

State: Bihar
Agriculture Contingency Plan for District: Supaul

KRISHI VIGYAN KENDRA, SUPAUL (RAGHOPUR)

1.0 District Agriculture profile				
1.1	Agro-Climatic/Ecological Zone			
	Agro Ecological Sub Region (ICAR)	Eastern Plain, Hot Subhumid (moist) Eco-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 or part thereof falling under the NARP Zone	Sharsha, Madhepura, Supaul, Purnea, Araria, Kishanganj, Katihar, Khagaria and Naugachhia sub division of Bhagalpur district		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		25 ^o 37' N to 26 ^o 32' N	86 ^o 22' E to 87 ^o 90' E	49 m
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	RRS, Agwanpur (Saharsa)		
	Mention the KVK located in the district	KVK Supaul		
Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	BAC, SABOUR			

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset	Normal Cessation
	SW monsoon (June-Sep)	1294.3	67	3 rd week of June	1 st week September
	NE Monsoon(Oct-Dec)	82.6			
	Winter (Jan- Feb)	0.0			
	Summer (March -May)	73.1			
	Annual	1450			

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)	238.6	146.6	0.6	50.5	0.3	21.9	3.0	14.5	14.5	1.5

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Sandy Soils	79.274	38.77
	Coarse Sandy Loam Soils	88.53	43.29
	Fine Sandy Loam Soils	33.47	16.37
	Saline/ Calcareous Soils	3.217	1.57

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	146.6	173%
	Area sown more than once		
	Gross cropped area	254.1	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	60.5		
	Gross irrigated area			
	Rainfed area	86.1		
	Sources of Irrigation	Number	Area ('000 ha)	Percentage of total irrigated area
	Canals		120.3	33.6
	Tanks		1.4	2.4
	Open wells		1.3	2.2
	Bore wells		24.1	39.8
	Lift irrigation schemes			

	Micro-irrigation			
	Other sources		11, 145	18.4
	Total Irrigated Area		60.545	
	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			
	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 latest figures)

1.7	Major field crops cultivated	Area ('000 ha)							
		Kharif			Rabi			Summer	Grand total
		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total		
	Rice			80				17	97
	Wheat						62		62
	Maize			7.5				8.5	16
	Oilseeds								5.5
	Pulses								32
	Barley						0.2		0.2

	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed
	Mango	1.1		

	Guava	0.4		
	Banana	0.5		
	Litchi	0.1		
	Coconut	0.7		
	Horticulture crops - Vegetables	Total	Irrigated	Rainfed
	Potato	0.2		
	Cauliflower, Brinjal, Cabbage	0.2		
	Medicinal and Aromatic crops	Total	Irrigated	Rainfed
	Mentha	0.4		
	Plantation crops	Total	Irrigated	Rainfed
	Fodder crops	Total	Irrigated	Rainfed
	Total fodder crop area			
	Grazing land			
	Sericulture etc			

1.8	Livestock	Male ('000)	Female ('000)	Total
	Non descriptive Cattle (local low yielding)	201	152	353
	Crossbred cattle	0.13	0.6	0.73
	Non descriptive Buffaloes (local low yielding)	14	91	105
	Graded Buffaloes			
	Goat			395
	Sheep			
	Others (Pig)			76
	Commercial dairy farms (Number)			
1.9	Poultry	No. of farms	Total No. of birds ('000)	
	Commercial		196	
	Backyard		185	
1.10	Fisheries (Data source: Chief Planning Officer)			
	A. Capture			
	i) Marine (Data Source: Fisheries)	No. of fishermen	Boats	Nets

Department)		Mechanized	Non-mechanized	Mechanized (Trawl nets, Gill nets)	Non-mechanized (Shore Seines, Stake & trap nets)	(Ice plants etc.)
ii) Inland (Data Source: Fisheries Department)	No. Farmer owned ponds	No. of Reservoirs		No. of village tanks		
	447	594		147		
B. Culture						
		Water Spread Area (ha)	Yield (t/ha)		Production (tons)	
i) Brackish water (Data Source: MPEDA/ Fisheries Department)		1542.1	3.2		1944.6	
ii) Fresh water (Data Source: Fisheries Department)						

1.11 Production and Productivity of major crops (Average of last 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	160	2000			62.9	3700	222.9	2850	
	Wheat			173.6	2800			173.6	2800	
	Maize			33.7	4500	29.7	3500	63.5	4000	
	Pulses							29.2	930	
	Oil seeds							4.63	8.09	
Major Horticultural crops (Crops identified based on total acreage)										
	Mango							0.9	800	
	Banana							1.7	3400	
	al, Cauliflower, Cabbage etc							0.3	1690	

1.12	Sowing window for 5 major field crops (start and end of normal sowing period)	Rice	Wheat	Jute	Green gram	Summer / Boro Rice
	Kharif- Rainfed	June - July	-	-	March-April	-
	Kharif-Irrigated	June - July	-	April-May	-	-
	Rabi- Rainfed	-	-	-	-	-
	Rabi-Irrigated	-	2 nd week of November – 4 th week of December	-	2 nd week of November – 2 nd week of December	-
	Summer-Irrigated	-	-	-	2 nd week of March – 1 st week of April	December -February

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: No
		Soil map as Annexure 3	Enclosed: Yes

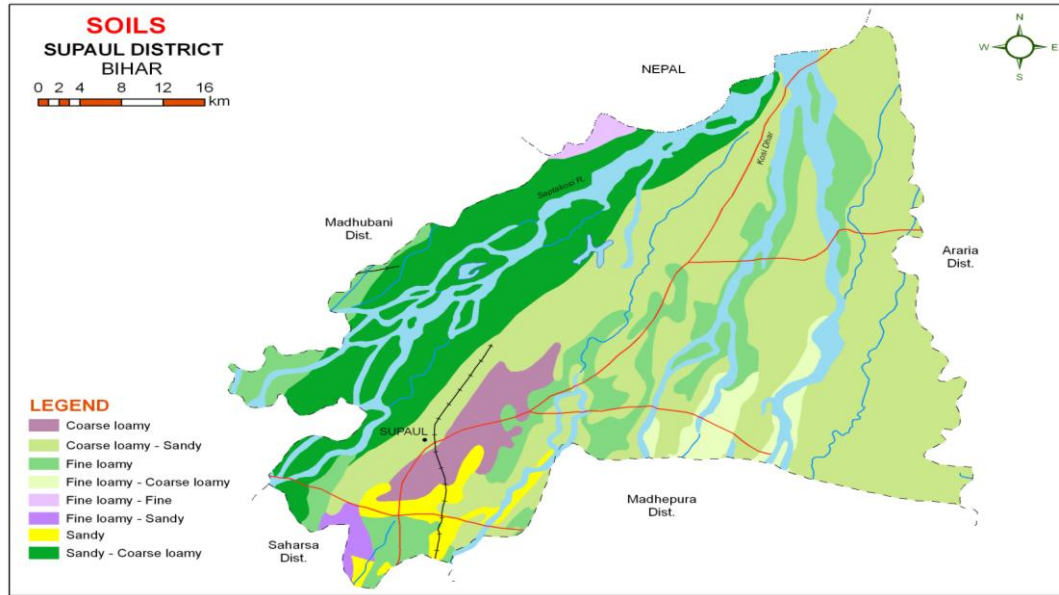
Annexure I

Agro climatic Zones of Bihar



Source: krishi.bih.nic.in

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 shallow red soils	Pigeonpea	Pigeonpea Pigeonpea – Narendra Arhar-I Bahar, Pusa-9	-	-
	Upland heavy loamy soils	Rice-Wheat Rice-Maize	Rice – Wheat Rice- Prefer Short duration varieties	<ul style="list-style-type: none"> • Adopt normal package of practices • Interculture for timely weed control in direct seeded rice 	
	Medium land	Rice- Wheat Rice-Maize	Rice-Wheat Rice- Prefer medium duration varieties Rice - Rajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130140d), Rajendra Suwasni, Rajshree (140d),		
	Shallow Lowland	Rice – Wheat	Rice – Wheat Rice- Prefer Long duration varieties Rice- Rajshree (140dMahamaya (125-130d), Satyam, Kishori ‘ Swarna sub-1		

	Deep Lowland	Deep water Rice – Boro rice	Sudha, Vaidhehi Gautam,Prabhat.	<ul style="list-style-type: none"> Adopt normal package of practices 	
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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 4 weeks 3 rd week of July	Upland shallow red soils	Pigeonpea	Pigeonpea – Greengram Pigeonpea–Bahar, Pusa-9 Narendra	-	- Seeds from BAU, Sabour, NSC, TDC, BRBN etc.
	Upland heavy loamy soils	Rice-Wheat Rice-Maize	Rice – Wheat Rice- Prefer Short duration varieties	<ul style="list-style-type: none"> Direct seeding of rice with medium duration drought tolerant varieties with pre emergence herbicide application under sufficient soil moisture conditions Interculture for timely weed control in direct seeded rice 	
	Medium land	Rice- Wheat Rice-Maize	Rice-Wheat Rice- Prefer medium duration varieties Rice - Rajendra sweta (135-140d), Rajendra mahsuri (140-150 days), Sita (130140d), Rajendra Suwasni, Rajshree (140d),	<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 	
	Shallow Lowland	Rice – Wheat	Rice – Wheat Rice- Prefer Long duration		

			varieties Rice- Rajshree (140dMahamaya (125-130d), Satyam, Kishori ‘ Swarna sub- 1	quick availability of young seedlings for transplanting of medium duration varieties by first fortnight of August in mid and low lands	
	Deep Lowland	Deep water Rice – Boro rice	Sudha, Vaidhehi Gautam,Prabhat.	<ul style="list-style-type: none"> • Raise staggered community nursery preferably with long duration varieties in lowlands • Transplant with 30-35 days old seedling may be used with 3-4 seedling per hill with close spacing. • Napier,Jowar,Maize cultivation for fodder in low land • Timely interculture for weed control in direct seeded rice 	

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 6 weeks 1 st week of August	Upland heavy loamy soils	Rice-Wheat	Rice – Wheat Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant Blackgram-30 , Pant Blackgram-19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1 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)	<ul style="list-style-type: none"> • Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions • Life saving irrigation 	Seeds from BAU, Sabour, NSC, TDC , BRBN etc.

	Medium land	Rice – Wheat	Blackgram/ Finger millet-Wheat Blackgram- T-9, Navin, Pant urd-30 , 19 Finger millet- DB-7, BR-5, BR-10, Coimbatore-1	<p>-</p> <ul style="list-style-type: none"> • 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 • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions • Life saving irrigation 	
		Rice – Wheat	Rice (Short duration)-Wheat Rice- Prabhat, Dhanlaxmi, Richharia, Turanta Saroj		
	Lowland	Rice + Greengram	Rice (Short Duration)-Wheat Rice- Rajshree, Santosh , Sita,Rajendra Suwasni, Rajendra Sweta, 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		
	Deep Lowland	Deep water Rice – Boro rice	Sudha, Vaidhehi Gautam,Prabhat.		

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 8 weeks 3 rd week of August	Upland shallow to heavy soils	Rice-Wheat	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)	<ul style="list-style-type: none"> • Moisture conservation • Inter cultivation • Sowing of <i>rabi</i> crops such as Wheat, Lentil, Chickpea, Pea, Mustard (Pusa Mahak, RAU TS17), Linseed (Garima) and Vegetables 	Seeds from BAU, Sabour, NSC, TDC , BRBN etc.
	Medium land	Rice-Wheat	Direct seeded rice (DSR) with short duration (80-90 days) varieties (Turanta dhan, Prabhat, Anjali, Vandana, CR-Dhan-40 etc.) can be taken up in midlands till the end of August subject to availability of at least one assured irrigation Early Rice-Prabhat, Dhanlaxmi, Richharia, Turanta	<ul style="list-style-type: none"> • Direct/Drum 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. 	
	Lowland	Rice- Potato	Rice-Potato/Wheat Rice- Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta	<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 	

		Rice-Wheat-Green gram	Sept. Pigeonpea-Greengram Pigeonpea – Bahar, Pusa-9 Narendra Arhar-I	<ul style="list-style-type: none"> with close planting (40-45 hills per square meter) Application of organic manure and vermi compost initially for Rice and other crops. 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 	
			Sesame-Rabi maize Sesame – Krishna, Pragati		

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.	1. Upland	Rice-Wheat/ Chickpea	<ul style="list-style-type: none"> Gap filling through Dapog nursery Intensive weed management Life saving irrigation 	<ul style="list-style-type: none"> Interculture Mulching for moisture conservation Conservation tillage, 	Seeds from BAU, Sabour, NSC, TDC , BRBN etc.
	Deep, gray sandy soil	Rice-Prabhat			
	2. Medium land	Rice-Wheat /Jute			
	Deep, gray sandy soil	Rice- Prabhat, R. Mahsuri, MTU, 1010, R. Bhagwati			
	3.Low Land	Rice-Wheat			
	Dark grayish brown loamy soil	Rice- MTU-1001, Rajshree, Swarna sub-1			

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	1. Upland Deep, gray sandy soil	Rice-Wheat/ Chickpea Rice-Prabhat	<ul style="list-style-type: none"> • Gap filling through Dapog nursery • Intensive weed management • Life saving irrigation, 	<ul style="list-style-type: none"> • Inter culturing, • Mulching for moisture conservation • Conservation tillage 	
	2. Medium land Deep, gray sandy soil	Rice-Wheat /Jute Rice- Prabhat, R. Mahsuri, MTU, 1010, R. Bhagwati			
	3.Low Land Dark grayish brown loamy soil	Rice-Wheat Rice- MTU-1001, Rajshree, Swarna sub-1			

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)					
At flowering/ fruiting stage	1. Upland Deep, gray sandy soil	Rice-Wheat / Greengram Rice (Prabhat)	<ul style="list-style-type: none"> • Gap filling • Life saving irrigation, • Foliar spray with (1%) Urea 	<ul style="list-style-type: none"> • Inter culturing • Mulching • Conservation tillage • Foliar spray with (1%) MOP 	
	2. Medium land Deep, gray sandy soil	Rice-Wheat / Chickpea Rice : Prabhat, MTU 1010, R. Mahsuri, R. Bhagwati			
	3.Low Land Dark grayish brown loamy soil	Rice-Wheat /Jute / Chickpea Rice-R. Mahsuri, MTU 1010, Rajshree			

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Crop management	Rabi Crop planning	Remarks on Implementation
Terminal drought (Early withdrawal of monsoon)					
	Upland Medium land Low Land	Rice-Wheat Rice (Prabhat)-Wheat (K9107) -Green gram (Local)	<ul style="list-style-type: none"> • Gap filling • Life saving irrigation, • Foliar spray with (1%) Urea 	Plan to sow early rabi crop like Sweet potato, Toria (RAUTS 17), Early Potato, Yam bean	Seeds from BRBN, RAU, Pusa, NSC, TDC

				etc.	
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2.1.2 Drought - Irrigated situation

Condition	Suggested Contingency measures				Remarks on Implementation
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	
Delayed/Limited release of water in canals due to low rainfall	1. Up land	Rice –Wheat	Rice- Toria/ Wheat Rice (Short Duration)- Prabhat, Dhanlaxmi	<ul style="list-style-type: none"> Direct seeding of short duration Rice Puddling and Life saving irrigation through tubewell 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	2 Medium land	Rice-Wheat Jute + Greengram- Rabi Maize	1. Sesame (Krishna) –Maize (Hybrid) / Wheat 2.Early potato- Mentha	<ul style="list-style-type: none"> Puddling and Life saving irrigation through tubewell Application of micro irrigation system especially sprinkler irrigation to save ground water. 	
	3. Low land	Rice-Wheat- Greengram	Rice Rice – MTU 1010, Rajshree, Swarna sub-I, Wheat-NW 2036, DBW-14	<ul style="list-style-type: none"> Directed seeded Rice and wheat through zero tillage cum seed drill to save irrigation water Dapog nursery Puddling of Rice by canal/tubewell water. 	

Condition	Suggested Contingency measures				Remarks on Implementation
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	
Non release of water in canals under delayed onset of monsoon in catchment	1. Up land	Rice-Wheat- Greengram	1.Rice -Late sown W heat 2. Short duration Rice –Toria (RAUTS 17)-Mentha	<ul style="list-style-type: none"> Direct seeded Rice and wheat thresh zero till cum seed drill to save time and irrigation water. Transplanting of Rice by irrigation water from tube well Use of sprinkler irrigation for wheat, toria etc. Pudding for transplanting by tube well 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	2 Medium land	Rice-Wheat-Jute- Greengram	1. Sesame (Krishna) –Maize (Hybrid) / Wheat 2.Early potato- Mentha	<ul style="list-style-type: none"> Life saving irrigation through tube well Application of micro irrigation system especially sprinkler irrigation to save 	

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
				<ul style="list-style-type: none"> ground water. Puddling and Life saving irrigation through tubewell 	
3. Low land	Rice-Wheat-Greengram	Rice	Rice – MTU 1010, Rajshree, Swarna sub-I, Wheat-NW 2036, DBW-14	<ul style="list-style-type: none"> Directed seeded Rice and Wheat through zero tillage cum seed drill to save irrigation water Dapog nursery Puddling of Rice by canal/tube well water. 	
	Fallow-Boro/ Summer Rice	Kharif Rice (Swarana sub-I) - Boro/ Summer Rice			

Condition	Suggested Contingency measures				
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	1. Up land	Rice-Wheat-Green gram	<ol style="list-style-type: none"> Rice (Prabhat) -Late sown Wheat Short duration Rice –Toria (RAUTS 17)-Mentha 	<ul style="list-style-type: none"> Transplanting of Rice by irrigation water from tube well Life saving irrigation Puddling of Rice for transplanting by tube well 	Seeds from BRBN, RAU, Pusa, NSC, TDC
	2 Medium land	Rice-Wheat-Jute-Greengram	<ol style="list-style-type: none"> Sesame (Krishna) –Maize (Hybrid) / Wheat Early potato- Mentha 	<ul style="list-style-type: none"> Life saving irrigation through tubewell Application of micro irrigation system especially sprinkler irrigation to save ground water. Puddling of Rice for transplanting by tube well 	
	Low land	Rice-Wheat-Green gram	Change in variety of Rice – MTU 1010, Rajshree, Swarna sub-I, Wheat-NW 2036, DBW-14	<ul style="list-style-type: none"> Directed seeded Rice and wheat through zero tillage cum seed drill to save irrigation water Dapog nursery Puddling of Rice by canal/tube well water. 	
		Fallow-Boro/ Summer Rice	Kharif Rice (Swarana sub-I) - Boro/ Summer Rice	<ul style="list-style-type: none"> Directed seeded Rice Dapog nursery SRI transplanting 	

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
				<ul style="list-style-type: none"> • Puddling of Rice by canal/tube well water. • Brown manuring

Condition	Suggested Contingency measures			
	Major Farming situation	Normal Crop/cropping system	Change in crop/cropping system	Agronomic measures
Insufficient groundwater recharge due to low rainfall	1. Up land	Rice-Wheat	<ul style="list-style-type: none"> • Rice(Prabhat)-Late sown wheat • Sesame (Krishna)-Wheat / Toria- Mentha • Pigeonpea (Pusa-9) 	<ul style="list-style-type: none"> • Direct seeding of Rice and wheat to save time and irrigation water • Need based use of tubewell water in puddling and subsequent irrigation of Rice crop. • Use of sprinkler method of micro irrigation in wheat, sesame etc. to save water
	2 Medium land	Rice-Wheat- Jute	Sesame –Maize Sesame-Wheat-Jute	<ul style="list-style-type: none"> • Mulching for moisture conservation
	3. Low land	Rice-Wheat-Green gram	Rice-Wheat Change in variety of Rice – MTU 1010, Rajshree, Swarna sub-I, Wheat-NW 2036, DBW-14	<ul style="list-style-type: none"> • Directed seeded Rice and wheat through zero tillage cum seed drill to save irrigation water • Use Dapog nursery seedlings • Puddling of Rice by canal/tube well water.
		Fallow-Boro/ Summer Rice	Kharif Rice (Swarana sub-I) - Boro/ Summer Rice	<ul style="list-style-type: none"> • Directed seeded Rice • Use Dapog nursery seedlings • SRI transplanting • Puddling of Rice by canal/tube well water. • Brown manuring
Remarks on Implementation Seeds from BRBN, RAU, Pusa, NSC, TDC				

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 • Gap filling. • Re transplanting through Dapog nursery 	<ul style="list-style-type: none"> • Drainage management • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Harvest the crop at physiological maturity • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Shiffing and drying the grain at safe place • Keep dried grain in air tight container alongwith celphos tab. • Keep dried grain meant for seed after mixing methyl parathion, in air tight container.
Maize	<ul style="list-style-type: none"> • Gap filling • Drainage management 	<ul style="list-style-type: none"> • Drainage management • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Harvest the crop at physiological maturity • Alternative crops if totally damaged 	
Wheat				
Horticulture				
Bhendi, Brinjal, Chilli, Tomato, Cucurbits	<ul style="list-style-type: none"> • Drainage management • Soil drenching with <i>trichoderma viridae</i> to avoid wilting • Resowing, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Soil dranding with <i>trichodera viridae</i> to amid wilting • alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management, • Alternative crops if totally damaged. 	Storage at safe place
Heavy rainfall with high speed winds in a short span²				
Rice	<ul style="list-style-type: none"> • Drainage management • Alternative crops if totally damaged • Replanting • Gap filling 	<ul style="list-style-type: none"> • Drainage management, • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management • Harvest the crop at physiological maturity • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Shiffing and drying the grain at safe place • Keep dried grain in air tight container along with celphos tab. • Keep dried grain meant for seed after mixing methyl parathion, in air tight container.
Maize & Wheat	<ul style="list-style-type: none"> • Drainage management for excess water 	<ul style="list-style-type: none"> • Drainage management, • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management, • Alternative crops if totally damaged 	
Horticulture				
Bhendi, Brinjal, Chilli, Tomato, Cucurbits	<ul style="list-style-type: none"> • Drainage management • Soil drenching with <i>trichoderma viridae</i> to avoid wilting • Resowing, if completely damaged 	<ul style="list-style-type: none"> • Drainage management • Soil dranding with <i>trichodera viridae</i> to amid wilting • alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage management, • Alternative crops if totally damaged. 	Storage at safe place
Outbreak of pests and diseases due to unseasonal rains				
Rice	❖ Seedling treatment with granular insecticide – Cartap hydrochloride	❖ Use copper fungicides against Bacterial leaf blight.	❖ Harvest at physiological maturity	<ul style="list-style-type: none"> • Shiffing and drying the grain at safe place

	<p>or phorate 10G or carbofuran 3G.</p> <ul style="list-style-type: none"> ❖ Maintain shallow water in nursery beds ❖ Providing good drainage. 	<ul style="list-style-type: none"> ❖ Split application of N fertilizer (3-4 times) 		<ul style="list-style-type: none"> • Keep dried grain in air tight container alongwith celphos tab. • Keep dried grain meant for seed after mixing methyl parathion, in air tight container.
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 	
Horticulture				
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. 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</p>

(0.3%) is more effective.

2.3 Floods

Condition	Suggested contingency measures			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Transient water logging/ partial inundation¹				
Rice	<ul style="list-style-type: none"> • Drainage Management • Re sowing through Dapog nursery, 	<ul style="list-style-type: none"> • Drainage Management • Alternative crops if totally damaged • Gap filling • 40-45 days old seedlings may be used, • Kharuhan (double transplanting) 	<ul style="list-style-type: none"> • Harvest at physiological maturity • Lentil as paira crop. 	Storage at safe place
Maize	<ul style="list-style-type: none"> • Drainage Management • Re sowing if substantially damaged 	<ul style="list-style-type: none"> • Drainage Management • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Harvest at physiological maturity 	Storage at safe place
Wheat	<ul style="list-style-type: none"> • Drainage management 	<ul style="list-style-type: none"> • Drainage management 	Harvest at Physiological maturity	Storage at safe place
Horticulture				
Bhendi	<ul style="list-style-type: none"> • Drainage Management • Re transplanting • Spray metalaxyl 2gm/lt to check damping off 	<ul style="list-style-type: none"> • Drainage Management • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage, alternative crops if totally damaged • Drainage Management • Alternative crops if totally damaged 	Storage at safe place
Brinjal	<ul style="list-style-type: none"> • Drainage Management 	<ul style="list-style-type: none"> • Drainage Management • Alternative crops if totally damaged 	<ul style="list-style-type: none"> • Drainage Management • Alternative crops if totally damaged 	Storage at safe place
Continuous submergence for more than 2 days	Not Applicable			
Sea water intrusion	Not Applicable			

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

Extreme event type	Suggested contingency measure ^r
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	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave^p				
Rice	Provide irrigation	Provide irrigation		
Maize	Provide irrigation	Provide irrigation		
Horticulture				
Bhendi			Provide irrigation	
Brinjal			Provide irrigation	
Chili			Provide irrigation	
Tomato			Provide irrigation	
Cucurbits			Provide irrigation	
Cold wave^q				
Wheat		Provide irrigation, Mulching	Provide irrigation	
Maize		Provide irrigation, Mulching		
Lentil		Provide irrigation, Mulching		
Horticulture				
Bhendi		Provide irrigation, Mulching		
Brinjal		Provide irrigation, Mulching		
Chili		Provide irrigation, Mulching		
Tomato		Provide irrigation, Mulching		
Lauki		Provide irrigation, Mulching		
Frost				
Wheat		Provide irrigation, Mulching		
Chickpea		Provide irrigation, Mulching		
Pigeonpea		Provide irrigation, Mulching		
Lentil		Provide irrigation, Mulching		
Horticulture				
Bhendi		Provide irrigation, Mulching		
Brinjal		Provide irrigation, Mulching		
Chilli		Provide irrigation, Mulching		
Tomato & Potato				
Lauki		Provide irrigation, Mulching		
Hailstorm				

Cyclone				
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2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	<i>Suggested contingency measures</i>		
	<i>Before the event</i>	<i>During the event</i>	<i>After the event</i>
Drought			
Feed & fodder availability	Silage making of leguminous and Non leguminous fodder	Feeding of unconventional livestock feed such as Karanj cake, leaves of trees , Urea treated straw	Feeding of leaves of subabul etc, Urea-molasses feeding
Drinking water	Recharge the ponds with fresh water	Provides animal water from well, Tube well , Hand pump, etc	provide water from hand pump, tube well etc.
Health & disease management	Give vaccine for tick borne diseases like thalaria	Check the population of tick, fleas, mosquito by keeping the environment clean & disinfected by chemicals, fumigation in barn.	Take care about he disease spread by tick, mites, fleas etc.
Floods			
Feed & fodder availability	Hay making of grasses & fodders.	Feeding the animals with tree leaves like subabul, Banana etc. and Urea molasses	Dry the greens then feed it, Do not feed animals mouldy fodders.
Drinking water	Hand pump and tube well should be on higher places	Drink the animals always fresh water, running water, not stagnant water	Drink the animals running water, water from hand pump, tube well
Health & disease management	Give vaccine for H.S., B.Q, Anthrax etc	De worm animals regularly special care for Fasciolosis (Liver fluke)	Do not graze the animals where snail population is more, control the snail population.
Cyclone			
Feed & fodder availability	Silage & hay making	feed animals silage or hay, urea molasses	Do not feed animals moist mouldy fodder, feed animals dry fodder
Drinking water	Pump, hand pump at higher places	Always drink animals fresh water	Drink animals fresh or running water
Health & disease management	Provide animals proper housing.	Keep the animals in good quality house that shouldn't be damaged due to cyclone, in case of causality provide first aid immediately.	Provide proper treatment to injured animals, deep burial of dead animals and disinfect the environment with good quality disinfectants like bleaching powder etc.
Heat waves and cold waves			
Shade/ environment management	Construct animal house well ventilated and spacious with shady trees around.	In case of heat wave provide the animals shade with kachcha roof, well ventilated. In cold wave protect the animals with clothing of jute etc. Proper bedding, protection from cold wind with jute carton etc provide	Provide well ventilated house with shady trees.

		warmth with fire	
Health & disease management	In case of heat wave Anthelmintic & Antiprotozoal drug must be provided, keep fleas & mosquito free environment.	In case of heat wave- Provide animals cool places & keep them cool by bathing twice, Protect from heat stroke by keeping them on cool places and do not allow them to graze during day time, feed animals light diet during cool time i.e. early morning & evening, regular feeding of digestive tonics	After heat wave :- Provide animals anti-stress drug keep environment clean, provide adequate nutrition & fresh water, feeding digestive tonics, after cold wave keep animals in sun light, Let them graze, Provide them quality concentrate.

2.5.2 Poultry

	Suggested contingent measures		
	Before the event	During the Event	After the events
Drought			
Shortage of feed ingredients	Maize is replaced by broken rice, Kodo, Sawan, Mustard cake replaced groundnut cake.	Small millets and molasses can replace cereals, mustard cake, saya bean meal cake can replace ground nut cake	Cotton seed cake, sun flower seed meal replace groundnut cake, Small millets can replace cereals.
Drinking water	Harvest water in water tanks with sanitation measures & use after proper disinfection of water	Give water 4 times in a day in earthen utensils, Water should be clean with beaching powder. Periodically provide electrol powder etc in water	Give fresh water in adlibdom.
Health & Disease Management	Vaccinate the stock with Fowlpox, Fowl cholera, Marex disease etc	Give sulpha drugs to check cholera, Amprolium, salts etc to check coccidiosis	Give Anti-stress drugs for cope up the condition, provide adequate feed & water
Floods			
Shortage of feed ingredients	Stock the cereals (Maize, Rice, Wheat bran etc) on higher places and Maize is replace by sorghum	Feed sorghum in place of maize, replace G/N cake by mustard or cotton seed cake, Fish meal can be replaced by Live residue meal.	Small millets can replace maize. Sunflower meal can replace g/n cake
Drinking water	Fresh water of hand pump or tube well of higher palace should be used	Disinfected fresh water should be given to birds, bleaching powdered water can be used	Fresh water with proper disinfection with carbofuran etc must be used.
Health & diseases management	Use de wormer regularly & vaccinate the birds with proper vaccine	Give de wormer periodically, vaccine of fowl cholera, Ranikhet disease must be given. Anti coccidial drug in preventive doses also be given.	Anti-stress and Multi vitamin and minerals must be given.
Cyclone			
Shortage of feed ingredients	Stock the cereals (Maize, Rice, Wheat bran etc) on higher places and Maize is replace by sorghum	Feed sorghum in place of maize, replace G/N cake by mustard or cotton seed cake, Fish meal can be replaced by Live residue meal.	Small millets can replace maize. Sunflower meal can replace g/n cake
Drinking water	Fresh water of hand pump or tube well of higher palace should be used	Disinfected fresh water should be given to birds, bleaching powdered water can be used	Fresh water with proper disinfection with carbofuran etc must be used.
Health & diseases management	Provide poultry proper housing.	Keep the birds in good quality house that shouldn't be damaged due to cyclone.	Provide proper treatment to injured birds, deep burial of dead birds and disinfect the environment with good quality disinfectants like bleaching

			powder etc.
Heat waves and cold waves			
Shade/ environment management	Construct poultry house well ventilated with shady trees around.	In case of heat wave the poultry house with straws on roof, well ventilated, windows with carton of jute soaked in water, if possible cool the house with cooler. In cold wave protect the poultry with carton of jute etc., provide warmth with electrical bulb or gas burner etc.	Provide well ventilated house with shady trees.
Health & disease management	In case of heat wave Anthelmintic & Antiprotozoal drug must be provided, keep fleas & mosquito free environment.	In case of heat wave- provide poultry cool places, Protect from heat stroke by keeping them in well ventilated places, feed birds moisten diet during cool time i.e. early morning & evening, regular feeding of digestive tonics and electoral powder	After heat wave :- Provide birds anti-stress drug keep environment clean, provide adequate nutrition & fresh water, feeding digestive tonics, after cold wave keep poultry with maximum light in house.

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
1) Drought			
A. Capture			
Marine			
Inland			
(i) Shallow water depth due to insufficient rains/inflow	Harvest the Indian & Exotic major Carps and stock the air breathing fish	Culture air breathing/hardy fish species	
(ii) Changes in water quality	water quality start deteriorating	water quality deteriorate, temperature increases and oxygen decreases	
B. Aquaculture			
(i) Shallow water in ponds due to insufficient rains/inflow	Harvest the Indian & Exotic major Carps and stock the air breathing fish	Culture air breathing/hardy fish species	Pond renovation/preparation
(ii) Impact of salt load build up in ponds / change in water quality	water quality deteriorate, temperature increases and oxygen decreases	water become heated, oxygen depletion	
2) Floods			
A. Capture			

B. Aquaculture			
(i) Inundation with flood water	Harvest the fishes as much as possible, check for outlets	Install net fencing to avoid escape of fishes	Increase the depth of the water body, install more outlet
(ii) Water contamination and changes in water quality	Stock hardy fish species, maintain proper slope	Remove bottom debris through outlet	maintain proper slope
(iii) Health and diseases	Feed probiotic feed and apply disinfectant, avoid contamination	Remove, dead or infected fish	dry the water body properly, use disinfectant
(iv) Loss of stock and inputs (feed, chemicals etc)	Reduce stocking density, harvest big fishes	harvest fishes	Repair the damage
(v) Infrastructure damage (pumps, aerators, huts etc)	Reduce stocking density, harvest big fishes, remove organic matter from bottom	Install net fencing to avoid escape of fishes	Repair the damage
3.Cyclone			
4.Heat wave and Cold wave			