

State: - Bihar

Agriculture Contingency Plan for District: Vaishali

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 West Alluvial Plain Zone (BI-1)		
	List all the districts falling under the NARP Zone* (*>50% area falling in the zone)	Vaishali, Muzaffarpur, Saran, Siwan, Gopalganj, East & west Champaran, Sitamarhi, Sheohar, Darbhanga, Begusarai.		
	Geographic coordinates of district headquarters	Latitude	Longitude	Altitude
		25° 30 N	84° 85 E	58 meter msl
	Name and address of the concerned ZRS/ ZARS/ RARS/ RRS/ RRTTS	Tirhut College of Agriculture, Dholi, Muzaffarpur.		
	Mention the KVK located in the district with address	Krishi Vigyan Kendra, Hariharpur (Via- Rajauli), Hajipur, Vaishali- 844101		
	Name and address of the nearest Agromet Field Unit (AMFU, IMD) for agro-advisories in the Zone	District Agriculture Officer, Vaishali		

1.2	Rainfall	Normal RF(mm)	Normal Rainy days (number)	Normal Onset (specify week and month)	Normal Cessation (specify week and month)
	SW monsoon (June-Sep)	919	45	3 rd week of June	2 nd week of October
	NE Monsoon(Oct-Dec)	66	03		
	Winter (Jan- Feb)	6	03		
	Summer (Mar-May)	28	04		
	Annual	1014	55		

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)	201.7	150.2		29.3	0.4	5.4	4.5	1.9	10	

Source :- SREP,ATMA,Vaishali,2006 - 07.

1.4	Major Soils	Area ('000 ha)	Percent (%) of total
	Sandy Soils	4.312	2.42
	Coarse Sandy Loam Soils	26.413	14.85
	Fine Sandy Loam Soils	14.552	8.18
	Clayey Soils	49.654	27.93
	Saline/ Calcareous Soils	82.866	46.61

1.5	Agricultural land use	Area ('000 ha)	Cropping intensity %
	Net sown area	150.2	135%
	Area sown more than once	52.7	
	Gross cropped area	202.8	

1.6	Irrigation	Area ('000 ha)		
	Net irrigated area	39.8		
	Gross irrigated area	46.1		
	Rainfed area	110.3		
	Sources of Irrigation	-	Area ('000 ha)	Percentage of total irrigated area
	Canals		4550	-
	Tanks	-		-
	Open wells/shallow boring	-	4769/1790	-
	Bore wells	-	29558	-
	Lift irrigation schemes	-	1480	-
	Micro-irrigation			-
	Other sources	-	5738	-
	Total Irrigated Area		52.7	100%
	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	16	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 latest figures of 2007-08)

1.7	Major field crops cultivated	Area ('000 ha)			
		<i>Kharif</i>	<i>Rabi</i>		

		Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Summer	Grand total
	Rice		62.3	62.3					62.3
	Maize (<i>Kharif</i>)	17.7		17.7					17.7
	Pigeonpea		3.5	3.5					3.5
	Wheat				49.9		49.9		49.9
	Maize (<i>Rabi</i>)				13.7		13.7		13.7
	Sesame							0.05	0.05
	Blackgram							0.6	0.6
	Rai & Mustard					3.9	3.9		3.9

	Horticulture crops - Fruits	Area ('000 ha)		
		Total	Irrigated	Rainfed
	Mango	8.1		8.1
	Litchi	3.5		3.5
	Banana	2.8		2.8
	Guava	1.2		1.2
	Lemon	0.6		0.6
	Horticulture crops – Vegetables	Total	Irrigated	Rainfed

	Potato	13.5	13.5	
	Cauliflower	4.6	4.6	
	Tomato	3.7	3.7	
	Onion	1.6	1.6	
	Cabbage	2.4	2.4	
	Okra	3.5	3.5	
	Medicinal and Aromatic crops			
	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)			67.2
	Improved cattle			-
	Crossbred cattle			-
	Non descriptive Buffaloes (local low yielding)			91.4
	Descript Buffaloes			
	Goat			
	Sheep			
	Others (Camel, Pig, Yak etc.)			171.2

	Commercial dairy farms (Number)								
1.9	Poultry	No. of farms		Total No. of birds ('000)					
	Commercial	-		63.3					
	Backyard	-							
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			
		430		1105		667			
	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)			972.7		3.2		1817.5	

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	104	16	-	-	-	-	104	16	
	Maize	32.9	18	-	-	-	-	32.9	18	

Pigeonpea	3.5	10	-	-	-	-	3.5	10		
Wheat	-	-	130.8	26			130.8	26		
Maize	-	-	41.2	30			41.2	30		
Chickpea	-	-	1.8	10			1.8	10		
Pea	-	-	0.3	8			0.3	8		
Lentil	-	-	0.4	9			0.4	9		
Blackgram	-	-			364	6	364	6		
Sesame	-	-			20	4	20	4		
Rai & Mustard	-	-	2.6	6.6			2.6	6.6		
Major Horticultural crops (Crops identified based on total acreage)										
Mango	79.3	98	-	-	-	-	79.3	98		
Litchi	26.7	77	-	-	-	-	26.7	77		
Banana	119.4	412	-	-	-	-	119.4	412		
Guava	11.4	93	-	-	-	-	11.4	93		
Lemon	4.4	7798	-	-	-	-	4.4	7798		
Papaya	2.3	280	-	-	-	-	2.3	280		

1.12	Sowing window for 5 major field crops	Rice	Maize	Greengram	Wheat	Rai & Mustard
	Kharif- Rainfed	3 rd week of June	3 rd week of June	2 nd week of March-2 nd week of April	-	-
	Kharif-Irrigated 1. Upland	1 st week of July - 2 nd week of July	-	-	-	-
	2.Mid Land	2 nd week of June - 3 rd week of June				
	3.Lowland	3 rd week of May - 2 nd week of June				
	Rabi- Rainfed 1.Unirrigated	-	2 nd week of October- 3 rd week of November	-	3 rd week of October - 3 rd week of November	2 nd week of October - 4 th week of October

	Timely sown				3 rd week of November - 2 nd week of December	
	Late sown				2 nd week of December to 4 th week of December	
	Very late sown				1 st week of January to 2 nd week of January	
	Rabi-Irrigated	-	2 nd week of October to 3 rd week of November	-	2 nd week of November - 4 th week of November	2 nd week of Oct.– 4 th week of Oct.

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		√	
	Water logging (Due to impeded drainage condition)		√	

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 II	Enclosed: Yes
		Soil map as Annexure III	Enclosed: Yes

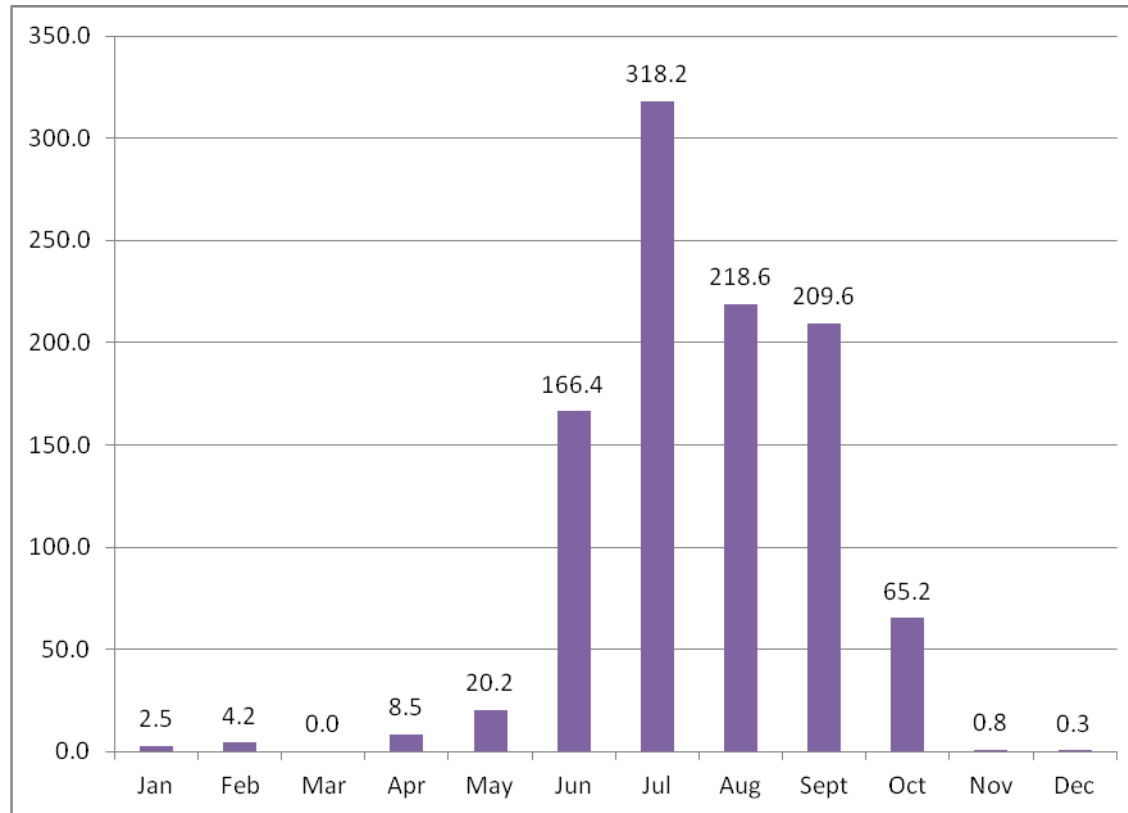
Annexure I

Agro climatic Zones of Bihar

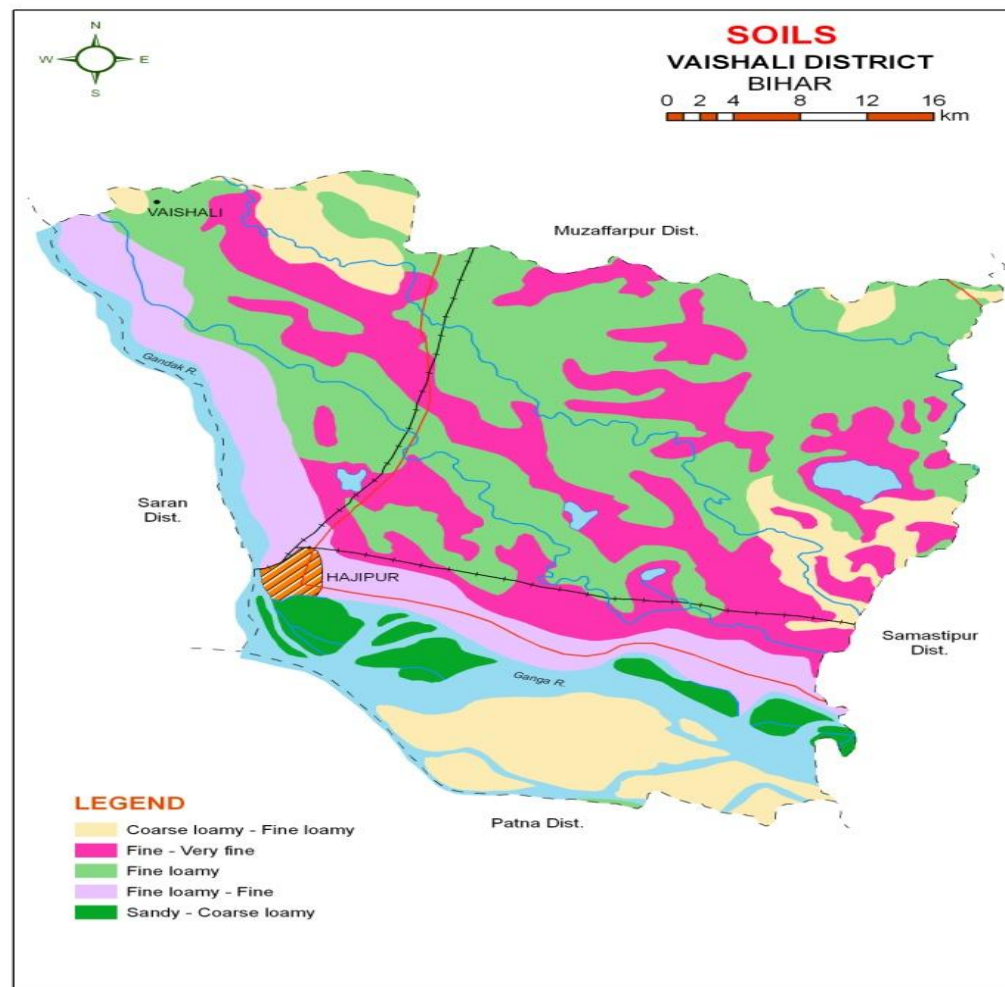


Source: krishi.bih.nic.in

Annexure-II



Annexure-III



Source : NBSS& LUP, Regional Centre, 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 ^c including variety	Agronomic measures	Remarks on Implementation
Early season drought (delayed onset) Delay by 2 weeks 1 st week of July	Upland Calcareous fine loamy soils	1.Rice-Wheat 2.Pigeonpea-Greengram	1. Rice – Wheat 2.Pigeonpea – Greengram	Normal package of Practices Direct sowing of rice	
	Medium land	1.Rice - Wheat	1.Rice – Wheat Prefer medium duration Rice		
	Lowland	1.Rice – Wheat	1.Rice – Wheat Prefer medium Medium to long duration Rice		

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 Calcareous fine loamy soils	Pigeonpea – Greengram	Pigeonpea – Greengram Pigeonpea–Bahar, Pusa-9 Narendra	-	Seeds from RAU, Pusa, NSC, TDC, BRBN etc.
		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	

				<p>management.</p> <ul style="list-style-type: none"> • Normal sowing of rice can be used with enhanced NPK to boost the early vegetative growth in late plantings under sufficient moisture • Interculture for timely weed control in direct seeded rice 	
	Medium land	Rice – Wheat	Rice-Wheat Direct sowing / 20d old dapog seedlings with medium to short duration varieties – BR34, Rajendra Dhan-201(130-135d), Rajendra Bhagwati,	<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 	
	Lowland	Rice – Wheat Makhana (in ponds) Var. local	Rice- Direct/ dapog seedlings with Rajshree, Santosh , Sita, Rajendra Suwasni, Rajendra Sweta, Swarna sub-1	<ul style="list-style-type: none"> • 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. • 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 <ul style="list-style-type: none"> • Timely interculture for weed control in direct seeded rice • Life saving irrigation 	
--	--	--	--	--	--

Condition	Major Farming situation ^a	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
Delay by 6 weeks 1 st week of August	Upland calcareous fine loamy soils	Pigeonpea-Greengram	Blackgram – T – 9, Navin, Pant Urd – 30, Pant Urd – 19 Finger Millet – DB – 7, BR- 5, BR – 10, Coimbatore – 1	Life saving irrigation	Seeds from RAU, Pusa, NSC, TDC, BRBN etc.
		1.Rice-Wheat	1.Early Rice – Wheat 2. Blackgram/Finger Millet-Wheat Blackgram – T – 9, Navin, Pant Urd – 30, Pant Urd – 19 Finger Millet – DB – 7, BR- 5, BR – 10, Coimbatore – 1 Rice – Prabhat, Dhanlaxmi, Richharia, Turanta	<ul style="list-style-type: none"> • Direct seeding of Rice • Application of fertilizers especially phosphorous and potash to be ensured under late transplanted conditions in severely affected districts Life saving irrigation	
	Medium land	1.Rice-Wheat	1.Rice (Short duration) – Wheat 2.Blackgram/Finger Millet-Wheat Blackgram – T – 9, Navin, Pant Urd – 30, Pant Urd – 19 Finger Millet – DB – 7, BR- 5, BR – 10, Coimbatore – 1	<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 	

				<p>duration varieties by first fortnight of August</p> <ul style="list-style-type: none"> • Direct seedling of Rice • 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 	
	Lowland	Rice-Wheat-Greengram (Greengram)	<p>1.Rice (Short duration) – Wheat 2.Rice – Vegetables 3.Rice – Pulses 4.Rice – Oilseeds</p> <p>Rice- Prabhat, Dhanlaxmi, Richharia, Turanta, Saroj</p> <p>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 25th August</p>		

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	Pigeonpea-Greengram	<p>Blackgram/Finger millet -Sep. Pigeonpea / Late Wheat/Lentil/ Potato/ Rai/ Mustard</p> <p>1.Sept. Pigeonpea- Greengram</p> <p>Sept. Pigeonpea – Pusa – 9, Sharad Arhar – 1</p>	<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 	Seeds from RAU, Pusa, NSC, TDC , BRBN etc

		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)	Vegetables	
	Medium land	Maize-Wheat	Sesame –Rabi maize/ Late Wheat Sesame – Krishna, Pragati	<ul style="list-style-type: none"> • 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 	
		Pigeonpea – Greengram	September Pigeonpea-Greengram Greengram – Samrat, Pusa Vishal, SML 668, PDM-44, T-44 Sept.Pigeonpea–Pusa-9, Sharad Narendra Arhar-I		

		Rice-Wheat	<p>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</p> <p>Early Rice-Prabhat, Dhanlaxmi, Richharia, Turanta</p>	<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 	
	Lowland	Rice- Potato	<p>Rice-Potato/Wheat</p> <p>Rice- Rajshree, Santosh , Sita Rajendra Suwasni, Rajendra Sweta</p>	<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	<p>with close planting (40-45 hills per square meter)</p> <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 	
			Sesame-Rabi maize Sesame – Krishna, Pragati		

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/crop stand etc.	Upland	1.Rice – Wheat	Gap filling of existing crop, Thinning Life saving irrigation,	Inter culturing, Mulching, Conservation tillage	Seeds from RAU, Pusa, NSC, TDC, BRBN etc.
	Calcareous fine loamy soils	Rice – Prabhat, Dhanlaxmi, Richharia, Turanta,			
		Medium land	1.Maize – Wheat		
			2.Pigeonpea – Greengram		
		Pigeonpea – Bahar, Pusa- 9, Narendra Arhar – 1			
	Lowland	1.Rice – Wheat – Greengram	Life saving irrigation, Gap filling through Dapog nursery seedlings		
		Rice – Rajshree, Santosh, Sita, Rajendra Sywasni, Rajendra Sweta			

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, consecutive 2 weeks rainless (>2.5 mm) period)					
At vegetative stage	Upland	1.Rice – Potato	Gap filling of existing crop, Postponement of top dressing of fertilizers	Inter culturing Mulching Conservation tillage Life saving irrigation Spray (1%) MOP on the crops	
		2.Rice – Wheat			
	Calcareous fine loamy soils	Pigeonpea – Greengram			
	Medium land	1.Rice – Wheat – Green gram			

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)	Upland Calcareous fine loamy soils	1.Rice – Wheat 2.Vegetables - Wheat		Inter culturing, Mulching, Conservation tillage, Life saving irrigation,	
	Medium land	1.Maize – Wheat	Clipping of maize leaves		
		Pigeonpea– Greengram Pigeonpea- Var. Bahar, Narendra - 1	Postpone the top dressing		
	Lowland	1. Rice – Wheat – Greengram	<ul style="list-style-type: none"> Postpone the top dressing Foliar application with 2% Urea 		

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 Calcareous fine loamy soils	1.Rice – Wheat	<ul style="list-style-type: none"> Foliar spray with (1%) Urea Mulching Life saving irrigation 	<ul style="list-style-type: none"> Foliar application with 2% Urea or MOP 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 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 	
	Medium land	1.Maize – Wheat			
	Lowland	1.Rice – Wheat – Greengram			

				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> .	
--	--	--	--	---	--

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					
Non release of water in canals under delayed onset of monsoon in catchment					
Lack of inflows into tanks due to insufficient /delayed onset of monsoon	Upland	1.Rice-Wheat 2.Rice - Oil seeds 3.Rice - Pulses 4.Rice - Rabi maize 5.Rice -Blackgram 6.Rice -Sesame	1.Short duration of Rice- Pigeon pea 2.Rice - Blackgram 3..Rice – Sesame	Mulching, Application of organic manure and vermi compost	
	Medium land	1.Rice-Wheat 2.Rice - Oil seeds 3.Rice - Pulses 4.Rice - Rabi maize	1.Short duration of Rice- Pigeonpea 2. Rice - Greengram 3.Blackgram- Wheat 4.Sesamum – Wheat		

Condition	Major Farming situation	Normal Crop/cropping system	Suggested Contingency measures		
			Change in crop/cropping system	Agronomic measures	Remarks on Implementation
	Lowland	1.Rice-Wheat 2.Rice - Oilseeds 3.Rice - Pulses	1.Short duration of Rice- Wheat - Lentil 2.Rice - Mustard 3.Rice – Linseed		
Insufficient groundwater recharge due to low rainfall	Upland	1.Rice- Wheat 2.Rice - Oilseeds 3.Rice - Pulses 4.Rice - Maize	1.Short duration of Rice- Pigeonpea 2.Rice - Blackgram 3.Rice – Sesamum	Direct sowing of rice, Life saving irrigation, Mulching, Application of organic manure and vermi compost	
	Medium land	1.Rice- Wheat 2.Rice - Oilseeds 3.Rice - Pulses 4.Rice - Maize	1.Short duration of Rice- Pigeonpea 2.Rice - Blackgram 3.Rice – Sesame		
	Lowland	1.Rice- Wheat 2.Rice - Oilseeds 3.Rice - Pulses 4.Rice - Maize	Short duration Rice- Wheat/Lentil/Mustard/Linseed	Use Dapog nursery seedlings for rice, Life saving irrigation, Mulching, Application of organic manure and vermicompost	

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	Provide drainage	Provide drainage		
Maize	Provide drainage	Provide drainage		
Pigeonpea	Provide drainage	Provide drainage		
vegetables	Provide drainage	Provide drainage		

Horticulture		Provide drainage		
Mango	Provide drainage	Provide drainage	Provide drainage	Safe storage and transportation
Litchi	Provide drainage	Provide drainage	Provide drainage	
Banana	Provide drainage	Provide drainage	Provide drainage	
Guava	Provide drainage	Provide drainage	Provide drainage	
Heavy rainfall with high speed winds in a short span²				
Rice	Replanting with Dapog seedling Gap filling, Kharuhan (double transplanting) method			
Maize	Earthing up			
Pigeonpea	Earthing up			
Vegetables	Grow nursery on raised bed and poly tunnel			
Horticulture				
Mango	Re planting	Provide wind break	Provide wind break	
Litchi	Re plantin	Provide wind break	Provide wind break	
Banana	Re planting	Provide wind break	Support with Bamboo plant	
Guava	Re planting	Provide wind break	Provide wind break	
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	❖ Use copper fungicides against Bacterial leaf blight. ❖ Split	❖ Harvest at physiological maturity	❖ Proper drying ❖ Storage at safe place and transportation

	<ul style="list-style-type: none"> ❖ nursery beds ❖ Providing good drainage. 	<ul style="list-style-type: none"> application of N fertilizer (3-4 times) 		
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</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</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>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</p>

	from healthy fruits. Use of wind-breaks helps in reducing brushing/ wounding and thus reduces the chance of infection.	(0.1%) during second week of December	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.	and burnt to avoid the spread for next season
Litchi	Fruit Fly: Monitor adult fruit flies emergence by using methyl eugenol or sex pheromone traps.	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	Harvest at proper time	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
Banana	Provide drainage	Provide drainage	Harvest at proper time	
Guava	Provide drainage	Provide drainage	Harvest at proper time	

2.3 Floods

Condition	Suggested contingency measures			
Transient water logging/ partial inundation ¹	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Rice	<ul style="list-style-type: none"> • Provide drainage • Re transplanting through Dapog nursery seedlings • Gap filling 	<ul style="list-style-type: none"> • Provide drainage • Gap filling • 40-45 days old seedlings may be used 	<ul style="list-style-type: none"> • Provide drainage • Harvest at physiological maturity • Lentil as paira crop can be taken 	Storage at safer place

		<ul style="list-style-type: none"> • Kharuhan (double transplanting) method 		
Maize	<ul style="list-style-type: none"> • Provide drainage , • Re sowing • Gap filling 	<ul style="list-style-type: none"> • Provide drainage 	<ul style="list-style-type: none"> • Provide drainage • Harvest at physiological maturity 	Storage at safer place
Pigeonpea	<ul style="list-style-type: none"> • Provide drainage • Re sowing • Gap filling 	<ul style="list-style-type: none"> • Provide drainage 	<ul style="list-style-type: none"> • Provide drainage • Harvest at physiological maturity 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	Judicious harvesting
Litchi	<ul style="list-style-type: none"> • Gap filling • Replanting • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	Judicious harvest
Banana	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	Judicious harvesting
Guava	<ul style="list-style-type: none"> • Replanting • Gap filling • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	<ul style="list-style-type: none"> • Drenching with copper fungicides • Provide drainage 	Judicious harvesting
Continuous submergence for more than 2 days²				
Rice	<ul style="list-style-type: none"> • Gap filling, • Re-sowing 	<ul style="list-style-type: none"> • Replanting through Kharuhan (double transplanting) by 3-4 seedlings per hill • Short duration rice variety 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Maize	<ul style="list-style-type: none"> • Re-sowing 	<ul style="list-style-type: none"> • Re sowing or gap filling 	<ul style="list-style-type: none"> • Toria/Late wheat if completely damaged 	Storage at safer place
Horticulture				
Mango	<ul style="list-style-type: none"> • Provide drainage 			
Guava	<ul style="list-style-type: none"> • Provide drainage 			
Banana	<ul style="list-style-type: none"> • Provide drainage 			
Sea water intrusion³	Not Applicable			

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

Extreme event type	Suggested contingency measurer			
	Seedling / nursery stage	Vegetative stage	Reproductive stage	At harvest
Heat Wave^p				
Maize	Provide irrigation	Provide irrigation	Provide irrigation	
Pigeonpea	Provide irrigation	Provide irrigation	Provide irrigation	
Wheat			Provide irrigation (Terminal heat)	
Horticulture				
Mango	Provide irrigation	Provide irrigation	Provide irrigation	
Litchi	Provide irrigation	Provide irrigation	Provide irrigation	
Papaya	Provide irrigation	Provide irrigation	Provide irrigation	
Cold wave^q				
Wheat		Provide irrigation , Mulching		
Maize		Provide irrigation , Mulching		
Mustard		Provide irrigation , Mulching		
Potato		Provide irrigation , Mulching		
Pulses		Provide irrigation , Mulching		
Horticulture				
Vegetables		Provide irrigation, Mulching		

Frost		Provide irrigation, Mulching		
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		Earthing up Provide irrigation , Mulching		Harvest in dry weather
Hailstorm	Not Applicable			

2.5 Contingent strategies for Livestock, Poultry & Fisheries

2.5.1 Livestock

	Suggested contingency measures		
	Before the event ^s	During the event	After the event
Drought			
Feed and fodder availability	Hay & silage-Storage of feed and fodder like Rice and wheat straw as per requirement	Stored fodder can be used as a feed. Tree leaf can also used as green fodder.	Urea molasses block can be used as a fodder .Hay should be stored for feed & fodder.

Drinking water	Clean water should be provided to the animals	Recycling of water	Storage of rain water for animal washing
Health and disease management	Mineral mixture should be given in the feed .	Precaution should be taken that animal should not graze harmful weeds	Deworming of animals with broad spectrum dewormer .
Floods			
Feed and fodder availability	Storage of feed and fodder like Rice and wheat straw as per requirement in fodder bank at upland.	Stored fodder can be used as a feed. Azolla can also used as green fodder.	Urea molasses block can be used as a fodder .Hay should be stored for feed & fodder.
Drinking water	Clean water should be provided to the animals	Clean water	Storage of rain water for animal washing
Health and disease management	Mineral mixture should be given in the feed .	Precaution should be taken that animal should not graze harmful breeds	Deworming of animals with broad spectrum dewormer .Disposal of dead animals /carcasses at appropriate place and scientifically
Cyclone			
Feed and fodder availability	Storage of feed and fodder like Rice and wheat straw as per requirement		Urea molasses block can be used as a fodder .Hay should be stored for feed & fodder.
Drinking water			Storage of rain water for animal washing
Health and disease management			Deworming of animals with broad spectrum de wormer .
Heat wave and cold wave			
Shelter/environment management		Animal should be protected from heat wave by avoiding day grazing and stall feeding . During cold wave animal should	

		be protected with gunny bag and proper housing.	
Health and disease management	Mineral mixture should be given in the feed .	During cold urea jaggery mixture should be used.	Deworming of animals with broad spectrum de wormer .Disposal of dead animals /carcasses at appropriate place and scientifically. Vaccination against HS,BQ and FMD

^s 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	Storage of poultry feed and maize as per requirement from market.	Stored poultry feed can be used.		
Drinking water	Clean water should be provided to the animals	Clean water should be provided to the poultry.		
Health and disease management	Mineral mixture should be given in the feed .	Precaution should be taken that poultry house is well ventilated and temperature is under control.	Mineral mixture should be provided in the poultry feed.	
Floods				
Shortage of feed ingredients	Storage of poultry feed and maize as per requirement from market.	Stored feed can be used as a feed. Azolla can also used as a poultry		

		feed.		
Drinking water	Clean water should be provided to the poultry.	Clean water should be provided to the poultry.	Clean water should be provided to the poultry.	
Health and disease management	Mineral mixture should be given in the feed .Anticoccidial drug should be used in the feed.	Mineral mixture should be given in the feed .Anticoccidial drug should be used in the feed.	Mineral mixture should be given in the feed .Anticoccidial drug should be used in the feed. Poultry house should be dry and clean	
Cyclone				
Shortage of feed ingredients	Storage of poultry feed and maize as per requirement from market.	Stored poultry feed can be used.		
Drinking water	Clean water should be provided to the animals	Clean water should be provided to the poultry.		
Health and disease management	Mineral mixture should be given in the feed .	Precaution should be taken that poultry house is well protected against cyclone.	Mineral mixture should be provided in the poultry feed.	
Heat wave and cold wave				
Shelter/environment management	Storage of poultry feed and maize as per requirement from market.	Stored feed can be used as a feed. Azolla can also be used as a poultry feed.		
Health and disease management	Clean water should be provided to the poultry.	Clean water should be provided to the poultry.	Clean water should be provided to the poultry.	

^a based on forewarning wherever available

2.5.3 Fisheries/ Aquaculture

	Suggested contingency measures		
	Before the event ^a	During the event	After the event
1) Drought			
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 a. Monitoring of water quality b. Reduction of manuring according to water level.	
2) Floods			
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