

State: BIHAR

Agriculture Contingency Plan for District: Gaya

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Northern Plain, Hot Subhumib (Dry) Eco-Region (9.2)		
	Agro-Climatic Zone (Planning Commission)	Middle Gangetic Plain Region (IV)		
	Agro Climatic Zone (NARP)	South Bihar Alluvial Plain Zone (BI-3)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Aurangabad, Gaya, Jahanabad, Patna, Arwal, Rohtas, Nalanda, Bhojpur, Buxar, Bhabhua, Nawada		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		24 ⁰ 16'30" N	84 ⁰ 17' to 84 ⁰ 23'30"E	111M
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	ARI, Mithapur, Patna		
	Mention the KVK located in the district with address	PC, Krishi Vigyan Kendra, Seed Multiplication Farm, Manpur, Gaya-823003		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	BAC, Sabour , Bhagalpur			

1.2	Rainfall	Normal RF(mm)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep)	950	3 rd week of June	3 rd week of October
	NE Monsoon(Oct-Dec)	68.7		
	Winter (Jan- Feb)	35.1		
	Summer (March -May)	33.4		
	Annual	1034.6		

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)	493.7	235.8	77.3	56.6	3.9	8.1	1.8	27.4	70.8	

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	1. Black soils	210.7	42
	2. Sandy soils	110.2	22
	3. Sandy Loam soils	70.3	14
	4. Alkali Soils	86.3	17
	5. Diara Land	16.1	05

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	235.8	139%
	Area sown more than once	98.8	
	Gross cropped area	328.6	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	100.3		
	Gross irrigated area	100.3		
	Rainfed area	61.1		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		41.7	28.7
	Tanks			
	Open wells		63.0	43.4
	Bore wells- Deep TW			
	Lift irrigation schemes (Surface lift)			
	Micro-irrigation		40.30	27.80
	Other sources (please specify) Dug well & shallow well			
	Total Irrigated Area		145	
	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	24	100%	
	Wastewater availability and use			
	Ground water quality			
*over-exploited: groundwater utilization > 100%; critical: 90-100%; semi-critical: 70-90%; safe: <70%				

1.7 Area under major field crops & horticulture (as per figures of 2008-09)

1.7	Major field crops cultivated	Area ('000 ha)							
		<i>Kharif</i>			<i>Rabi</i>			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Rice			177.5					177.5
	Wheat						81.5		81.5
	Chickpea						17.6		17.6
	Lentil						22.09		22.09
	Rai						13.8		13.8
	Greengram						3.3		3.3

	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed
	Mango	1.1		
	Gauva	0.6		
	Lemon	0.3		
	Banana	0.2		
	Coconut	0.02		
	Horticulture crops - Vegetables	Total	Irrigated	Rainfed
	Cauliflower	1.7		
	Cabbage	0.8		

	Onion	1.3		
	Ladiesfinger	1.7		
	Brinjal	1.5		
	Tomato	0.8		
	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Plantation crops			
	Fodder crops			
	Barseem	0.068		
	Oat	0.126		
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

1.8	Livestock	Male ('000)	Female ('000)	Total ('000)			
	Non descriptive Cattle (local low yielding)	343.5	358.4	701.9			
	Improved cattle						
	Crossbred cattle	6	17.1	23.1			
	Non descriptive Buffaloes (local low yielding)	99.5	229.7	329.3			
	Descript Buffaloes	5.7	7.7	13.4			
	Goat	142.8	275.7	418.5			
	Sheep	2.5	3.2	5.7			
	Others (Camel, Pig, Yak etc.)	59.0	67.5	126.5			
	Commercial dairy farms (Number)						
1.9	Poultry	No. of farms	Total No. of birds ('000)				
	Commercial	20	18				
	Backyard	8	12				
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
		1106	1106
B. Culture			
		Water Spread Area (ha)	Yield (t/ha)
i) Brackish water (Data Source: MPEDA/ Fisheries Department)			
ii) Fresh water (Data Source: Fisheries Department)			
		2575.6	3.2
			518.6

1.11 Production and Productivity of major crops (Average of 5 years: 2004- 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 identified based on total acreage)										
	Rice	640	3352					640	3352	
	Wheat			143	1728			143	1728	
	Chickpea			17.2	495			17.2	495	
	Lentil			17	795			17	795	
	Rai			9.3	722			9.3	722	
	Greengram					1.7	531	1.7	531	
Major Horticultural crops (Crops identified based on total acreage)										
	Mango					7.7	690	7.7	690	
	Guava	4.209	680					4.209	680	
	Cauliflower			27.9	1555			27.9	1555	
	Onion			27.3	2000			27.3	2000	
	Ladiesfinger	21.5	1241					21.5	1241	
	Tomato			12.1	1400					

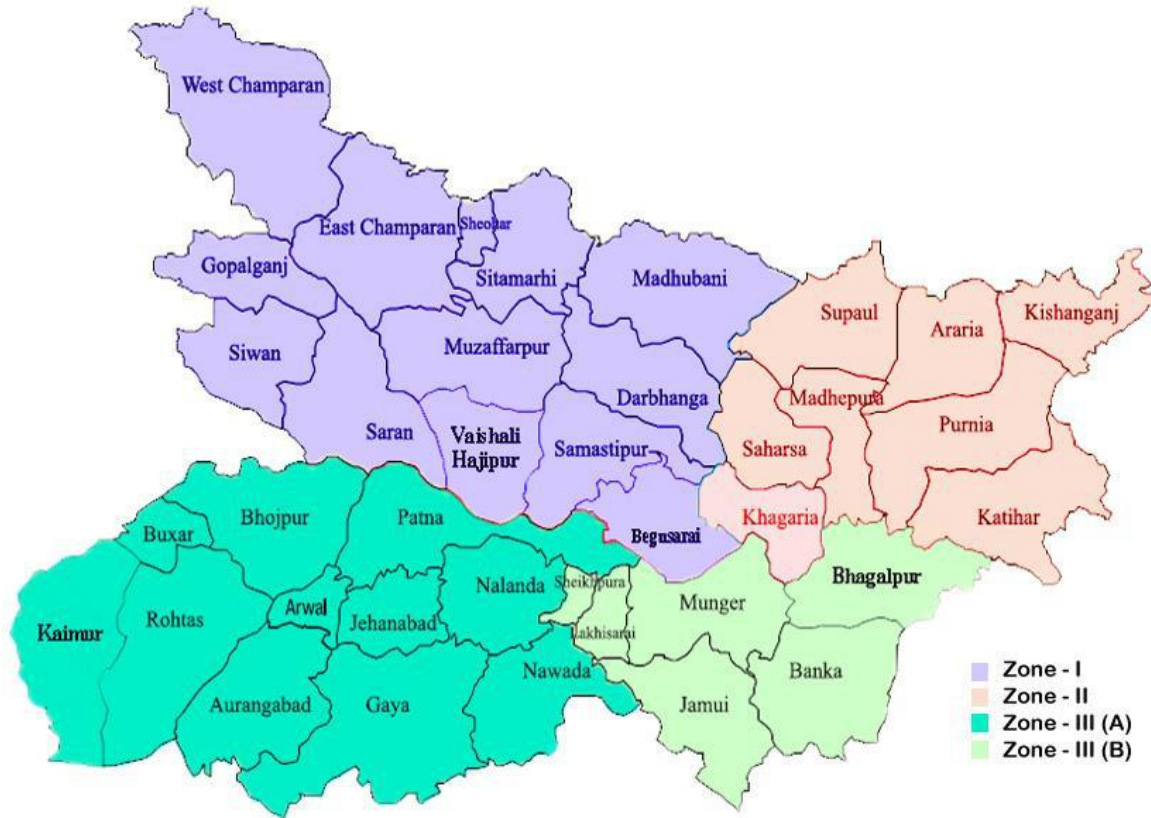
1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Wheat	Maize	Lentil	Potato
	Kharif- Rainfed	-	-	-	-	-
	Kharif-Irrigated	4 th week of May – 4 th week of June	-	4 th week of May – 4 th week of June	-	-
	Rabi- Rainfed	-	-	-	2 nd week of October - 2 nd week of November	-
	Rabi-Irrigated	-	2 nd week of November - 2 nd week of December	-	2 nd week of October – 2 nd week of November	4 th week of October - 2 nd week of November

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

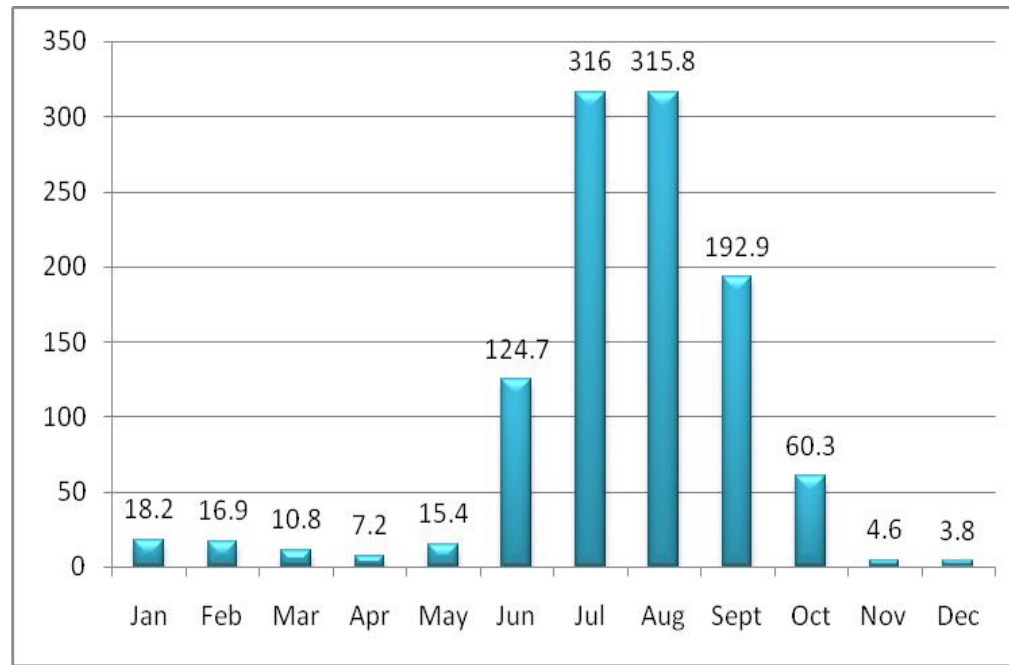
Agro climatic Zones of Bihar



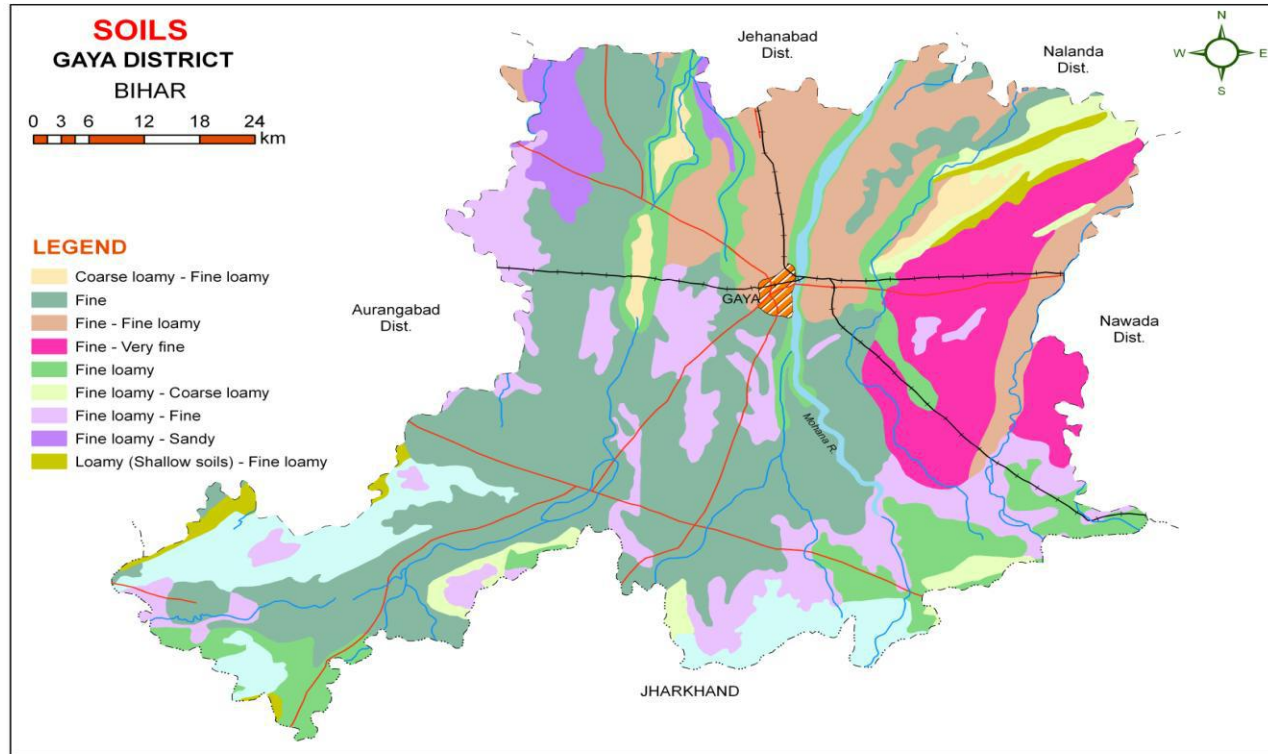
Source: krishi.bih.nic.in

Annexure-II

Mean annual rainfall(mm)



Annexure-III



Source: NBSS&LUP, Kolkata

2.0 Strategies for weather related contingencies

2.1 Drought

2.1.1 Rainfed situation

Condition	Major Farming situation	Normal Crop / Cropping system	Suggested Contingency measures			
			Change in crop / cropping system including variety	Agronomic measures	Remarks on Implementation	
Early season drought (delayed onset) Delay by 2 weeks 1 st week of July	Upland	Pigeonpea Maize - Vegetables	Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039	<ul style="list-style-type: none"> • No change in normal package of practices • Balanced use of fertilizers • Application of manures 		
	Medium deep, sandy to sandy loam soils		Pigeonpea –Finger millet Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039 Finger millet– Local			
			Maize – Vegetables Maize – Deoki . Ganga -2			
		Medium land	Rice- Wheat- Greengram Rice –Vegetables Rice-Wheat	Medium duration Rice-Wheat – Greengram/ Rice – Vegetables Rice - Rajendra Bhaga wati, Rajendra Suwasni, Prabhat, Kuwan		<ul style="list-style-type: none"> • Normal package of Practices • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • Drum seedling • Balanced use of fertilizers • Interculture for timely weed control in direct seeded rice • Groundwater to be used for life saving irrigation to upland crops and transplanted rice
	Deep Sandy loam to Clay loam soils					
	Low land	Rice – Wheat Rice – Wheat – Greengram Rice – Lentil/Chickpea Fallow – Lentil / Chickpea	Rice – Wheat Rice- Sita , RM -1, Rajendra Suwasni, Rajendra Sweta			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 4 weeks 3 rd week of July	Upland	Pigeonpea- Pigeonpea Maize - Vegetables	Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039	<ul style="list-style-type: none"> • Normal package of Practices ▪ Life saving irrigation 	Seeds from RAU, Pusa, NSC, TDC , BRBN , KVKetc.
	Medium deep, sandy to sandy loam soils		Maize – Vegetables Maize – Dewki . Ganga -2		
	Medium land	Rice- Wheat- Greengram Rice –vegetables Rice-Wheat	Rice-Wheat – Greengram/ Rice – Vegetables Rice - Rajendra Bhagawati, Rajendra Suwasni, Prabhat	<ul style="list-style-type: none"> • 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 and lowlands • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. 	
	Deep Sandy loam to Clay loam soils				
	Low land	Rice – Wheat Rice – Wheat – Greengram Rice – Lentil/ Chickpea Fallow – Lentil/ Chickpea	Rice – Wheat Rice- Sita , RM -1 Rajendra Suwasni, Rajendra Sweta		
	Deep Sandy loam to Clay loam soils		Rice – Wheat – Chickpea/ Rice – Lentil / Chickpea Rice- Sita , RM -1 Rajendra Suwasni, Rajendra Sweta		

				<ul style="list-style-type: none"> Enhanced dose of nitrogen with full basal dose of NPK at the time of transplanting to boost the early vegetative growth in late plantings under sufficient moisture Timely interculture for weed control in direct seeded rice Life saving irrigation 	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 6 weeks 1 st week of August	Upland Medium deep, Sandy to Sandy loam soils	Pigeonpea- Pigeonpea Maize - Vegetables	Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I, ICPL 88039 Maize – Vegetables Maize – Dewki . Ganga -2 Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19 Finger millet- DB-7, BR-5, BR-10, Coimbatore -1	<ul style="list-style-type: none"> Life saving irrigation 	Seeds from RAU, Pusa, NSC, TDC, BRBN, KVK etc.

	Medium land Deep Sandy loam to Clay loam soils	Rice- Wheat Rice –Toria Rice-Vegetables	Rice-Wheat/ Rice – Toria Rice – Rajendra Bhagawati, Rajendra Suwasni Prabhat Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant urd-30 , 19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1	<ul style="list-style-type: none"> • Direct seedling of rice or Drum seedling • 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 • Raise staggered community nursery preferably with medium duration varieties in mid and lowlands • Enhanced basal dose of NPK to boost the early vegetative growth • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts • Life saving irrigation 	
	Low land Sandy loam to Clay loam soils	Rice – Wheat Rice – Lentil/ Chickpea Fallow – Lentil / Chickpea	Rice – Wheat Rice- Sita , RM -1 Rajendra Suwasni, Rajendra Sweta Rice (Short Duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj If dry spell continues, direct seeding of short duration rice varieties (100 days) can be done in midlands by first fortnight of August and extra short duration (70-75 days) up to 25 th August		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system ^c	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset)					
Delay by 8 weeks 3 rd week of	Upland Medium deep, Sandy to Sandy	Pigeonpea- Pigeonpea Maize -	Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039	<ul style="list-style-type: none"> • Moisture conservation • Inter cultivation • Sowing of <i>rabi</i> crops such as Wheat, Lentil, Chickpea, Pea, 	Seeds from RAU, Pusa, NSC, TDC , BRBN KVK etc

August	loam soils	Vegetables	Toria – panchali , Bhavani	Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables	
	Medium land Deep Sandy loam to Clay loam soils	Rice- Wheat Rice –Toria Maize – Wheat Maize – Vegetables	Rice – Wheat/ Rice - Toria Rice - Rajendra Bhagawati, Rajendra Suwasni,Turanta, PR113, 115 , Prabhat , Susksh Samrat Pigeonpea Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I	<ul style="list-style-type: none"> • 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. • Enhanced basal dose of NPK in rice to boost early vegetative growth • 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 	
	Low land Deep Sandy loam to Clay loam soils	Rice – Wheat Rice – Late Wheat Rice – Lentil/Chickpea Fallow – Lentil / Chickpea	Rice – Wheat Rice- Sita , RM -1Rajendra Suwasni, Rajendra Sweta, Rice short duration (Direct seeded)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Rice – Late Wheat	<ul style="list-style-type: none"> • Double 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) 	

			Rice – Potato	<ul style="list-style-type: none"> • Application of organic manure and vermi compost initially for Rice and other crops. • Sowing of <i>rabi</i> 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 <i>rabi</i> production would compensate the production loss during <i>kharif</i>. • 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 	
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Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Early season drought (Normal onset)					
Normal onset followed by 15-20 days dry spell after sowing leading to poor germination/cr op stand etc.	Upland Medium deep, Sandy to Sandy loam soils	Pigeonpea- Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	<ul style="list-style-type: none"> • Gap filling of existing crop • Life saving irrigation 	<ul style="list-style-type: none"> • Inter cultivation • Mulching for moisture conservation • Foliar application of 2% MOP • Conservation tillage 	Seeds from RAU, Pusa, NSC, TDC , BRBN KVK etc
		Maize – Toria Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Macca-3			

	Medium land	Maize-Wheat – Vegetables			
	Sandy loam – Clay Loam soils	Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki Pusa early hybrid Macca-3			
		Rice –Wheat – Vegetables			
		Pigeonpea- Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-	<ul style="list-style-type: none"> • Pre sowing irrigation • higher seed rate • Gap filling 		
Low land	Rice-Wheat-Green gram Rice – Vegetables Rice – Lentil /Chickpea Fallow – Lentil / Chickpea	<ul style="list-style-type: none"> • Life saving irrigation • Gap filling 			
	Sandy loam to Clay loam soils	Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasni, Santosh, R. Kasturi, Sita			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementation
Mid season drought (long dry spell, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Upland Medium deep, Sandy to Sandy loam soils	Pigeonpea- Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	<ul style="list-style-type: none"> • Gap filling of existing crop • Postponement of top dressing 	<ul style="list-style-type: none"> • Inter culturing • Foliar application of 2% MOP • Mulching • Conservation tillage • Life saving irrigation 	
		Maize - Vegetables Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki, Pusa early hybrid Macca-3			

		Maize – Toria Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki Pusa early hybrid Macca-3			
	Medium land Sandy loam – Clay Loam soils	Rice-Wheat-Green gram Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasini Santosh, R. Kasturi, Sita,			
		Rice- Lentil / Chickpea/ Vegetables			
		Maize – Wheat – Vegetables Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki Pusa early hybrid Macca-3			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measures	Remarks on Implementation
Mid season drought (long dry spell) At flowering/ fruiting stage	Up land	Pigeonpea Pigeonpea – Bahar, Pusa-9	<ul style="list-style-type: none"> IPM practices Foliar application of 1% Urea to boost up the vegetative growth 	<ul style="list-style-type: none"> Inter culturing Foliar application of 2% MOP Mulching Conservation tillage Life saving irrigation 	
		Maize – vegetables Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki,Pusa early hybrid Macca-3			
		Maize – Toria Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki Pusa early hybrid Macca-3			
	Medium land	Rice-Wheat-Greengram Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasini Santosh, R. Kasturi, Sita,			
		Rice- Wheat			

		Rice – Lentil / Chickpea			
		Rice – Vegetables			
		Maize – Wheat – Vegetables			
	Low land	Rice-Wheat-Greengram Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasini Santosh, R. Kasturi, Sita,			
		Rice- Lentil / Chickpea/ Vegetables Rice– Wheat Fallow – Lentil / Chickpea			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Soil nutrient & moisture conservation measues	Remarks on Implementati on
Terminal drought (Early withdrawal of monsoon)					
	Up land	Pigeonpea Pigeonpea – Bahar, Pusa-9	<ul style="list-style-type: none"> • IPM practices • Foliar application of 1% Urea to boost up the vegetative growth in pigeonpea 	<ul style="list-style-type: none"> • Open the furrow during evening and left furrow open overnight and plank in the next morning before sunrise for growing of early rabi crops like wheat, Rabi Maize/Pulses /Oilseeds/ Vegetables 	
		Maize – vegetables Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki,Pusa early hybrid Macca-3			
		Maize – Toria Maize - Shaktiman-1,2,3,4, Suwan, Ganga-11, Deoki Pusa early hybrid Macca-3			
	Medium land	Rice-Wheat-Greengram Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasini Santosh, R. Kasturi, Sita,			
		Rice- Wheat			
		Rice – Lentil / Chickpea			

		Rice – Vegetables			
		Maize – Wheat – Vegetables			
	Low land	Rice-Wheat-Greengram Rice-Rajendra Bhagawati, Saroj, Rajendra Suwasini Santosh, R. Kasturi, Sita,			
		Rice- Lentil / Chickpea/ Vegetables Rice– Wheat Fallow – Lentil / Chickpea			

2.1.2 Drought - Irrigated situation

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delayed release of water in canals due to low rainfall	Not Applicable				
Limited release of water in canals due to low rainfall	Not Applicable				
Non release of water in canals under delayed onset of monsoon in catchment	Not Applicable				

Condition	Major Farming situation ^f	Normal Crop/cropping system ^g	Suggested Contingency measures		
			Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
Lack of inflows into tanks due to insufficient	Medium deep, Sandy to Sandy loam	Pigeonpea- Pigeonpea Maize - Vegetables	Pigeonpea – Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039	<ul style="list-style-type: none"> Mulching Application of organic manure and vermicompost 	Seeds from RAU, Pusa, NSC, TDC , BRBN , KVK etc

Condition	Major Farming situation ^f	Normal Crop/cropping system ^g	Suggested Contingency measures		
			Change in crop/cropping system ^h	Agronomic measures ⁱ	Remarks on Implementation ^j
/delayed onset of monsoon			Maize – Toria/ Vegetables / Finger millet Maize – Deoki . Ganga	<ul style="list-style-type: none"> Life saving irrigation 	
	Medium land Deep Sandy loam to Clay loam soils	Rice- Wheat- Greengram Rice –Vegetables Rice – Wheat	Rice-Wheat – Greengram Rice - Rajendra Bhagawati, Rajendra Suwasni Prabhat , Turanta , Shusk Samrat Rice – Vegetables/ Wheat	<ul style="list-style-type: none"> Apply full basal dose of NPK fertilizer Life saving irrigation 	
	Low land Deep Sandy loam to Clay loam soils	Rice – Wheat Rice- Greengram Rice – Lentil/Chickpea Fallow – Lentil / Chickpea	Rice – Wheat Rice – Wheat – Greengram Rice – lentil / Chickpea Rice- Sita , RM -1 Rajendra Suwasni, Rajendra Sweta	<ul style="list-style-type: none"> 40-45 days old seedlings may be used with 3-4 seedlings per hill with close spacing Enhanced dose of nitrogen with full basal dose of NPK at transplanting 	

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Insufficient groundwater recharge due to low rainfall	Medium deep, Sandy to Sandy loam	Pigeonpea- Pigeonpea Maize - Vegetables	Pigeonpea – Pigeonpea Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I , ICPL 88039 Maize – Toria/ Vegetables / Finger millet Maize – Deoki . Ganga	<ul style="list-style-type: none"> Mulching Application of organic manure and vermicompost Life saving irrigation 	Seeds from RAU, Pusa, NSC, TDC , BRBN , KVK etc
	Medium land Deep Sandy loam to Clay loam soils	Rice- Wheat- Greengram Rice –Vegetables Rice – Wheat	Rice-Wheat – Greengram Rice - Rajendra Bhagawati, Rajendra Suwasni Prabhat , Turanta , Shusk Samrat	<ul style="list-style-type: none"> Apply full basal dose of NPK fertilizer Foliar application of 2% MOP in standing crops to 	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
			Rice – Vegetables/ Wheat	resist from drought ▪ Life saving irrigation	
Low land Deep Sandy loam to Clay loam soils	Rice – Wheat Rice – Lentil/Chickpea Fallow – Lentil / Chickpea	Rice – Wheat Rice – Wheat – Greengram Rice – Lentil / Chickpea Rice- Sita , RM -1 Rajendra Suwasni, Rajendra Sweta	• Enhanced dose of nitrogen with full basal dose of NPK at transplanting • 40-45 days old seedlings may be used with four seedlings per hill with close spacing		

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

Condition	Suggested contingency measure			
	Vegetative stage	Flowering stage	Crop maturity stage	Post harvest
Continuous high rainfall in a short span leading to water logging				
Rice	<ul style="list-style-type: none"> • Drainage management • Re transplanting through Dapog nursery if needed • Gap filling • Re sowing through drum seeder 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged i.e. Toria 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged • Harvest at physiological maturity 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Drainage management • Gap filling • Re sowing, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent if totally damaged • Harvest at physiological maturity 	Storage at safe place
Pigeonpea	<ul style="list-style-type: none"> • Drainage management • September sowing if Kharif Pigeonpea is completely damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other rabi crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent if totally damaged • Harvest at physiological maturity 	Storage at safe place
Horticulture				

Mango	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Drainage management • Harvesting at proper maturity 	
Lichi	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling 			
Banana	<ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Spray and pasting of trunk 	
Papaya	<ul style="list-style-type: none"> • Drainage management • Replanting, if completely damaged 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Spray and pasting of trunk 	
Vegetables	<ul style="list-style-type: none"> • Re sowing , if required • Replanting 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	Storage at safe place
Heavy rainfall with high speed winds in a short span²				
Rice	<ul style="list-style-type: none"> • Drainage management • Replanting if completely damaged • Gap filling if needed 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged i.e. Toria 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safe place
Maize	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative maize or other crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Subsequent crop if totally damaged 	Storage at safe place
Pigeonpea	<ul style="list-style-type: none"> • Re sowing If completely damaged • Gap filling if needed • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Alternative crop if totally damaged 	Storage at safe place
Vegetables	<ul style="list-style-type: none"> ▪ Drainage management ▪ Gap filling 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicide 	Storage at safe place
Horticulture				
Mango	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicides 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
Banana	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Staking 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	

Guava	<ul style="list-style-type: none"> • Drainage management • Replanting if substantially damaged 	<ul style="list-style-type: none"> • Drainage management • Drenching with copper fungicides 	<ul style="list-style-type: none"> • Drainage management • Harvest at proper time 	
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Outbreak of pests and diseases due to unseasonal rains				
Rice	<ul style="list-style-type: none"> ❖ Seedling treatment with granular insecticide – Cartap hydrochloride or phorate 10G or carbofuran 3G. ❖ Maintain shallow water in nursery beds ❖ Providing good drainage. 	<ul style="list-style-type: none"> ❖ Use copper fungicides against Bacterial leaf blight. ❖ Split application of N fertilizer (3-4 times) 	<ul style="list-style-type: none"> ❖ Harvest at physiological maturity 	Proper drying and safe storage
Maize	<ul style="list-style-type: none"> ❖ 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 	<ul style="list-style-type: none"> ❖ 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) 	<ul style="list-style-type: none"> ❖ Cob harvesting from standing crop ❖ Harvest at physiological maturity 	<ul style="list-style-type: none"> ❖ Storage in safe places like farmer warehouse/tent covering of produce ❖ Ensure 10-12% moisture in grains before storage ❖ Proper drying
Pigeonpea	<ul style="list-style-type: none"> ❖ Provide drainage ❖ Seed treatment with 1 g carbendizim +2g thiram/kg seed. 	Provide drainage	Provide drainage	<ul style="list-style-type: none"> ❖ Proper drying • Storage at safe place and transportation

Horticulture				
Vegetables	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	

Mango	<p>Anthracnose:- The foliar infection can be controlled by spraying of copper oxychloride (0.3%)</p> <p>Use bio control agent viz <i>Streptosporangium pseudovulgare</i></p> <p>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.</p>	<p>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.</p> <p>Mango powdery mildew: Spray wettable sulphur(0.2%) & calixin or karathane (0.1%) during second week of December</p>	<p>Mango powdery mildew: Prune diseased leaves and malformed panicles harbouring the pathogen to reduce primary inoculum load.</p> <p>Spray wettable sulphur (0.2%) when panicles are 3-4" in size</p> <p>Spray dinocap (0.1%) 15-20 days after first spray. Spray tridemorph (0.1%) 15-20 days after second spray.</p> <p>Spraying at full bloom needs to be avoided.</p> <p>Mango bacterial canker: Three sprays of Streptocycline (200 ppm) at 10 days intervals reduce fruit infection.</p> <p>In severe infection, spraying of Streptocycline (300 ppm) or copper oxychloride (0.3%) is more effective.</p>	<p>Harvest at proper time</p> <p>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.</p> <p>Diseased leaves, twigs, and fruits, should be collected and burnt to avoid the spread for next season</p>
Litchi	<p>Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.</p>	<p>Fruit Fly: First Spray delta menthrin 0.0025% plus molasses 0.1% . after 10-12 days spray fenthion 0.05% + molasses 0.1% followed by dimethoate 0.045% + molasses 0.1% if required</p>	<p>Harvest at proper time</p>	<p>Fruit Fly: Collect all fallen infested fruits and put in a drum covered with fine wire mesh. Harvest fully matured fruits one week earlier to escape egg laying</p>
Banana , Guava	Provide drainage	Provide drainage	Harvest at proper time	

2.3 Floods :

Condition	Suggested contingency measure ^o			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation ¹				
Continuous submergence	Not Applicable			

for more than 2 days ²	
Sea water intrusion 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				
Rice	Provide irrigation	Provide irrigation,	Provide irrigation,	
Maize	Provide irrigation	Provide irrigation	Provide irrigation	
Pigeonpea	Provide irrigation	Provide irrigation	Provide irrigation	
Horticulture				
Mango	Provide irrigation	Provide irrigation	Provide irrigation	
Papaya	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave^q				
Wheat, Maize , Mustard ,		Light irrigation, Mulching		
Potato		Light irrigation, Mulching		
Pulses		Light irrigation, Mulching		
Horticulture				
Bhendi, Brinjal, Chilli		Light irrigation, Mulching		
Tomato		Light irrigation, Mulching		
Bottle gourd		Light irrigation, Mulching		
Frost				
Wheat, Chickpea, Pigeonpea, Lentil		Light irrigation, Mulching		
		Light irrigation, Mulching		
Horticulture				
Bhendi, Brinjal, Chilli		Light irrigation, Mulching		
Tomato & Potato		Earth up to 15cm ht. Light irrigation, Mulching		Harvest in dry weather
Hailstorm	Not Applicable			
Cyclone	Not Applicable			

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	<ol style="list-style-type: none"> 1. Cultivation of fodder tree 2. Storage of Improved Quality Fodder 3. Conservation & Storage of <ul style="list-style-type: none"> • Feed & Fodder • Hay & Silage: — Preserve the fodder in the form of hay from Berseem & other grasses as well as silage from <ol style="list-style-type: none"> (a) Maize- harvesting at well developed cob. (b) Jowar - at flowering stage. (c) Oat (d) Hybrid Napier – 40-45 day old. (e) Water hycianth mixing with Paddy straw in ratio of 4:1 with 70 kg molasses /ton of clean water hycianth. (f) Potato leaves mixing with wheat straw in ratio of 7:1 and should be supplemented with 3% molasses. <p>Hay: –</p> <ul style="list-style-type: none"> • Berseem/Lucerne and other grasses. • Bales of hay and other dry fodder should be stored in dry places at a height of last flood level and covered with asbestos sheet or polythene sheet. 	<ol style="list-style-type: none"> 1. Feeding of Complete Feed Block 2. Feeding of Urea-Molasses-Mineral-Block & Fodder 3. Feeding of stored Hay/Silage/Improved Quality Fodder 4. Feeding of Tree leaves some of which are as follows: <ol style="list-style-type: none"> 1. Bamboo leaves 2. Neem 3. Bargad 4. Peepal 5. Seesam 6. Subabul 	<p>Production of forage crops</p> <ol style="list-style-type: none"> 1. Balanced feeding of Animal supported with little higher concentrate mixture 2. Cultivation of fodder Rabi maize if water stagnated upto Nov/December 3. Jowar/Cowpea 4. Maize in September
Drinking water			

<p>Health and disease management</p>	<p>Veterinary Preparedness with Medicines, Vaccines and provision for mobile ambulatory van.</p> <ul style="list-style-type: none"> • Vaccination <p>During drought stress becomes an incriminating factor for the precipitation of diseases in livestock and poultry.</p> <p>So, necessary vaccination of livestock and poultry should be done against economically important contagious disease.</p> <p>This will be helpful not only to check epidemic in animals, but also to reduce the probability of zoonoses in human beings.</p> <p>Care should be taken for mass vaccination of livestock and poultry with a view to covering 80% of livestock population in order to achieve herd immunity.</p> <p>Mass vaccination should be conducted by a team of Department staff with proper maintenance of detailed Inoculation Register.</p> <p>Pro-active steps should be taken to receive and stock the required doses of vaccines against different diseases for their use in face of Flood.</p>	<p>Animal safety, Health camp and Treatment</p> <p>Important Suggestions for animal and Poultry safety</p> <p>During drought, all efforts should be made to rescue most of the livestock and poultry as carefully as possible.</p> <p>The people should be made conscious through announcement with the help of mikes or other means of communication, so that they may escape with their livestock and poultry to safe area.</p> <p>Do not tie animals together when releasing.</p> <p>Report the location, identification and disposition of livestock and poultry to authorities handling the disaster.</p> <p>Health camp and treatment</p> <p>Diseases that can occur during drought should be given special attention and accordingly medicines should be available in the health camp for the following mentioned diseases.</p> <p>Treatment of Non infectious</p> <p>Arrangement should be made for the treatment of drowning and traumatic injuries, aspiration pneumonia, lameness and other surgical cases in the health camp.</p> <p>Disinfection of livestock premises and Poultry shed</p> <p>Disinfection of livestock</p>	<p>Sanitation, deworming, treatment, health camps</p> <p>Culling of Sick animals and disposal of carcass</p> <p>Maintenance of Sanitation: 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. Arrangements should be made accordingly.</p> <p>De-worming after the flood: Immediately after drought, the animals like cattle, buffalo. Sheep, goat, pig, dog and poultry need to be de-wormed with suitable broad spectrum anthelmintics. This will enable the animals to regain proper health.</p> <p>Treatment of sick animals: The Disposal of Carcass: the disposal of dead animals and birds are to be done by Animal Husbandry Department. Accordingly, necessary arrangement should be made for prompt and easy disposal of carcasses during the drought. Carcasses of animals affected by the disease are the chief source of soil infection. They harbour the germs in large numbers and liberate them from both artificial and natural</p>
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		premises and the temporary sheds should be done with the help of bleaching powder, phenol, carbolic acid etc	body openings into the surrounding soil. Methods of Carcass disposal to be adopted Burial Burning Composting Vulturing s. Health Camp after the drought: Protection of livestock from out breaking and communicable diseases be made. Health camps are to be organised in drought affected areas to restore the normal breeding capability of breedable population as well as to restore the normal health of livestock and poultry.
Cyclone	Not Applicable		
Heat wave and cold wave	Not Applicable		

based on forewarning wherever available

2.5.2 Poultry

	Suggested contingency measures			Convergence/linkages with ongoing programs, if any
	Before the event ^a	During the event	After the event	
Drought				
Shortage of feed ingredients				
Drinking water				
Health and disease management	Vaccines to be used for different animals and Poultry			

	<p>Cattle and Buffalo Hemorrhagic Septicemia Vaccine Black Quarter Vaccine FMD Vaccine Anthrax Vaccine as per endemicity.</p> <p style="text-align: center;">Sheep and Goat</p> Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity <p style="text-align: center;">Pigs</p> Hemorrhagic Septicemia Vaccine PPR Vaccine FMD Vaccine Goat pox Vaccine Enterotoxemia Vaccine Anthrax Vaccine as per endemicity. <p style="text-align: center;">Poultry</p> Mareks disease vaccine RDV (F ₁ & R ₂ B), FPV, IBRV & IBDV <ul style="list-style-type: none"> • Medicines • Mobile Veterinary Clinics Mobile Veterinary Clinics should be kept ready at Veterinary Hospital or Veterinary Camps so that immediate treatment of injured and affected animals may be done.			
Cyclone				
Heat wave and cold wave				

^a based on forewarning wherever available

	Suggested contingency measures		
	Before the event ^a	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	(i) Partial harvesting (ii) Addition of water (iii) Stocking of air breathing fishes	(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 (iii) Addition of water from external resource	(i) Arrangement of aeration. (ii) Addition of water <ul style="list-style-type: none"> • Monitoring of water quality • Reduction of manuring according to water level. 	
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	-Retain the water in pond immediately after flood through repairing of damaged dyke etc. -Netting of pond -Removal of unwanted, predatory/weed fishes -Sell of large size fishes
(ii) Water contamination and changes in water quality	Arrangement of regular water quality monitoring		
(iii) Health and diseases	(a) Use lime/ potassium permanganate (b) Arrangement of CIFAX and medicines & chemical stock		-Sampling of fishes and water for disease analysis - Liming, use of drugs/ medicine if required in consultancy of fisheries

			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 fingerling/ yearlings for stocking	Stocking of large size fingerlings carp 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.	A regular water on the flood and infrastructure facilities.	Re establishment of the infra structural facility.
3. Cyclone / Tsunami			
4. Heat wave and cold wave			

^a based on forewarning wherever available