Specify option for drinking water reserves
Health and disease management	Organize health camp	Vaccinate against contagious diseases. organization of mass animal health camps	Vaccinate against contagious diseases
Floods	N.A.		
Feed and fodder availability		Provide dry fodder and feed in sufficient amount	Provide dry fodder and feed in sufficient amount
Drinking water		Provide safe drinking water, maintain sanition	Provide safe drinking water
Health and disease management		Organization of mass animal health camp, Spraing of fly repellents	Deworming, proper disposal of dead animals
Cyclone	N.A.		
Feed and fodder availability			
Drinking water		Cover the shelter from north side/west side and use heaters/coolers, Grazing during morning and evening time	Normal condition
Health and disease management			
Heat wave and cold wave			

Shelter/environment management	Repair and maintenance of shelter	Shifting of live stocks in shelters and monitoring	Review and feedback collection to face the future requirement
Health and disease management	Organize health camp	All the curative measures needs to be taken	Review and feedback collection to face the future requirement

[s] based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shortage of feed ingredients	Training for mass awareness	Alternative Supplementary feed	Review and feedback collection to face the future requirement
Drinking water	Storage of water in reservoirs	Judicious supply of stored drinking water	Review and feedback collection to face the future requirement
Health and disease management	Organize health camp	Distribute medicines	Review and feedback collection to face the future requirement
Floods	N.A.	N.A.	N.A.
Shortage of feed ingredients			
Drinking water			
Health and disease management			
Cyclone	N.A.	N.A.	N.A.
Shortage of feed ingredients			
Drinking water			
Health and disease management			
Heat wave and cold wave			
Shelter/environment management	Repair and maintenance of shelter	Shifting of birds in shelters and	Review and feedback collection to

		monitoring	face the future requirement
Health and disease management	Organize health camp	All the curative measures needs to be taken	Review and preparation to mitigate the future requirement

[a] based on forewarning wherever available

2.5.3 Fisheries / Aquaculture

	Suggested contingency measures		
	Before the event[a]	**During the event**	**After the event**
Drought			
Shallow water in ponds due to insufficient rains/inflows	Stop the release of water for irrigation	Supplement part of water requirement through tube well	Review and preparation to mitigate the future requirement
Impact of heat and salt load build up in ponds / change in water quality			
Floods	N.A.	N.A.	N.A.
Inundation with flood waters			
Water contamination and changes in BOD			
Health and disease management			
Cyclone	N.A.	N.A.	N.A.
Overflow / flooding of ponds			
Change in fresh/brackish water ratio			
Health and disease management			
Heat wave and cold wave			

Management of pond environment	Tree plantation around the pond		
Health and disease management	Organize health camp	All the curative measures needs to be taken	Review and preparation to mitigate the future requirement

[a] based on forewarning wherever available