State: BIHAR

Agriculture Contingency Plan for District: MADHEPURA

1.0 District Agriculture profile				
1.1	**Agro-Climatic/Ecological Zone**			
	Agro Ecological Sub Region (ICAR)	Eastern Plain, Hot Subhumid (moist) Eco-sub region (13.1)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	North East Alluvial Plain Zone (BI-2)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Begusaria, Saharsa, Supoul, Madhepura, Purnea , Kishanganj, Araria, Katihar, Khagaria,		
	Geographic coordinates of district headquarters	**Latitude**	**Longitude**	**Altitude**
		26.28^0N	86.09^0E	44.63 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Regional Research Station, Agwanpur, Saharsa (Bihar)		
	Mention the KVK located in the district with address	KVK, Madhepura		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	M.B. Agriculture College, Agwanpur, Saharsa		

1.2	**Rainfall**	**Normal RF(mm)**	**Normal Onset**	**Normal Cessation**
	SW monsoon (June-Sep)	1146	2^{nd} week of June	3^{rd} week of October
	NE Monsoon(Oct-Dec)	100		
	Winter (Jan-Feb)	21		
	Summer (March -May)	144		

	Annual	1411		

1.3	**Land use pattern of the district**	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)	179.6	127.1	0	30.3	0.05	0	6.9	3.9	10.1	1.0

1. 4	**Major Soils**	**Area (‘000 ha)**	**Percent (%) of total**
	Sandy Soils	46.099	26.38
	Coarse Sandy Loam Soils	70.391	40.28
	Fine Sandy Loam Soils	56.484	32.32
	Clayey Soils	0.00	0.00
	Saline/ Calcareous Soils	1.782	1.02

1.5	**Agricultural land use**	Area (‘000 ha)	Cropping intensity %
	Net sown area	127.1	158
	Area sown more than once	73.6	
	Gross cropped area	200.7	

1.6	**Irrigation**	Area (‘000 ha)		
	Net irrigated area	86.0		
	Gross irrigated area	137.0		
	Rainfed area	41.1		
	Sources of Irrigation	Number	Area (‘000 ha)	Percentage of total irrigated area
	Canals		3.6	2.7
	Tanks			
	Open wells		0	

	Bore wells	3932	133.4	97.3
	Lift irrigation schemes		0	
	Micro-irrigation			
	Other sources		0	
	Total Irrigated Area		137.048	
	Pump sets			
	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			
	Critical			
	Semi- critical			
	Safe	13	100%	
	Wastewater availability and use			
	Ground water quality			

1.7 Area under major field crops & horticulture

1.7	**Major field crops cultivated**	**Area ('000 ha)**							
		Kharif			***Rabi***				
		Irrigated	**Rainfed**	**Total**	**Irrigated**	**Rainfed**	**Total**	**Summer**	**Grand total**
	Rice	-	-	82.6				1.9	84.5
	Wheat	-	-		35.6		35.6		35.6
	Maize	3.7	-	3.7	15.05		15.05		18.7
	Jute	-	-	5.5					5.5
	Oilseeds	-	-				7.2		7.2

	Pulses	-	-				1.1		1.1

	Horticulture crops - Fruits	**Area ('000 ha)**		
		Total	**Irrigated**	**Rainfed**
	Mango	1.8		
	Guava	0.6		
	Banana	1.2		
	Litchi	0.2		
	Lemon	0.4		
	Pineapple	0.3		
	Horticulture crops - Vegetables	**Total**	**Irrigated**	**Rainfed**
	Potato	6.9		
	Tomato	1.1		
	Cauliflower	1.7		
	Brinjal	1.5		
	Cabbage	1.4		
	Sponge gourd	2.01		

	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Fenugreek	0.05	0.05	-
	Plantation crops	-	-	-
	Fodder crops	-	-	-
	Total fodder crop area	-	-	-
	Grazing land	-	-	-
	Sericulture etc	-	-	-

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)
	Non descriptive Cattle (local low yielding)			295.6
	Improved cattle			
	Crossbred cattle			11.3
	Non descriptive Buffaloes (local low yielding)			121.8
	Descript Buffaloes			1.6
	Goat			332.7
	Sheep			
	Others (Camel, Pig, Yak etc.)			
	Commercial dairy farms (Number)			

1.9	Poultry	No. of farms	Total No. of birds ('000)
	Commercial		
	Backyard		68.3

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)	
	ii) Inland (Data Source: Fisheries Department)	**No. Farmer owned ponds**		**No. of Reservoirs**		**No. of village tanks**	
		809		0			
	B. Culture						
				Water Spread Area (ha)		**Yield (t/ha)**	**Production ('000 tons)**
	i) **Brackish water** (Data Source: MPEDA/ Fisheries Department)						
	ii) **Fresh water** (Data Source: Fisheries Department)			1508 (Pond)		2.2	5.097

1.11 Production and Productivity of major crops

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 identified based on total acreage)										
	Rice	99.2	1178			3.04	1634	113.6	1406	
	Maize	11.8	2687	42.3	3620	62.5	3841	125.3	3382	
	Wheat	-		54.1	1405			54.1	1405	
	Rai	-		2306	1134			2.3	1134	
Major Horticultural crops (Crops identified based on total acreage) (Year: 2005-08)										
	Banana	-						139.5	46528	
	Mango	-						44.8	14938	
	Guava	-						14.9	4980	
	Lemon	-						9.7	3263	

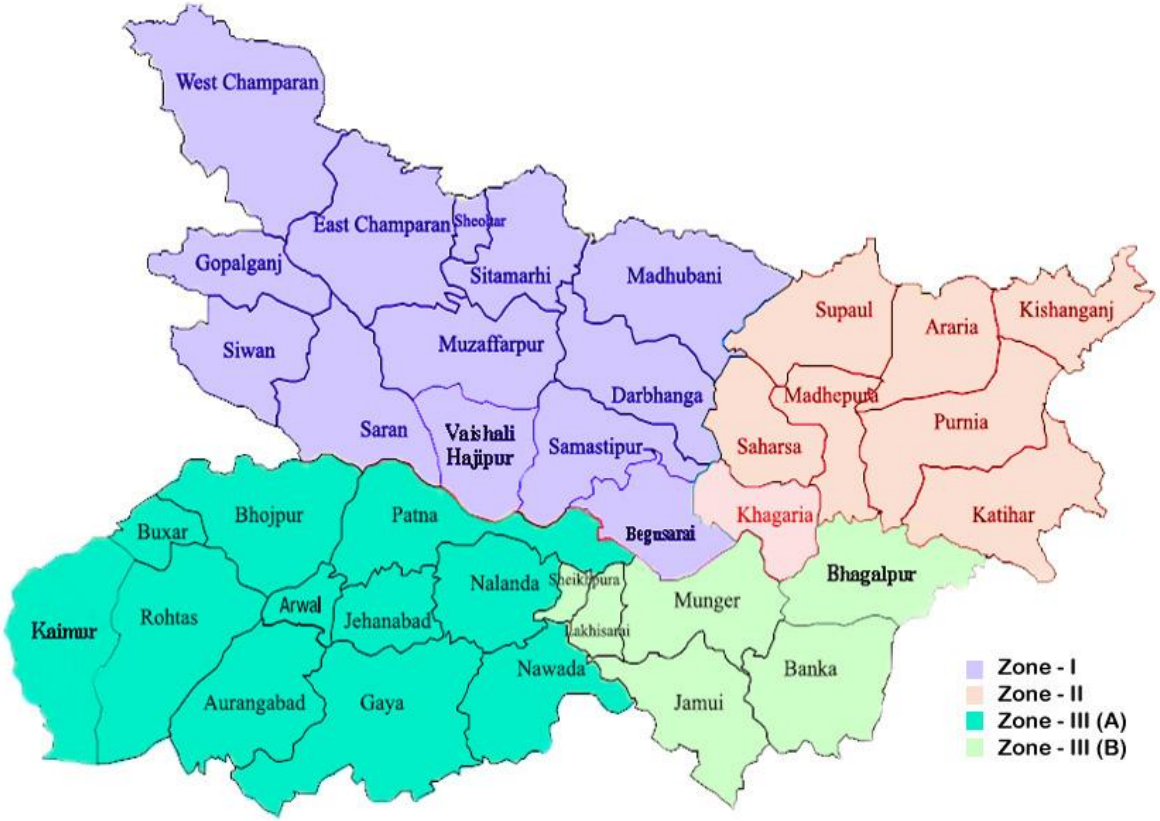
1.12	**Sowing window for 5 major field crops** (start and end of normal sowing period)	**Rice**	**Jute**	**Wheat**	**Maize**	**Greengram**
	Kharif- Rainfed	-	-	-	-	-
	Kharif-Irrigated	1st week of June - 4th week of July	3rd week of March - 3rd week of April	-	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	-	3rd week of November - 4th week of December	1st week of October - 1st week of December	1st week of April - 4th week of April

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			√

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 I

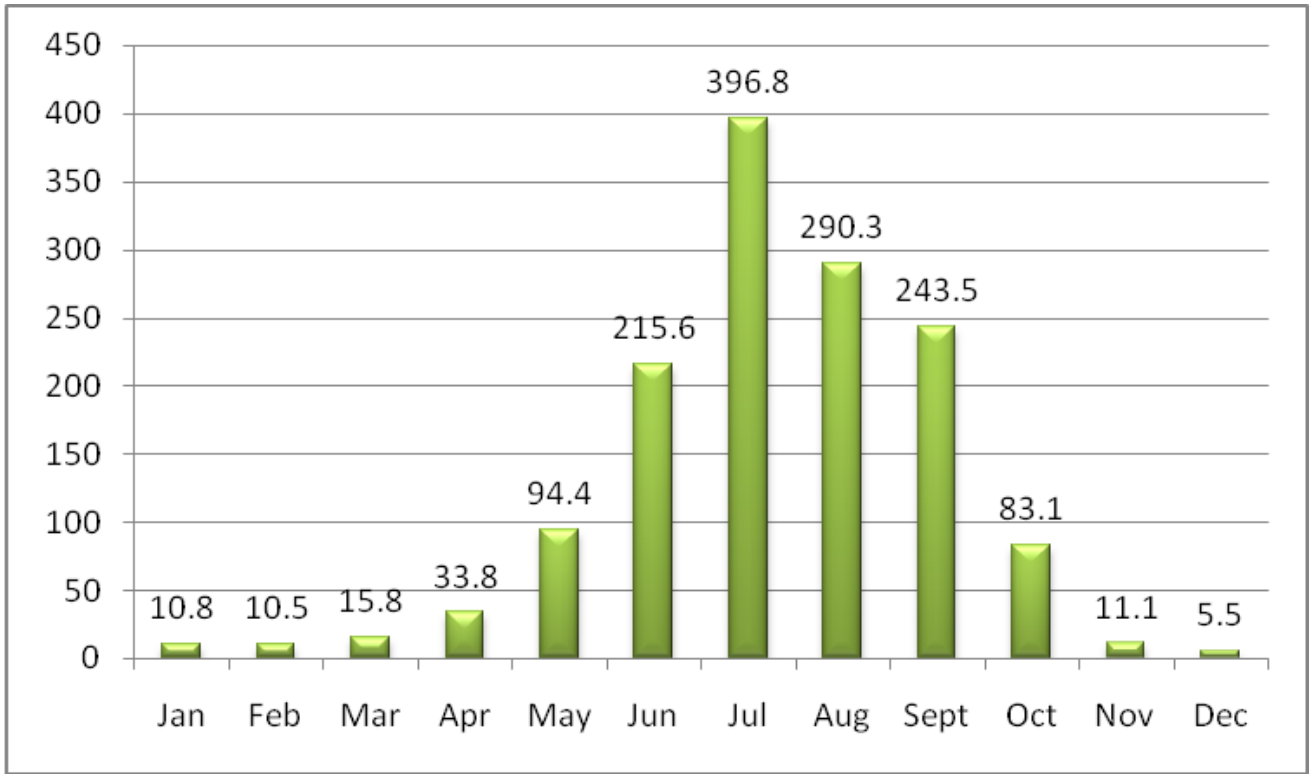
Agro climatic Zones of Bihar



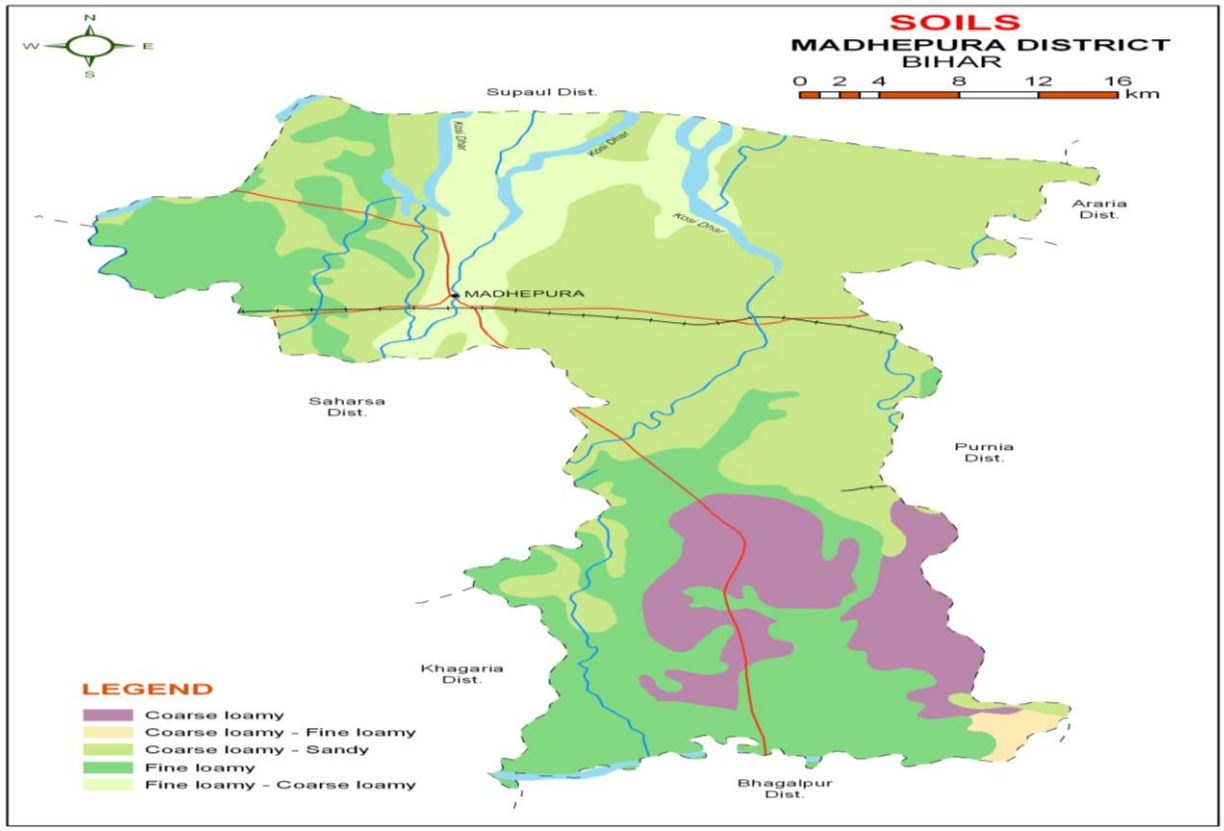
Source: krishi.bih.nic.in

Annexure –II

Mean annual rainfall (mm)



Annexure –III



Source: NBSS&LUP, Regional Centre, Kolkata

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 including variety**	**Agronomic measures**	**Remarks on Implementation**
Delay by 2 weeks 4th week of June	Upland	Rice-Wheat	Short duration Rice– Wheat Rice:Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	• Normal Package of practices	
	Medium land	Rice- Wheat-Jute Jute: JRO878, JRO632 JRC321, JRC-7447	Medium duration Rice- Wheat **Rice:** Rajendra Bhagawati, Rajendra Suwasni Rajshree, Prabhat ,	• Normal Package of practices	
	Lowland	Rice-Wheat	Medium duration Rice- Wheat Rice: Rajshree, Santosh , Sita Rajendra Suwasni	❖ Use dapog Nursery seedlings under moist conditions	

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 2nd week of July	Upland	Rice-Wheat	Rice– Wheat Rice- Prefer Medium to short duration varieties like Saroj (100-110d), Birsa Dhan-201 (100-115d)	• Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions followed up with a post-emergence weedicide application 20-25 days later for effective weed management. •	Seeds from BAU, Sabour, NSC, TDC , BRBN etc

	Medium land	Rice- Wheat-Jute Jute: JRO878, JRO632 JRC321, JRC-7447	Rice- Wheat Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati,	• Where field is moist, direct seeding of medium duration varieties (125 days) can be done during second fortnight of July in midlands. Post-emergence herbicide application use is essential • Use mat nursery/ dapog nursery , mat nursery (dapog method) can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands • Raise staggered community nursery preferably with short duration varieties in mid lands • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Para grass cultivation for fodder in low land • Timely interculture for weed control in direct seeded rice • Life saving irrigation	
	Lowland	Rice-Wheat-Greengram	Rice (Midt Duration)-Wheat Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1		

Condition			**Suggested Contingency measures**		
Early season drought (delayed onset)	**Major Farming situation**	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Delay by 6 weeks	Upland	Rice-Wheat	Short duration Rice– Wheat Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant.U-31	• Direct seeding of Rice ❖ Mulching for moisture conservation	Seeds from BAU, Sabour, NSC, TDC , BRBN etc

4th week of July			, Pant .U-19 Finger millet- RAU-7&8 Rice- Prefer short (early matured) varieties like Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi , Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)	• Field channels and raised sunken bed for small and marginal farmers • Life saving irrigation	
	Medium land	Rice- Wheat-Jute	Short duration Rice- Wheat Rice: Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat , Dhanlaxmi, Richharia, Turanta Saroj Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant urd-30 , 19 Finger millet- RAU-7&8	• Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Direct seedling of Rice • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • ❖ Life saving irrigation ❖ Field channels, drainage system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram	Rice (Mid Duration)-Wheat/ Vegetable/ Pulses/ Oilseeds Rice- Rajshree, ,Rajendra Suwasni, Rajendra Sweta		

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 2nd week of August	Upland	Rice-Wheat	Vegetable- Wheat/ Pulses/ Blackgram Blackgram-Winter Maize	• Moisture conservation • Inter cultivation • Sowing of *rabi* crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium Land	Rice- Wheat-Jute	Rice –Maize Sesame-Wheat Sesame: Krishna, Pragati Blackgram/Finger millet -Sep. Pigeonpea / Late Wheat/Lentil/ Potato/ Rai/ Mustard Rice- Prefer Early matured varieties like Turanta dhan (75d), Prabhat (90d), Birsa Dhan 105 (85-90d), Birsa Dhan-106 (90-95d), Rajendra Bhagavathi (early-upland and midland), Dhanlaxmi, Richharia(<100d), Saroj (100-110d), Birsa Dhan-201 (100-115d)	• Direct seeding of rice • Mat nursery (dapog method)/ Community nursery can be raised for quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August • Use of 20 days old dapog seedling in rice. • Supply of contingency crop seeds of Toria, Maize (QPM varieties, Swann composite-65-70 days; HM-4 hybrid baby corn), Arhar (Bahar, NDA1, Pusa 9), Urd (Navin and T9), Cowpea and Horsegram need to be ensured for taking up of sowing in September in midlands ❖ Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts ❖ Life saving irrigation ❖ Field channels, drainage	

				system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram	Rice/ Sesame- Wheat/ Vegetables/ Pulses/Oilseeds Rice: Rajshree, Santosh , Sita, Rajendra Suwasni Sesame – Krishna, Pragati	• Re-transplanting of rice (karuhan) can be done with 30 + 45 days old seedlings of long duration or photosensitive varieties up to 30th August with close planting (40-45 hills per square meter) • Application of organic manure and vermi compost initially for Rice and other crops. • Sowing of *rabi* crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables can be taken up on time for maximizing productivity from lowlands with support from the government for timely supply of inputs and in a way *rabi* production would compensate the production loss during *kharif.* • Fodder varieties of Jowar, Maize, Bajra in combination with legumes (cowpea and horsegram) can be taken up wherever feasible to meet the fodder requirements in deficit rainfall districts • Life saving irrigation • Field channels, drainage channel and raised sunken bed for small and marginal farmers	

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.	Upland	Rice-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj	❖ Life saving irrigation ❖ Gap filling through Dapog nursery ❖ Weed management	❖ Application of potash at final land preparation ❖ Mulching ❖ Conservation tillage ❖ Field channels and raised sunken bed for small and marginal farmers	-
	Medium land	Rice- Wheat-Jute Rice:Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi,Sita, Jaya	❖ Life saving irrigation ❖ Gap filling ❖ Mulching for moisture conservation ❖ Weed management through mechanical weeding	❖ Application of potash must at final land preparation ❖ Inter culturing ❖ Mulching ❖ Conservation tillage ❖ Field channels, drainage system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram Rice: Rajshree, Santosh , Sita, Rajendra Suwasni	❖ Life saving irrigation ❖ Gap filling through Dapog nursery seedlings	❖ Application of potash must at final land preparation ❖ Inter culturing ❖ Mulching for moisture conservation ❖ Conservation tillage ❖ Foliar application of nitrogen & potassic fertilizer with adjuvant ❖ Field channels, drainage channel and raised sunken bed for small and marginal farmers	

Condition			Suggested Contingency measures		
Mid season drought (long dry spell, consecutive 2 weeks	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Soil nutrient & moisture conservation measures**	**Remarks on Implementation**

rainless (>2.5 mm) period)					
At vegetative stage	Upland	Rice-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	❖ Gap filling ❖ Foliar application of (1%) Urea ❖ Life saving irrigation	❖ Interculturing ❖ Foliar application of (1%) MOP ❖ Mulching ❖ Conservation tillage, ❖ Field channels and raised sunken bed for small and marginal farmers	-
	Medium land	Rice-Rai-Potato Rice:Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi,Sita, Jaya	❖ Gap filling ❖ Foliar application of (1%) Urea ❖ Life saving irrigation	❖ Inter culturing ❖ Foliar application of (1%) MOP ❖ Mulching ❖ Conservation tillage, ❖ Field channels, drainage system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram Rice- Wheat-Jute Rice: Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi,Sita, Jaya	❖ Gap filling ❖ Life saving irrigation ❖ Foliar application of (1%) Urea	❖ Inter culturing ❖ Foliar application of (1%) MOP ❖ Mulching ❖ Conservation tillage, ❖ Field channels, drainage channel and raised sunken bed for small and marginal farmers	

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	Upland	Rice-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	❖ IPM practices ❖ Foliar application of (1%) Urea ❖ Life saving irrigation	❖ Inter cultivation ❖ Foliar application of (1%) MOP ❖ Mulching ❖ Conservation tillage	-

				❖ Field channels and raised sunken bed for small and marginal farmers ❖ Life saving irrigation	
	Medium land	Rice- Wheat-Jute Rice:Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi,Sita, Jaya	❖ IPM practices ❖ Life saving irrigation	❖ Inter cultivation ❖ Foliar application of (1%) MOP ❖ Mulching ❖ Conservation tillage ❖ Application of potassic spray ❖ Field channels and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ IPM practices ❖ Life saving irrigation ❖ Spray of potassic fertilizer with adjuvant	❖ Inter cultivation ❖ Foliar application of (1%) MOP ❖ Mulching through weeds ❖ Conservation tillage ❖ Field channels, drainage channel and raised sunken bed for small and marginal farmers	

Condition			**Suggested Contingency measures**		
Terminal drought (Early withdrawal of monsoon)	**Major Farming situation**	**Normal Crop/cropping system**	**Crop management**	**Rabi Crop planning**	**Remarks on Implementation**
	Upland	Rice-Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	❖ Mulching ❖ Life saving irrigation	❖ Open the furrow during evening leave it open overnight and plank next morning for growing of early rabi crops	Seeds from RAU, Pusa, NSC, TDC , BRBN etc
	Medium land	Rice- Wheat-Jute Rice:Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R.	❖ Mulching ❖ Life saving irrigation		

		Kasturi,Sita, Jaya			
	Lowland	Rice-Wheat-Greengram Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ Mulching ❖ Life saving irrigation		

2.1.2 Drought - 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	Upland	Rice-Wheat	Rice (Short Duration)-Late sown Wheat/Vegetable–Wheat/ Cowpea-Rajmash Rice: Prabhat, Dhanlaxmi, Richharia, Turanta Saroj	❖ Direct seeding of short duration Rice ❖ Life saving irrigation ❖ Field channels and raised sunken bed for small and marginal farmers	
	Medium land	Rice- Wheat-Jute	Rice–Maize Rice-Wheat Rice: Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat	❖ Application of Organic manure and vermicompost initially ❖ Use Dapog Nursery seedlings ❖ Intercultivation ❖ Mulching ❖ Life saving irrigation ❖ Field channels, drainage system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Greengram	Rice-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ Use Dapog Nursery seedlings ❖ Direct seeding of short duration rice varieties	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
Limited release of water in canals due to low rainfall	Upland/ Lowland	**Not Applicable**			

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	Upland	Rice-Wheat	Rice (Short Duration)-Late sown Wheat Rice: Prabhat, Dhanlaxmi, Richharia, Turanta	❖ Direct sowing of short duration Rice ❖ Mulching ❖ Field channels and raised sunken bed for small and marginal farmers	Seeds from RAU, Pusa, NSC, TDC, BRBN etc
	Medium land	Rice- Wheat-Jute	Rice –Maize/Wheat Rice: Rajendra Bhagawati, Rajendra Suwasni, Rajshree, Prabhat	❖ Inter cultivation ❖ Mulching ❖ Application of Organic manure and vermicompost initially ❖ Clipping of leaves in maize ❖ Field channels and raised sunken bed for small and marginal farmers ❖ Life saving irrigation	
	Lowland	Rice-Wheat-Greengram	Rice (Short Duration)-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ Use dapog Nursery seedlings ❖ Life saving irrigation	

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	Upland	Rice-Wheat	Rice (Short Duration)-Late sown Wheat/Pigeonpea/ Blackgram Sesamum	❖ Mulching for moisture conservation ❖ Direct sowing of short duration Rice	Seeds from RAU, Pusa, NSC, TDC , BRBN etc

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
of monsoon			Rice: Prabhat, Dhanlaxmi, Richharia, Turanta,	❖ Field channels and raised sunken bed for small and marginal farmers	
	Medium land	Rice- Wheat-Jute	Rice –Maize/ Rice-Wheat Rice: Rajendra Bhagawati, Rajendra Suwasni Rajshree, Prabhat	❖ Application of Organic manure and vermicompost initially ❖ Use of Dapog Nursery seedlings ❖ Inter cultivation ❖ Mulching ❖ Clipping of leaves in maize ❖ Field channels and raised sunken bed for small and marginal farmers ❖ Life saving irrigation	
	Lowland	Rice-Wheat-Greengram	Rice (Short Duration)-Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ Use of Dapog Nursery seedlings ❖ Direct seeding of short duration rice varieties ❖ Mulching for moisture conservation ❖ Life saving irrigation ❖ Field channels, drainage channel and raised sunken bed for small and marginal farmers	

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	Upland	Rice-Wheat	❖ Rice (Short Duration)-Late sown Wheat ❖ Black gram/Sesame-Wheat	❖ Direct sowing of short duration Rice ❖ Foliar application of 2% Urea to boost vegetative growth and 2% MOP for	

Condition			Suggested Contingency measures		
	Major Farming situation	**Normal Crop/cropping system**	**Change in crop/cropping system**	**Agronomic measures**	**Remarks on Implementation**
low rainfall			❖ Pigeonpea Rice: Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj Sesame: Krishna, Pragati	drought resistance ❖ Field channels and raised sunken bed for small and marginal farmers ❖ Life saving irrigation	
	Medium land	Rice- Wheat-Jute	Sesame –Maize/ Sesame-Wheat Sesame: Krishna, Pragati	❖ Direct sowing of short duration Rice ❖ Foliar application of 2% Urea to boost vegetative growth and 2% MOP for drought resistance ❖ Inter cultivation ❖ Mulching for moisture conservation ❖ Clipping of leaves in maize ❖ Field channels, drainage system and raised sunken bed for small and marginal farmers	
	Lowland	Rice-Wheat-Green gram	Rice - Wheat Rice: Rajshree, Santosh , Sita, Rajendra Suwasni, R Sweta	❖ Direct sowing of short duration Rice ❖ Use Dapog Nursery seedlings ❖ Foliar application of 2% Urea to boost vegetative growth and 2% MOP for drought resistance ❖ Mulching for moisture conservation ❖ Life saving irrigation ❖ Spray of potassic fertilizer with adjuvant ❖ Field channels and raised sunken bed for small and marginal farmers	

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**
Rice	❖ Drainage Management ❖ Re-transplanting through Dapog	❖ Drainage management ❖ Subsequent crop like- Toria may be taken if present crop is	❖ Drainage management ❖ Alternative crop if totally damaged	❖ Proper dying ❖ Transportation

	nursery, if needed ❖ Gap filling, if required	substantially damaged/affected	❖ Harvest the crop at physiological maturity	
Maize	❖Drainage Management ❖ Gap filling, if needed ❖Resowing, if substantially affected ❖Sowing of R&F should be adopted	❖Drainage management ❖ Alternative Rabi crops if substantially damaged	❖ Drainage management ❖ Subsequent crop if totally damaged ❖ Harvest at physiological maturity	❖ Proper dying ❖ Safer storage and Transportation
Horticulture /Vegetables				
Bhendi	❖ Drainage management ❖ Resowing, if completely damaged	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Brinjal	❖ Drainage management ❖ Replanting , if completely damaged	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Chilli	❖ Drainage management ❖ Replanting , if completely damaged	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Tomato	❖ Drainage management ❖ Replanting, if completely damaged	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Bottle gourd	❖ Drainage management	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Heavy rainfall with high speed winds in a short span[2]	❖ Drainage management ❖ Resowing, if completely damaged	❖Drainage management ❖ Alternative crop if totally damaged	❖ Drainage management ❖ Alternative crop if totally damaged	
Rice	❖ Drainage management ❖ Gap filling ❖ Replanting, ❖ Alternative crop, if totally damaged	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management ❖ Harvest the crop at physiological maturity	
Maize	❖ Drainage management ❖ Gap filling ❖ Alternative crop, if totally damaged	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management ❖ Harvest the crop at	

			physiological maturity	
Horticulture				
Bhendi	❖ Gap filling ❖ Resowing	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management	
Brinjal	❖ Gap filling ❖ Replanting	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management	
Chilli	❖ Gap filling ❖ Replanting	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management	
Tomato	❖ Gap filling ❖ Replanting	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management	
Bottle gourd	❖ Gap filling ❖ Replanting	❖Drainage management ❖Alternative crop if totally damaged	❖ Drainage management	
Outbreak of pests and diseases due to unseasonal rains				
Rice	❖ Seedling treatment with granular insecticide – Cartap hydrochloride or phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage.	❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times)	❖ Harvest at physiological maturity	Proper drying and safe storage
Maize	❖ Drainage, and yellowing mainly due to nitrogen deficiency apply N split doses ❖ Application of granular insecticides viz. Thimet 10g, or Carbofuran 3g. in whorl of maize	❖ Foliar blight control through Mancozeb @ 2.5g/l or Zineb/ Maneb @ 2.5-4 g/lit of water (2-4 applications at 8-10 days interval)	❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity	❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper dying

Sugarcane	❖ Provide drainage	Provide drainage	Provide drainage	❖ Proper dying • Storage at safe place and transportation
Horticulture				
Vegetables	• Drainage management	• Drainage management	• Drainage management	
Mango	**Anthracnose:-** The foliar infection can be controlled by spraying of copper oxychloride (0.3%) Use bio control agent viz *Streptosporangium pseudovulgare* **Bacterial canker:** Regular inspection of orchards, sanitation and seedling certification are recommended as preventive measures. Mango stones for raising seedlings (root stock) should always be taken from healthy fruits. Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.	**Anthracnose:-** Apply Carbendazim/ Thiophanate methyl (1g/lit) to control of Anthracnose. Blossom infection can be controlled effectively by spraying of Bavistin (0.1%) at 15 days interval. **Mango powdery mildew:** Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December	**Mango powdery mildew:** Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load. Spray wettable sulphur (0.2%) when panicles are 3-4" in size Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%) 15-20 days after second spray. Spraying at full bloom needs to be avoided. **Mango bacterial canker:** Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection. In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.	Harvest at proper time **Anthracnose:-** Pre-harvest sprays of hexaconazole (0.01%) or Carbendazim (0.1%) at 15 days interval should be done in such a way that the last spray falls 15 days prior to harvest. Diseased leaves, twigs, and fruits, should be collected and burnt to avoid the spread for next season
Banana			Harvest at proper time	
Guava			Harvest at proper time	

2.3 Floods

Condition	**Suggested contingency measure[o]**			
Transient water logging/ partial inundation[1]	**Seedling / nursery stage**	**Vegetative stage**	**Reproductive stage**	**At harvest**
Rice	❖ Drainage management ❖ Gap filling, if needed ❖ Re transplanting through Dapog nursery	❖ Drainage management ❖ Gap filling, if required ❖ Alternative crop if totally damaged ❖ 40-45 days old seedlings may be used ❖ Kharuhan (double transplanting)	❖ Harvest at physiological maturity ❖ Lentil as paira crop Lentil- PL-406, Malika, Arun	Storage at safe place
Maize	❖ Drainage management ❖ Re sowing, if substantially damage	❖ Drainage management ❖ Alternative crops if totally damaged	❖ Harvest at physiological maturity ❖ Toria crop, if standing crop damaged Toria- RAU TS-17, Panchali, Bhawani	Storage at safe place
Sugarcane	❖ Drainage management	❖ Drainage management		
Horticulture				
Vegetables	❖ Drainage management	❖ Drainage management		
Continuous submergence for more than 2 days[2]				
Rice	❖ Resowing if damaged after receding of flood	❖ Replanting through Kharuhan (double transplanting) by 3-4 seedling per hill	❖ Toria/Late wheat Toria- RAU TS-17, Panchali, Bhawani Late Wheat – HUW-234, C-306, DBW-14, HP-1744, HD-2643	Storage at safe place
Maize	❖ Resowing if damaged after receding of flood	❖ Resowing ❖ Gap filling	Toria/Late wheat Toria- RAU TS-17, Panchali, Bhawani Late Wheat – HUW-234, C-306, DBW-14, HP-1744, HD-2643	Storage at safe place
Sugarcane	❖ Drainage management	❖ Drainage management	❖ Drainage management	Storage at safe place
Horticulture				

Vegetables	❖ Drainage Management ❖ Spray of Metalaxyl 2gm/lt to check damping off	❖ Drainage Management ❖ Spray of Metalaxyl 2gm/lt to check damping off	❖ Drainage management ❖ Alternative crop if totally damaged	
Old orchard	❖ After flood spray Dimethoate @ 1-1.5ml/lt on trees ❖ Drench the tree with carbendazim @ 1 gm/lt ❖ Prune the diseased and dried branches and apply Copper oxy chloride@ 3gm/ lt ❖ Apply Bordeaux Paste up to 5'ht			
Sea water intrusion[3]	**Not Applicable**			

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				
Maize	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Pigeonpea	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Wheat	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Horticulture				
Mango	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Litchi	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Papaya	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Cold wave				
Wheat		Irrigation, mulching		
Lentil		Irrigation, mulching		
Horticulture				
Mango	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Litchi	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Papaya	Life saving irrigation	Life saving irrigation	Life saving irrigation	
Frost				

Wheat		Irrigation, mulching		
Lentil		Irrigation, mulching		
Horticulture				
Vegetables		Earth up to 15cm ht. Irrigation , mulching		Harvest in dry weather
Hailstorm				
Cyclone				

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event	**During the event**	**After the event**
Drought			
Feed and Fodder availability	**1. Reserve feed/ fodder bank at community level** 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. Checking of feed availability may be made at 3 months interval, particularly before onset of summer. Silage:20-50 t Urea molasses mineral bricks (UMMB): and complete feed block (CFB) 50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements	Harvest and use all the failed crop (Maize, Rice, Wheat, Horse gram etc) material as fodder. Harvest the top fodder (Neem, Subabul, Acasia, Pipal, Gulmohar, Sesame, Bamboo etc) and unconventional feeds resources like banana plants, babool pods etc for use as fodder for livestock (LS). Sugarcane tops or whole sugarcane plant may be fed to livestock. Aquatic plants like lotus, water hyacinth, duckweed may be fed to livestock mixing with straw. During drought, sorghum may accumulate HCN, which is toxic to livestock. Care may be taken in feeding of stunted grown Sorghum fodder. Available feed and fodder should be collected 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	Short duration fodder crops of Sorghum / Pearl millet / Maize (UP Chari, Pusa Chari, HC-136, HD-2/Rajkoo, Gaint Bajra, L-74, K-6677, Anand / African tall, Kissan composite, Moti, Manjari, BI-7) and cowpea should be sown in unsown and crop failed areas. Cultivation of fodder Rabi maize if water stagnated upto Nov/ December. Cultivation of Sorghum /CowpeaMaize in September. Rapeseed, mustard, Chinese cabbage etc and maize may be grown as fodder where feasible. These crops will be harvested in November to facilitate the sowing of wheat, pulses etc. Under irrigated conditions sowing of barseem with Chinese cabbage in last week of

	mixture:1-5 t **2. Preparation and storage of silage and hay at household level** Preserve the fodder in the form of hay from Berseem, cowpea, oat & other grasses as well as silage from (a Maize- harvesting at dough stage. (b) Jowar - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hycianth mixing with Rice straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth. Bales of hay and other dry fodder should be stored and covered with asbestos sheet or polythene sheet. **3, Creation of permanent fodder seed banks in all drought prone areas.** **2. Establishment of silvi-pastoral system and cultivation of fodder tress** Establishment of silvi-pastoral system in CPRs with ***Stylosanthus hamata*** and ***Cenchrus ciliaris*** as grass with ***Leucaena leucocephala*** as tree component. Fodder trees may be planted around the house, wasteland etc. Recently, Chaya tree (*Cnidoacolus aconitifolius*) has been introduced in IGFRI, Jhansi which has high protein value, may be introduced in drought prone regions. **3. Management of CPRs**	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. In acute drought affected areas, animal camp may be organized along nearby canals or water sources. Farmers along with canal may be persuaded to cultivate fodder crops. Herd should be split and supplementation should be given only to the highly productive and breeding animals (pregnant animals). Due to prolonged under-feeding, there is a chance of abortion in pregnant animals and lactating cows may show the symptoms of hypoglycemia. Comparatively good quality feed may be offered to milch and pregnant animals. Dry and non-productive animals may be reared on dry roughages sprayed with 10% molasses or crude jaggery solution and 2% urea for maintenance of animals. Available kitchen waste should be mixed with dry fodder while feeding. Livestock should be kept in shelter or under shed during daytime. In case of hot weather condition, grazing may be done in morning and afternoon. Livestock should not be traveled long distance for grazing to save energy and drinking water intake. Animals should not be watered immediately after return from grazing. Washing of animals may be done at least twice a day. 40-50 g of salt and 30-40 g mineral mixture per adult animal and 10-20 g for small ruminants and calves to be provided daily through feed to reduce the imbalances of minerals. Livestock may be provided with drinking water from wells, hand pumps or from pond. In case of bad water quality, bleaching	September may be taken up for early availability of green fodder. Oats may be grown in October as multi cut fodder to ensure the fodder availability for longer period. Concentrates supplementation should be provided to all the animals.

	Top dressing of N in 2-3 split doses @ 20-25 kg N/ha in CPRs with the monsoon pattern for higher biomass production **4. Short duration and low water requiring fodder cultivation** 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) and cowpea. **5. Feeing management** 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 for feeding dairy animals. Establishment of back yard cultivation of para grass/ hybrid Napier with drain water from bath room/washing area Avoid feed wastage by offering chaffed fodder and less quantity feed for 4 times a day. Avoid burning of wheat straw and maize stover. The big farmers may allow smallholders to collect residual straw after using combine harvester. Harvesting and collection of perennial vegetation particularly grasses which grow during monsoon. If excess grasses are collected, dried grass may be stored.	powder or chlorine or lime may be applied to water. 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.	

	Proper drying, bailing and densification of harvested grass.		
Cyclone	Harvest all the possible wetted grain (rice/ wheat/maize etc) and use as animal feed after drying. 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. Identification of animals may be done. Keep animals untied in the shed in case of EFW.	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 lime/ bleaching 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	**1. Reserve feed/ fodder bank at community level** 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. Complete feed block or urea molasses mineral bricks may be stored. Checking of feed availability may be made at 3 months interval, particularly before onset of monsoon. Silage:20-50 t Urea molasses mineral bricks	**1. Immediate measures** Transportation of animals to elevated areas. Temporary shelter arrangement. Stall feeding of animals with stored hay and concentrates. Proper hygienic and sanitation of the animal shed/ temporary shelter. Application of lime/ bleaching powder or ash may be applied around shed. In severe floods, un-tether or let loose the animals Emergency outlet establishment for required medicines or feeds in each village. Checking of animals for injury and illness.	Repair of animal shed. Bring back the animals to the shed. Cleaning and disinfection of the shed with bleaching powder/ lime or ash. 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 lime and bleaching powder in pit. .

	(UMMB): and complete feed block (CFB) 50-100 t Hay:100-250 t Concentrates: 20-50 t Minerals and vitamin supplements mixture:1-5 t 2. Preparation and storage of silage and hay and crop by-products at household level. The feed storage may be established in high land where shelter may be taken during flood. Preserve the fodder in the form of hay from Berseem, cowpea, oat & other grasses as well as silage from (a Maize- harvesting at dough stage. (b) Sorghum - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hyacinth mixing with Rice straw in ratio of 4:1 with 70 kg molasses /ton of clean water hyacinth. Bales of hay and other dry fodder should be stored and covered with asbestos sheet or polythene sheet. Preserve crop by-products like broken rice/ wheat/ maize, bran, chunies etc and dried plant of masoor, moong, etc in *bhuskar*. The height of *bhuskar* may be high (above the water level of last flood). **3, Creation of permanent fodder seed banks in all flood prone areas.**	Spraying of fly repellants in animal sheds. Smoke may be generated at night inside the shed to prevent animals from mosquito bite. Govt. may supply feed block or urea molasses minerals bricks or concentrate as flood relief. Bleaching powder and lime may also be supplied. If stored feed are not available, feeding of animals may be done with top feeds (tree leaves,, aquatic plants, sugarcane tops) etc. as mentioned in drought. Fungal infected straw/ feed should not be fed. Bleach (0.1%) drinking water / water sources. If bleaching powder is not available, treat with lime powder. Produce smoke with mosquito replants in the shed during night.	Subsidy may be given for proper disposal of dead animals. Proper drying the harvested crop material and proper storage. Wet feed/ straw may be dried for animal feeding. Care should be taken not to feed fungal infected feed. Wet straw may be treated with urea (1%) to prevent fungal growth and enrichment. Govt. may supply cattle feed at frequent interval or at sufficient quantity to feed the animals. If available feed is insufficient quantity, concentrate mixture may only be fed to milch and pregnant animals. Feed wastage may be reduced by offering feed in small quantity feed in several times (4 times a day) Aquatic plants like duck weed, water hyacinth and banana plants may be fed to dry and unproductive animals along with wheat straw. Sugarcane tops, bamboo leaves and mango leaves may be fed to milching, pregnant and small ruminants. When local grass will be available, may be fed to all animals. Newly grown grasses may contain high amount of nitrate. Care may be taken to feeding grasses after flood water is receded. There may be leaching of essential minerals due to water logging. So, mineral mixture may be fed to all

	4. General precautions In case of EFW, harvest all the crops (Sorghum, Maize, Rice, Wheat, Horse gram, etc) 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. Keep animals untied in the shed. Permanent marking/ identification of animals. **5.** Strengthening of co-operative sectors in flood prone areas for milk marketing and inputs of medicine, seed, feed and veterinary care. One person in each village may be trained with primary veterinary health care and emergency rescue operation. 6. Emergency kit preparation Emergency medicine Temporary shelter		animals. Mineral mixture may be supplied by the Govt. at subsidized rate. Timely treatment of animals may be done by increasing of number of veterinary dispensary and mobile veterinary clinics. Medicine may be supplied at free of cost. Flood prone zones are susceptible to liver fluke, so, drug may be given to control fluke infestation. Smoke may be generated at night inside the shed to prevent animals from mosquito bite. Farmers may be given soft loan for purchase of new animals. Cooperative society may be extended to this area which will help in following 1. Society will provide loan through bank. In a month, price of 3 weeks milk will be given to the farmers and 1 week price will be given to bank for repay of loan. 2. Farmers will get medicine at wholesale rate. 3. Concentrate feed will be provided by co-operative at subsidized rate. 4. Timely treatment of animals will be done. 5. Marketing channel for milk will be steady. Subsidy may be given for construction

	Torch Rope		of temporary animals shed (Bamboo based). Animals should come under insurance coverage. Small-scale income generating activities like backyard poultry, duckery, goatery may be started. For this purpose, farms may be developed in non-flood prone zones where these animals will be raised up to certain age and will be distributed to the affected farmers for immediate income generation. Fodder cultivation may be encouraged with supply of fodder seed.
Heat & Cold wave	Arrangement for protection from **heat wave** i) Plantation around the shed ii) Water sprinklers / foggers in the shed ot frequent washing of animals. **iii)** Application of white reflector paint on the roof or putting rice straw on the roof of the shed. **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. Molasses may be added in the concentrate feed during heat waves. Put on the foggers / sprinkerlers and frequent washing of animals 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 Provision for mobile ambulatory van.	Rescue of sick and injured animals and their treatment Conducting mass animal health camps Animals may be checked for any external injury and illness, Pregnant animals may be checked for any discomfort and uneasiness. Animals may be dewormed with suitable anti-parasitic drug and be checked and treated for ecto-parasites, if any. Deworming will improve fodder and feed absorption. During flood do not leave halter or headstalls on animals. Do not tie animals together when releasing. Report the location, identification and disposition of livestock and poultry to authorities handling the disaster. During flood cases of malaria, diarrhea, respiratory infection, fever, injury, leg gangrene and snake bite may be high. Precaution may be taken to treat the affected animals.	Conducting psahu sibir, mass animal health camps, fertility camps and deworming camps. Conducting fertility camps. Disposal of carcass by above means. Pregnancy toxemia may occur due to prolonged under-feeding. Hypoglycemia is also observed. Treatment may be provided to affected animals. Adequate attention is to be paid to disinfect the premises of temporary sheds with the help of bleaching powder, phenol, carbolic acid etc. In no case the carcass/ cadaver should come in contact with healthy animals rehabilitated in sheds. During flood cases of malaria, diarrhea, respiratory infection, fever, injury, leg gangrene, water born diseases and snake bite may be high. Precaution may be taken to treat the affected animals Diseases that can occur during flood should be given special attention and accordingly medicines should be made available in the health camp for the following mentioned diseases. Salmonella spp. Escherichia coli Giardiasis Amoebiasis

			Rotavirus Leptospirosis Scabies Black leg Malignant Edema Foot rot Anthrax Botulism Tetanus Red water Black disease Entertoxemia Liver fluke Amphistomiasis Brooders pneumonia Malaria Snake bite.
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)	Before rainy season and 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, wheat 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, wheat 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 with bleaching powder/ lime etc. Treatment of affected birds Prevent water logging surrounding the sheds Assure supply of electricity Sprinkle lime powder to prevent ammonia	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

		accumulation due to dampness	
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	Routine practices are followed

		drinking water with electrolytes and vit. C In hot summer, add anti-stress probiotics in drinking water or feed. Increase energy and vitamin concentration in feed (supplementation with grain).	
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			
B. Aquaculture			

(i) Shallow water in ponds due to insufficient rains/inflow	(i) Thinning of population (ii) Arrangement of water supply from external resource (iii) Deepening of ponds for more storage of water	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes (Singhi, Magur or Murrel)	(i) Maintenances of remaining stock till favorable condition achieved (ii) If not feasible, total harvesting or transfer of fishes may be done. (iii) Preparation of the pond for next crop.
(ii) Impact of salt load build up in ponds / change in water quality	(i) Regular monitoring of water quality parameter. (ii) Arrangement of aeration (del) (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water (iii) Monitoring of water quality (iv) Reduction of manuring according to water level.	(i) 10 to 15% exchange of water
2) Floods			
A. Capture			
B. Aquaculture			
(i) Inundation with flood water	(i) Elevation/ Renovation of pond dyke. (ii) Sale of Table/marketable size fishes (iii) construction of earthen nursery ponds in upland areas	Collection of naturally bred seeds (Spawn /fry /fingerling) from flooded water Stocking in nursery ponds for rearing Enhancement of dykes by sand bags	-Retain the water in pond immediately after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sale of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		
(iii) Health and diseases	Use lime @ 200 kg/ ha / potassium permanganate – 2% (b) Arrangement of CIFAX and medicines & chemical stock	Use of potassium permanganate as prophylactics	-Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required in consultation with fishery experts

(iv) Loss of stock and inputs (feed, chemicals etc)	Raising the height of dyke by fencing with net and bamboo poles to prevent loss of stock	Arrangement of advance size fingerlings / yearlings for stocking	Stocking of large size fingerlings of carps Fertilization of pond and regular feeding of fish Harvesting and sale of fish
(v) Infrastructure damage (pumps, aerators, huts etc)	Repairing/ arrangement of alternate safe place to keep pumps, aerators etc.	Removal of flood water and infrastructure facilities from the site.	Re-establishment of the infra structural facility.
3. Cyclone / Tsunami			
4. Heat wave and cold wave			